

FY 2003 YEAR-END

SELF-EVALUATION

REPORT

OAK RIDGE NATIONAL LABORATORY

MANAGED BY UT-BATTELLE FOR THE DEPARTMENT OF ENERGY

OAK RIDGE NATIONAL LABORATORY

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November 3, 2003

Mr. George J. Malosh
ORNL Site Manager
Department of Energy
Oak Ridge National Laboratory
Post Office Box 2008
Oak Ridge, Tennessee 37831-6269

Dear Mr. Malosh:

Contract DE-AC05-00OR22725, Oak Ridge National Laboratory's Self-Evaluation Report

Attached is a copy of the Oak Ridge National Laboratory's (ORNL) Self-Evaluation Report for the period from October 1, 2002, through September 30, 2003. The report chronicles an outstanding year in support of the Department of Energy's missions. The quality of our scientific agenda brought us major victories in the areas of nanoscience, genomics, and computational science. The Laboratory's modernization efforts moved from plans to reality as we completed three privately-funded facilities (the Research Office Building, the Computational Sciences Building, and the Engineering Technology Facility) and the Functional Genomics Laboratory, with construction starts on the Advanced Materials Characterization Laboratory, the Center for Nanophase Materials Sciences, the Research Support Center, and the Joint Institute for Computational Sciences/Oak Ridge Center for Advanced Studies facility. Our ES&H performance exceeded expectations this year; however, we remained concerned with our level of operational discipline. As a result of our outreach efforts, ORNL is viewed by the community as the region's premier supporter of math and science education. Perhaps most significant, we continued with the construction of the Spallation Neutron Source, maintaining our on-time, on-budget performance while compiling an exemplary safety record.

As you review the report, I encourage you to examine the scope of our progress over the last twelve months. Our commitment is to sustain this momentum in the coming year. If you have any questions, please contact Kelly Beierschmitt at 241-7600.

Sincerely,



Jeffrey Wadsworth
Director

JW:ajd

Attachment

Mr. George J. Malosh
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November 3, 2003

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FY 2003

Self-Evaluation Report

of the

Oak Ridge National Laboratory

October 17, 2003

EXECUTIVE SUMMARY

OVERVIEW

Oak Ridge National Laboratory (ORNL) made unprecedented progress toward its strategic objectives of excellence in science and technology; excellence in Laboratory operations and environment, safety, and health (ES&H); and excellence in community service during fiscal year (FY) 2003. Overall, on the basis of the evidence contained in this self-evaluation report, we conclude that the Laboratory's performance during the FY 2003 evaluation period has been "Outstanding."

This conclusion is based in large part on our self-evaluation against the measures and indicators documented in the FY 2003 Performance Evaluation Plan (PEP). The PEP, developed in partnership with our Department of Energy (DOE) customers, addresses the full scope of ORNL's programmatic and operational activities, and it is the primary means by which our performance rating is determined.

In evaluating ORNL's performance in FY 2003, however, we find that we must look beyond the measures and indicators of the PEP to gain a full understanding of both those areas in which we delivered exceptional performance and those in which we fell short of our own expectation of excellence.

We have made truly extraordinary progress in creating a modern research campus that enables the conduct of leading-edge research and development (R&D).

- The construction project for the Spallation Neutron Source (SNS) continues on schedule and on budget, with an exemplary safety record.
- The Secretary of Energy visited ORNL in August 2003 to participate in groundbreaking ceremonies for the Center for Nanophase Materials Sciences (CNMS), the first DOE Nanoscale Sciences Research Center.
- On ORNL's east campus, three new facilities constructed with private-sector funding, comprising 258,000 square feet of laboratory and office space, are now occupied by ORNL staff. Also under construction are a facility to house the Joint Institute for Computational Sciences and the Oak Ridge Center for Advanced Studies, funded by the state of Tennessee, and the DOE-funded Research Support Center.
- At the west end, the DOE-funded Laboratory for Comparative and Functional Genomics (LCFG) was completed on time and on budget, and planning funds for the Joint Institute for Biological Sciences were made available in the state budget.
- Construction of the Advanced Materials Characterization Laboratory (AMCL) has begun.

In summary, our vision of ORNL as a 21st century laboratory is rapidly becoming reality. While several of these items are addressed in PEP indicators, we believe that the measures in the PEP do not fully capture the positive impact of our accomplishments in revitalizing the Laboratory.

Our environmental, safety, and health (ES&H) performance exceeded expectations this year; no environmental violations, the lowest radiological dose in our 60-year history, and a 40% improvement in our standard safety metrics. In contrast, in the area of operational discipline, we are disappointed in our performance. While numerous actions have been taken to establish a culture that embraces a high level of operational discipline, we still had some breakdowns. These breakdowns are reflected in the performance indicators of the PEP; however, we believe that the measures in the PEP do not fully reflect the importance that we place on our shortcomings in this area.

On balance, however, we believe that our overall performance in FY 2003, evaluated against the PEP and the other information presented in this report, was indeed outstanding.

PERFORMANCE HIGHLIGHTS

Strategic Objective 1: Science and Technology

Our self-evaluation of ORNL's FY 2003 performance in science and technology yields a rating of "Outstanding." The following discussion highlights the achievements delivered to ORNL's primary DOE programmatic customers. Key issues raised by customers are also addressed.

Office of Science: Office of Basic Energy Sciences

The SNS, the nation's largest civilian science project, was at its construction peak during FY 2003, remaining on budget and ahead of schedule and completing all major accelerator facilities. Substantial progress was made in the procurement, testing, and commissioning of technical components, demonstrating the successful partnership of the six DOE laboratories engaged in this project. The front end, constructed by Lawrence Berkeley National Laboratory, was commissioned in December 2002, three months ahead of its milestone date, and beam was delivered through the first drift tube linac tank, constructed by Los Alamos National Laboratory, in August 2003. The SNS project met or exceeded all technical, cost, and schedule requirements during a year in which more than 2.5 million hours of construction work were completed with no lost work days and no environmental violations.

Substantial progress was made in upgrades of the HFIR, including the installation of three world-class triple-axis spectrometers. Three more world-class instruments are being installed at the HB-2 shielding tunnel, which was completed in March 2003. The small-angle neutron scattering guide hall building has been constructed, with beneficial occupancy realized in August 2003. A formal neutron scattering user program was implemented, and the first users began experiments in March 2003. To date, 73 users have run 58 experiments that take advantage of the HFIR's expanded capabilities.

CD-3 approval was received for the \$65 million CNMS, and work is under way to develop an interactive and productive nanoscience user community. The CNMS is the first of five Nanoscale Sciences Research Centers that the Office of Basic Energy Sciences (BES) is building to serve as the Nation's premier user centers for interdisciplinary research at the nanoscale. The CNMS will provide the basis for a national program that focuses the new science, new tools, and new computing capabilities at ORNL on the synthesis, characterization, theory/modeling/simulation, and design of nanoscale materials.

In a related effort to build a thriving CNMS scientific user community, the Laboratory organized a series of workshops to initiate a "jump start" user program. Topics included "Electronic, Atomistic, and Mesoscale Simulation Methods for Nanoscience." The workshops were well attended and included hands-on experience using the resources of the Center for Computational Sciences. The call for the "jump start" user program proved successful with the submission of more than seventy proposals for nanoscale science and technology research at ORNL.

Construction of the Advance Materials Characterization Laboratory (AMCL) began in August 2003. This facility will provide the environment that ORNL's high-resolution electron microscopes need in order to deliver the best possible performance, extending the capabilities of our present subangstrom-resolution instruments and supporting the aberration-corrected electron microscope (ACEM) scheduled for delivery in 2004. ORNL was also selected to receive the first column of a next-generation electron microscope being developed by the multilaboratory Transmission Electron Aberration-Corrected Microscope

(TEAM) project. This column will be the prototype for a new era of in situ atomic-resolution microscopy experiments.

Researchers in ORNL's Chemical Sciences Division have successfully synthesized three nanocrystalline titanium dioxide supports with three different structures and used them as supports for gold catalysts. The activity of these gold-titanium oxidation catalysts has been found to correlate with the presence of gold clusters having mean sizes of around 0.5 nm (a few atoms). The presence of these previously unknown small clusters was discovered with the subatomic Z-STEM microscope in the Condensed Matter Sciences Division.

High-resolution fluorescence imaging of nanorods made from highly conjugated polymers has revealed unique optical properties, including narrow photoluminescence emission spectra and exceptionally long emission lifetimes ($>10^3$ s). These long lifetimes are in stark contrast to the millisecond lifetimes ("blinking") conventionally observed. These polymers have high potential for simple "tuning" of spectral properties to enable broad applications ranging from biological imaging to photonics.

Two ORNL technologies developed within the Physical Sciences Directorate received R&D 100 Awards: the MicroTrapMS, a highly miniaturized ion trap mass spectrometer, and CF8C Plus, a new cast stainless steel for high-temperature applications.

Office of Science: Office of Biological and Environmental Research

Construction of the \$14 million LCFG to house ORNL's mouse colony was completed on schedule and within budget. A contractor for the animal care operation at the new vivarium was procured, and the mammalian genetics research program completed the year within budget.

ORNL delivered solid scientific accomplishments on the three Genomes to Life (GTL) projects awarded in FY 2002, exceeding expectations for its contributions to the Functional Genomics Core project led by Lawrence Berkeley National Laboratory. In addition, all milestones were met for the Carbon Sequestration in Synechococcus project led by Sandia National Laboratories, collaborations were established with the Center for Molecular and Cellular Systems (a partnership with Pacific Northwest National Laboratory), and collaborations were maintained with key project staff members who left ORNL for positions at universities.

A major synthesis volume, describing a large-scale climatic investigation at the Throughfall Displacement Experiment in the Walker Branch Watershed, was published in FY 2003.

ORNL's Raman Integrated Tunable Sensor (RAMiTS), developed by researchers in the Life Sciences Division and the Engineering Science and Technology Division with an industry partner, won an R&D 100 Award. The RAMiTS device can rapidly perform qualitative analysis of hundreds of substances, including toxic chemicals, by-products from explosives, biomedical markers, and pharmaceuticals and illicit drugs.

Office of Science: Office of Advanced Scientific Computing Research

The ORNL Center for Computational Sciences completed its initial evaluation of the 4.5-teraflops IBM Cheetah and began transitioning that system to serve as the primary resource for DOE's Scientific Discovery through Advanced Computing (SciDAC) program.

The Cray X1 Phoenix system was moved to the world-class facility in the new Computational Sciences Building and has quadrupled in size, with 256 processors. This system provides the first scalable vector

system in the DOE complex and forms the basis of ORNL's proposal to DOE to build a ≥ 100 -teraflops computer for U.S. scientific research. ORNL is testing the effectiveness of this Cray architecture in solving important scientific problems in climate, fusion, biology, nanoscale materials, and astrophysics.

Researchers studying the explosion mechanism of core-collapse supernovae (one of the most important and challenging problems in nuclear astrophysics) as part of the Terascale Supernova Initiative, a SciDAC project, have modeled the polarization of radiation emitted by a supernova.

Office of Science: Office of Fusion Energy Sciences

All conceptual design activities for the Quasi-Poloidal Stellarator, an innovative magnetic fusion experiment, were completed, and a successful conceptual design review was held in June 2003. The integrated physics/engineering team delivered a major accomplishment by developing a new plasma configuration and magnet coil set.

Design, fabrication, and assembly of the High-Power Prototype (HPP) antenna were completed, and the antenna was successfully operated. The antenna design incorporates innovative features that are expected to simplify the control and improve the reliability of launching radio-frequency waves into high-performance fusion plasmas, such as those in the proposed International Thermonuclear Experimental Reactor (ITER).

Office of Science: Office of Nuclear Physics

The intensities of beams of radioactive nuclei from the Holifield Radioactive Ion Beam Facility have been increased in the past year, supporting the delivery of new physics results. For example, the first usable beam of ^{132}Sn enabled the first Coulomb excitation measurement to deduce the collectivity of the first excited state in this nucleus. This is important, since ^{132}Sn has a closed-shell number of neutrons and protons but is impossible to produce and study without unstable isotopic beams.

Office of Energy Efficiency and Renewable Energy

ORNL collaborated with two DOE Building America Teams to design and construct a Habitat for Humanity house equipped with a number of innovative energy-saving technologies. Monitoring of the integrated systems, which are designed to have the potential for marketability by 2010, has demonstrated excellent performance.

A test run of the Powerline Conductor Accelerated Testing Facility to test the capabilities of advanced transmission conductors was completed in March 2003. This new facility provides the capability to accelerate the testing of advanced conductors for transmission lines by simulating 30 years of use in a test cycle.

CD-1 authorization for the Energy Reliability and Efficiency Laboratory (EREL) was secured in July 2003. The EREL facility will support DOE's need for R&D on electricity transmission and distribution, distributed energy resources, and demand-responsive building systems.

The Uncooled Micromechanical Infrared Camera (UMIR-Cam), developed by researchers in the Engineering Science and Technology Division, received an R&D 100 Award. This sensitive device runs at room temperature and is expected to have a broad range of applications, including night vision, industrial process monitoring, and medical imaging.

National Nuclear Security Administration: Office of Defense Nuclear Nonproliferation

ORNL provided staff for key assignments to support the nonproliferation programs of the National Nuclear Security Administration (NNSA). Work in support of the Material Protection, Control, and Accounting (MPC&A) program was extended to protect nuclear weapons and weapon systems of the Russian Ministry of Defense.

Office of Nuclear Energy, Science and Technology

ORNL staffed and organized an expanded gas centrifuge technology team that is fully responsive to the multiyear Cooperative R&D Agreement (CRADA) with USEC, Inc. The technical team supporting the USEC CRADA to develop an economically attractive gas centrifuge was expanded by 40% to respond to the scheduled development and activation of key demonstration facilities. All CRADA milestones were met on or ahead of schedule.

Within the Advanced Gas Reactor (AGR) Program, ORNL has the lead for fuel technology and has developed R&D plans for the Very High Temperature Reactor/Next Generation Nuclear Project in the areas of fuel kernel preparation, coating, compacting, and product characterization.

ORNL also provided program management support and technology activities to assist DOE with the initiation of a new program for the NASA Nuclear Systems Initiative, completing and publishing the joint NASA/DOE Space Reactor Power System Screening Report. In addition, ORNL was assigned several lead roles by DOE in the new NASA Jupiter Icy Moon Orbiter (JIMO) project and the Prometheus program.

Office of Fossil Energy

ORNL developed a new Sensors and Controls Program to be implemented in FY 2004 and secured FY 2003 funding for two projects that support the ORNL–National Energy Technology Laboratory (NETL) Alliance on Computational Energy Systems. This collaboration provides an important linkage between the Office of Science and the Office of Fossil Energy through the SciDAC program.

The Functional Materials and Processes Laboratory has been established in renovated laboratory space, and equipment has been installed.

Strategic Objective 2: Operations and ES&H

We consider our FY 2003 performance in operations and ES&H as “Excellent.” In reviewing the PEP measures and indicators established for this critical outcome, we believe that we made substantial progress in improving the overall operation of the Laboratory and this is reflected by a PEP numerical determination of “Outstanding.” However, we are not satisfied with our progress in establishing a culture that embraces an enhanced level of operational discipline that will ensure consistently outstanding results in this area.

Distinguishing ourselves as the very best performers in operations and ES&H has become a matter of pride for Laboratory staff. We have made extraordinary progress in safely modernizing the ORNL campus; we achieved outstanding results in the first-ever Laboratory-wide multimedia inspection by the Environmental Protection Agency (EPA); we exceeded expectations for safety performance improvement in our work spaces; and we made major progress in cleaning up 50 years of legacy materials. These accomplishments required—and received—the collective attention and support of the entire Laboratory.

However, the year was not without its challenges. Operational discipline issues at the HFIR, the startup of our Nonreactor Nuclear Facilities Division (NNFD), and assessments conducted by the Occupational Safety and Health Administration and the Nuclear Regulatory Commission (to examine the potential for external regulation of DOE facilities) have all required significant management resources.

We believe that our greatest challenge going forward lies in the area of operational discipline within our nuclear facilities. As our programs mature and key leaders continue to drive programmatic improvement, we expect to find and report deficiencies at an increasing rate. We view this as a positive trend, but one which will continue to challenge Laboratory management in the coming year.

The success of our Facilities Modernization Initiative is most evident in the new facilities that are housing and supporting the work of ORNL staff, including many who were previously located at the Y-12 National Security Complex. As we have moved into these new facilities, we have consolidated our staff and vacated more than 1,000,000 square feet of space. Efforts to improve overall operational performance include the full implementation of the Facility Operations and Maintenance Management System and the consolidation of management and support efforts for ORNL's nonreactor nuclear facilities in the NNFD.

In the area of Integrated Safety Management (ISM), we have planned and executed programs to develop, deploy, and implement Laboratory-wide work planning and control systems for R&D, maintenance and operations, and the office environment. Recognizing the need to fully institutionalize the ISM philosophy and to respond to challenges prompted by self-disclosed events and worker safety and health issues, UT-Battelle management has taken an active and visible role in emphasizing the need for work planning, identification of hazards, and adherence to applicable rules. The resulting broad-based efforts to instill a behavior-based safety approach in all of our activities continue to positively influence how our staff plan and perform work. Making this a sustainable part of the Laboratory's culture is critical.

We have made notable progress in addressing chemical safety and other operational challenges. The Facility Environmental Vulnerability Assessment Recommendation Implementation (FEVARI) program is addressing legacy material removal, infrastructure maintenance and renovation, and associated environmental needs. We have also improved our control of hazardous material control areas and chemical inventories.

In FY 2003, we completed our three-year commitment to replace the previous requirements delivery system, which comprised a variety of directives and guidance, with the Standards-Based Management System (SBMS), a comprehensive set of program descriptions, subject areas, and procedures. This completes a principal element of our efforts to move the Laboratory culture from an expert-based approach to operations to a systems-based approach. We are also seeing more ownership of our processes as a result of the active participation of users in the development of these processes. In addition, SBMS instituted the maturity evaluation process to drive continuous improvement in the performance of our management systems.

As a result, we are beginning to see measurable changes in our Laboratory culture. We are encouraged by improvements in worker safety, as evidenced by recordable injury/illness (RII) and lost workday case (LWC) rates. A slight decline from FY 2001 to FY 2002 was followed by dramatic decreases of 36% in the RII rate and 47% in LWCs in FY 2003. With more construction under way than at any time since World War II, our construction safety record remains outstanding.

In the area of environmental performance, there were no reportable releases to the environment, no findings by external environmental regulators, and no National Pollution Discharge Elimination System permit nonconformances attributed to UT-Battelle activities. This was the first year in which we achieved a perfect record in all three areas.

In occurrence reporting, we have seen a stabilization of occurrences attributable to legacy contamination issues. Of the Laboratory's total occurrence reports in FY 2001, 41% were related to contamination; this figure fell to 27% in FY 2002 and remained at the same level during FY 2003. In addition, 54% of the occurrences reported in FY 2003 were identified through self-assessment activities, up from 48% in FY 2002. This trend indicates that our organizational responses, rather than being event-driven, are relying more on our own proactive assessment processes. Once again, we see this as evidence of the desired culture change.

Through our self-assessment results and through analysis of our self-disclosed events, we are also well aware of the areas where we can make improvements. We know that we can further improve our safety performance and have specific plans for doing so, and we will continue our efforts to infuse behavior-based strategies into our everyday work planning and risk mitigation activities.

We have expended tremendous management attention on improving the operational discipline in our nuclear facilities. Both at the HFIR and for our ten nonreactor nuclear facilities, we have installed an essentially new management team and communicated a vastly different set of performance expectations. We believe that this is changing the culture and improving our operational discipline in these facilities, but this area will require continued management emphasis and attention.

An analysis of our Radiation Event Reports and occurrence reports clearly shows that we need to continue our efforts to reduce workplace hazards through work planning and hazard mitigation and control. These results, however, reflect our continuing commitment to strengthen and fully use assessment activities to find our problems and provide feedback, so that the lessons we learn in one facility or organization can be shared with others with the potential for the same or similar problems.

We have much to do to broaden and sustain our efforts to achieve outstanding results in the areas of operations and ES&H, but our path forward remains clear. We will continue to use self-assessments to identify strengths that we can enhance and areas for improvement where we need to target our resources. The common thread that runs through all of our initiatives is to modify our culture so that we can best enable our staff's pursuit of world-class scientific and technological results.

Strategic Objective 3: Community Service

Our self-evaluation of ORNL's FY 2003 performance in community service yields a rating of "Outstanding."

UT-Battelle is committed to ensuring that ORNL is viewed by its neighbors as a highly valued partner in the region. In FY 2003, we delivered on this commitment through active participation in economic development, efforts to strengthen science and math education, and support of the community's civic and cultural activities.

We restructured and "right-sized" the Technology Transfer and Economic Development (TTED) Directorate to achieve a more efficient and effective organization with a greater business focus, revised the TTED management system description, and completed the first internal and external evaluation of the system. We now have a cohesive management system description and management system plan.

We replicated the Oak Ridge Center for Entrepreneurial Growth (CEG) model in Chattanooga and on the campus of UT Knoxville. During the year, 11 new companies, divisions, or product lines were started as a result of ORNL technology and/or expertise. We also established, with locally based startups, an opening position in each license negotiation that requires the company to join a mentoring or incubation program such as the CEG or the Fairview Technology Center. To date, two companies have graduated from the

CEG. Each has more than \$3 million in revenues and more than 20 employees, both are operationally funded, and both have an active board of directors or advisor team in place. Of the 33 CEG clients, 10 either moved to the next stage of maturation or completed significant milestone or validation events during FY 2003.

To improve science teaching in the region, UT-Battelle placed 40 uncertified science teachers from the Knoxville–Oak Ridge region in the UT Collaborative for Enhancing Education in Math and Sciences (formerly the Academy for Teachers of Science and Math) during the 2003 summer session.

To assess its value as a partner in the region, UT-Battelle conducted a focus group that engaged a group of Oak Ridge stakeholders on December 16, 2002. The report on the focus group stated that respondents were “overwhelmingly positive about the role UT-Battelle had played since assuming management of the Lab,” citing ORNL’s performance in science education, corporate volunteerism, and extensive communication of the Laboratory Agenda. As a follow-up to the report, UT-Battelle immediately implemented a plan to involve more members of ORNL’s Leadership Team in community activities.

The value of ORNL to Tennessee was recognized in remarks made by Tennessee Governor Phil Bredesen, U.S. Senator Bill Frist, U.S. Congressman Zach Wamp, and Chattanooga Mayor Bill Corker at the Tennessee Valley Corridor Summit in Chattanooga in October 2003.

Information Presented in this Report

Part I of this report presents UT-Battelle’s assessment of its performance in meeting the commitments documented in the PEP for FY 2003. Parts II through V contain information from other areas that we believe are indicators of UT-Battelle’s overall performance:

- a description of the focus and impact of our internal investments in science and technology,
- a summary of the direction and results of our internal investments in infrastructure, operations, and Laboratory reserve-funded initiatives,
- a report on our operational experience, covering both self-disclosed events (issues that were “surprises”) and issues that we identified and addressed, and
- a description of depth, breadth, and maturity of our overall planning and self-assessment programs and reviews the strengths and weaknesses of our management systems and their maturity.

Part VI summarizes our key strengths and areas for improvement, drawing on the results of our self-assessments at all organizational levels and on other information presented in this report.

Closing Comments

ORNL delivered a remarkable set of achievements in FY 2003. While our sense of accomplishment is tempered by our knowledge of how much remains to be done, we are confident that we are on the right track to continue our progress toward our strategic objectives.

In summary, on the basis of the evidence presented in this report, we believe that the Laboratory’s performance for the FY 2003 evaluation period is “Outstanding.”

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ACRONYMS AND ABBREVIATIONS

ACEM	aberration-corrected electron microscope
ADS	activity data sheets
AFCI	Advanced Fuel Cycle Initiative
AFDCS	Active Facilities Data Collection System
AGR	Advanced Gas Reactor
AMAS	Audit and Management Advisory Services
AMCL	Advanced Materials Characterization Laboratory
ANL	Argonne National Laboratory
ATS	Assessment Tracking System
BER	Biological and Environmental Research
BES	Basic Energy Sciences
BOA	basic order agreement
CAS	Condition Assessment Survey
CAA	Clean Air Act
CCL	coupled-cavity linac
CCR	Core Composite Rate
CEG	Center for Entrepreneurial Growth
CI	configuration item
CIAs	Compliance Implementation Activities
CLO	Central Laboratory and Office
CM	Commercialization Manager
CMC	Chemical Management Center
CNMS	Center for Nanophase Materials Sciences
CPPR	Comprehensive Publications and Presentations Registry
CRADA	Cooperative R&D Agreement
CWA	Clean Water Act
DNFSB	Defense Nuclear Facilities Safety Board
DOE	Department of Energy
DOE-EE	Department of Energy Office of Energy Efficiency and Renewable Energy
DOE-EM	Department of Energy Office of Environmental Management
DOE-FE	Department of Energy Office of Fossil Energy
DOE-HQ	Department of Energy Headquarters
DOE-OE	Department of Energy Office of Enforcement
DOE-OIG	Department of Energy Office of the Inspector General
DOE-ORO	Department of Energy Oak Ridge Operations Office
DOE-SC	Department of Energy Office of Science
DSAs	Documented Safety Analyses
DTL	drift tube linac
DTRA	Defense Threat Reduction Agency
EBS	Expensed Bench Stock
ECRs	Environmental Compliance Representatives
EM	Environmental Management
EMS	Environmental Management Services or Environmental Management System

EMSP	Environmental Management Science Program
EPA	Environmental Protection Agency
EPWS	Environmental Protection and Waste Services
EREL	Energy Reliability and Efficiency Laboratory
ETCs	Estimates to Complete
ES&H	Environment, Safety, and Health
FEVARI	Facility Environmental Vulnerability Assessment Recommendation
FIMS	Facility Information Management System
FLC	Federal Laboratory Consortium
FMD	Facilities Management Division
FRC	Field Research Center
FRP	Facilities Revitalization Program
FUAs	Facility Use Agreements
FY	fiscal year
F&O	Facilities and Operations
GEM	Graduate Degrees for Minorities in Engineering and Science
GI	Generator Interfaces
GTL	Genomes to Life
GPP	General Plant Project
G&A	general and administrative
HBCUs	Historically Black Colleges and Universities
HFIR	High Flux Isotope Reactor
HMIS	Hazardous Materials Inventory System
HOG	hot off-gas
HPP	High-Power Prototype
HR	Human Resources
HVCM	high-voltage converter modulator
IAEA	International Atomic Energy Agency
ICP/MS	inductively coupled plasma/mass spectrometry
IGPPs	Institutional General Plant Projects
IO	Independent Oversight
IP	Intellectual Property
IPA	Interagency Personnel Assignment
ISM	Integrated Safety Management
ISSM	Integrated Safeguards and Security Management
IT	Information Technology
ITER	International Thermonuclear Experimental Reactor
JIBS	Joint Institute for Biological Sciences
JIMO	Jupiter Icy Moon Orbiter
JINS	Joint Institute for Neutron Sciences
JPL	Jet Propulsion Laboratory
LCAM	life cycle asset management
LCFG	Laboratory for Comparative and Functional Genomics
LDRD	Laboratory Directed Research and Development
LMDI	Legacy Materials Disposition Initiative

LWC	lost workday case
LWS	Laboratory Waste Services
LLW	low-level liquid waste
MEIs	Minority Education Institutions
MJR	maintenance job requests
MPC&A	Material Protection, Control, and Accounting
MRS	Maintenance Resource Scheduling
M&C	Metals and Ceramics
M&O	management and operating
NABIR	Natural and Accelerated Bioremediation Research
NASA	National Aeronautics and Space Administration
NCRs	Nonconformance Reports
NCS	nuclear criticality safety
NEP	National Environmental Protection Act
NETL	National Energy Technology Laboratory
NERI	National Energy Research Initiative
NIH	National Institutes of Health
NNFD	Nonreactor Nuclear Facilities Division
NNSA	National Nuclear Security Agency
NPDES	National Pollution Discharge Elimination System
NRC	Nuclear Regulatory Commission
NSTD	Nuclear Science and Technology Division
NTS	Non-Compliance Tracking System
OAP	Operational Awareness Program
OIP	Operational Improvement Program
OM	Operations and Maintenance
OM&S	operations, maintenance, and services
ORNL	Oak Ridge National Laboratory
ORO	Oak Ridge Operations Office
ORPS	Occurrence Reporting and Processing System
OSHA	Occupational Safety and Health Administration
OSU	Oregon State University
O&M	Officials and Managers
P-AAA	Price-Anderson Amendments Act
PBM	performance-based management
PBMS	Performance-Based Management System
P-Card	small purchase credit card
PCAT	Powerline Conductor Accelerated Testing
PELs	permissible exposure limits
PEP	Performance Evaluation Plan
PER	Program for Ecosystem Research
PM	project management
QPS	Quasi-Poloidal Stellarator
RAM	Research Alliance for Minorities
RAMiTS	Raman Integrated Tunable Sensor

RCRA	Resource Conservation Recovery Act
RDD	radiological dispersal device
RDRs	Requirements Decision Records
RFP	Request for Proposals
REDC	Radiochemical Engineering Development Center
RERs	Radiological Event Reports
RII	recordable injury and illness
RF	radio-frequency
RFP	request for proposal
ROB	Research Office Building
RP	real and personal property
RRD	Research Reactors Division
RSC	Research Support Center
RTP	rail-transfer point
R&D	research and development
SAMS	Space Allocation Management System
SANS	Small-Angle Neutron Scattering
SAR	Safety Analysis Report
SBMS	Standards-Based Management System
SciDAC	Scientific Discovery through Advanced Computing
SECME	Southeastern Consortium for Minorities in Engineering
SMART	Sustainable Measurement and Rating Tool
SIOU	Surface Impoundment Operable Units
SNM	special nuclear material
SNS	Spallation Neutron Source
SRF	Strategic Rocket Forces
STOP	Safety Training Observation Program
S&T	science and technology
TBD	to be determined
TDEC	Tennessee Department of Environment and Conservation
TEAM	Transmission Electron Aberration-Corrected Microscope
TEMA	Tennessee Emergency Management Administration
TLVs	threshold limit values
TMAC	Test Machine for Automotive Crashworthiness
TPWG	Technology Partnership Working Group
TRU	Transuranic
TSR	Technical Safety Requirement
TTED	Technology Transfer and Economic Development
UMIR-Cam	Uncooled Micromechanical Infrared Camera
UT	University of Tennessee
VOG	vessel off-gas
WBS	Work Breakdown Structure
WFO	Work for Others
ZEB	Zero-Energy Buildings

INTRODUCTION

UT-Battelle's management of the Oak Ridge National Laboratory (ORNL) is guided by a fundamental commitment to simultaneous excellence in science and technology; laboratory operations and environment, safety, and health (ES&H); and community service. The UT-Battelle Leadership Team maintains a Laboratory Agenda to provide a structured framework for the strategic objectives, critical outcomes, major initiatives, and near-term actions through which it plans to deliver on this commitment. The foundation for the Laboratory Agenda is the Laboratory's annual Institutional Plan, a high-level strategic planning document with a five-year outlook.

Under the terms of its performance-based contract with the U.S. Department of Energy (DOE), UT-Battelle also prepares an annual Performance Evaluation Plan (PEP) that documents a set of critical outcomes and performance measures that are used to determine the fee paid to UT-Battelle for its management and operation of ORNL. These critical outcomes and performance measures, which address the full scope of ORNL programmatic and operational activities, reflect the consensus of UT-Battelle and our DOE customers on the essential aspects of UT-Battelle's performance in its management and operation of ORNL. (In general, the PEP and the Laboratory Agenda are closely aligned. The Laboratory Agenda, however, reflects UT-Battelle plans and goals for ORNL that may not be captured explicitly in the PEP.)

To support the proactive planning, effective allocation of resources, and assessments of performance that are needed to successfully execute the Laboratory Agenda and meet our commitments to DOE, UT-Battelle uses a performance-based management system (PBMS). The PBMS provides a formal process for developing business plans and performance assessment plans, conducting assessments of performance, analyzing the results, and making improvements as needed. It is used by both line managers at all levels (directorate, division, group, program, and project) and management system owners (persons with responsibility for ORNL's high-level operating and business processes). Self-assessment plans are used to refine and tailor the performance-based management process at each level. The highest-tier product resulting from the full utilization of the PBMS is this Self-Evaluation Report.

This report also meets the requirement, established in the PEP, for UT-Battelle to provide an evaluation report to the ORNL Site Office at the end of the year, with the following content:

- an overall summary of performance for FY 2003,
- performance ratings for each performance goal and for the Laboratory overall,
- a summary of key strengths and opportunities for improvement identified as part of the division and directorate self-assessment activities,
- any significant issues that were identified by external audits, reviews, etc., and
- any issues or topics that the contractor deems important to discuss.

Part I of this report presents UT-Battelle's assessment of its performance in meeting the commitments documented in the PEP for fiscal year (FY) 2003. Parts II through V contain information from other areas that we believe are indicators of UT-Battelle's overall performance.

- Part II presents the focus, impact, and results of our internal investments in S&T.
- Part III summarizes the direction and results of our internal investments in infrastructure, operations, and Laboratory reserve-funded initiatives.
- Part IV is a report on both self-disclosed events (issues that were "surprises") and issues that we identified and addressed.
- Part V describes the depth, breadth, and maturity of our overall planning and self-assessment programs and reviews the strengths and weaknesses of our management systems and their maturity.

Part VI presents the required summary of key strengths and areas for improvement, which draws on the results of our self-assessments at all organizational levels and on other information presented in this report.

PART I

PERFORMANCE EVALUATION PLAN RESULTS

The Performance Evaluation Plan (PEP), prepared to describe the basis for the evaluation of UT-Battelle’s performance in the management and operation of the Oak Ridge National Laboratory (ORNL) during fiscal year (FY) 2003, contains the set of critical outcomes and performance measures presented in Table I.1. In this part of the Self-Evaluation Report, we present our assessment of UT-Battelle’s success in meeting the expectations of our Department of Energy (DOE) customers for each performance measure.

Table I.1. FY 2003 Critical Outcomes and Performance Measures

Critical Outcome	Performance Measures
1. Excellence in Science and Technology	1.1 Quality of Research 1.2 Relevance to DOE Mission and National Needs 1.3 Success in Constructing and Operating Research Facilities 1.4 Effectiveness and Efficiency of Research Program Management (NOTE: Measures 1.1–1.4 Form the Basis for a Composite Evaluation of Continued Scientific Excellence) 1.5 Deliver SNS on Schedule, on Budget, and with Full Scope 1.6 Enhance ORNL’s Ability to Attract, Develop, Promote, and Retain a Diverse Staff with the Critical Skills Required to Accomplish the Laboratory’s Missions While Maintaining Reasonable Cost
2. Excellence in Operations and Environment, Safety, and Health (ES&H)	2.1 Integrated Management 2.2 Improve ES&H Performance 2.3 Facilities Modernization and Upgrades 2.4 Reduce Cost and Maximize Research Effectiveness
3. Excellence in Community Service	3.1 Be Recognized Within the Region as a Good Corporate Citizen 3.2 Encourage the Growth of Businesses Based on ORNL Technology and/or Resources to Enhance the Economy

1. EXCELLENCE IN SCIENCE AND TECHNOLOGY

To meet the critical outcome of excellence in science and technology (S&T), UT-Battelle has committed to deliver scientific advances and technological innovations that support Department of Energy (DOE) missions, apply our expertise and capabilities to the needs of other customers, and sustain and enhance the distinctive capabilities of the Oak Ridge National Laboratory (ORNL). In FY 2003, ORNL delivered outstanding S&T performance to a diverse customer base.

1.1–1.4 CONTINUED SCIENTIFIC EXCELLENCE

Preliminary Score: 3.52

Rating: Outstanding

Four of the performance measures established for the critical outcome in S&T are designed to measure ORNL’s effectiveness as a research and development (R&D) performer for DOE program sponsors and for other customers. The principal tool for measuring ORNL’s performance in the areas covered by these measures is a survey, administered by the DOE ORNL Site Office, that collects direct feedback from these program sponsors on the quality of ORNL’s research, the relevance of the research to DOE mission and national needs, ORNL’s success in constructing and operating research facilities, and the effectiveness and efficiency of ORNL’s research program management. While survey results are not yet

complete, preliminary indications are that the results of these surveys, which are combined to yield a composite rating of ORNL's continued scientific excellence, will demonstrate that the Laboratory continued to meet DOE's expectations. In addition, ORNL surveys its Work for Others (WFO) customers, and these surveys likewise indicate a high level of satisfaction with ORNL's S&T performance.

We also assess ORNL's S&T performance against a set of S&T Stewardship Priorities, documented in Appendix B of the FY 2003 PEP. Overall, our delivery of results for our principal program sponsors has been outstanding, as described in detail below.

Office of Science: Office of Basic Energy Sciences

- Achieve 60% availability and 90% predictability for High Flux Isotope Reactor (HFIR) operations.
Results: ORNL's delivery of results in HFIR operations was hampered by operational issues that required the shutdown of HFIR in February and March 2003. HFIR operations maintained overall levels of 48.3% availability and 80.6% predictability for FY 2003, representing 80.5% and 89.8% of the established goals, respectively.
Rating: Good.
- Implement a HFIR neutron scattering program.
Results: A formal neutron scattering user program has been implemented, with proposal calls issued in October 2002 and July 2003. For both proposal cycles, requests for beam time were oversubscribed by more than a factor of two. The first users began experiments with HFIR Cycle 393B on March 30, 2003. Through September 2003, 72 users have run 58 proposed experiments.
Rating: Outstanding.
- Obtain CD-3 approval for the Center for Nanophase Materials Sciences (CNMS).
Results: CD-3 approval for the CNMS, DOE's first Nanoscale Science Research Center was received on February 3, 2003, and ground breaking ceremonies were held in July 2003.
Rating: Outstanding.
- Complete the small-angle neutron scattering (SANS) guide hall.
Results. The building was constructed, and beneficial occupancy took place in August 2003.
Rating: Outstanding.
- Adhere to the planned schedule for installation of HFIR instruments subject to receiving full funding in the October financial plan.
Results: World-class triple-axis spectrometers were installed at HFIR beam tubes HB-1, HB-1A, and HB-3. All instruments are exceeding performance expectations. The installation of three additional world-class instruments is under way at the HB-2 shielding tunnel, which was completed in March 2003.
Rating: Outstanding.
- Complete the assembly of the moderator vessel in the HB-4 beam tube.
Results: Completion of the assembly has been delayed by a procurement problem and the redirection of HFIR resources in response to the operational issues identified in January and February 2003. Although this task will not be completed in FY 2003, this change is not expected to delay Phase I testing.
Rating: Good.

Office of Science: Office of Biological and Environmental Research

- Support the Genomes to Life (GTL) initiative with an integrated ORNL resource in systems biology, including mouse and microbial genomics, genome-scale proteomics and protein complex analysis (including mass spectrometry, advanced sample preparation and handling, cellular imaging, and other relevant analytical technologies), computational biology and bioinformatics, and structural molecular biology.
 - Meet all ORNL-specific milestones for newly funded GTL proposals on time and within budget.
 - Position ORNL for a comprehensive response in support of growth and future directions in GTL.
 - Develop the concept for the deuteration facility needed to support the GTL proteomics effort and the Center for Structural Molecular Biology.
 - Continue to provide strong support to the Office of Biological and Environmental Research (BER) in development of GTL facility plans and documentation.

Results: ORNL has provided outstanding support to GTL. Foremost were the scientific accomplishments in the three funded GTL projects, and the leadership ORNL provided for two of the three. To integrate resources and to position ORNL for future support, we funded six Laboratory Directed R&D (LDRD) projects that support our major Laboratory initiative in Complex Biological Systems and formalized a process to inform staff of opportunities and provide early evaluation and feedback of proposals responding to the GTL call. In addition, program development funding was obtained to plan and develop the GTL Facility for Characterization and Imaging of Molecular Machines, which has been identified as a top ORNL priority for future development.

Rating: Outstanding.

- Support the missions of the Climate Change Research Division through use of our core scientific capabilities in ecosystem dynamics, carbon and water cycle, global climate change modeling, carbon sequestration, and global change data.
 - Complete the start-up of two new projects in the Program for Ecosystem Research (PER).
 - Develop a vision of how ORNL will effectively contribute to DOE's future research needs in ecosystem science integrating capabilities and facilities for simulation, sensors, genomic tools, and large-scale field observation and experiment.

Results: Two new PER projects were successfully started during FY 2003. Excellent progress was made on developing new ideas for ecosystem science in collaboration with DOE staff and management. The results were presented at a strategic planning workshop for the UT-Battelle Leadership Team. Follow-up activities include development of a simulation concept for an LDRD proposal and a plan for an ORNL staff member to participate in a DOE-led planning workshop on ecosystem science needs. The Complex Biological Systems Initiative is also addressing this emerging area of science and developing plans for supporting DOE needs in FY 2004 and beyond.

Rating: Excellent.

- Support the missions of the Remediation Sciences Division through use of our core capabilities in biogeochemistry, geochemistry, geosciences, hydrology, microbiology, and separations science.
 - Complete start-up of two new collaborative projects at the Natural and Accelerated Bioremediation Research (NABIR) program's Field Research Center (FRC) in Oak Ridge, led by Pacific Northwest National Laboratory and Oregon State University (OSU), through both our FRC support functions and our research collaborators, while continuing to provide excellent site support to ongoing FRC projects and to individual investigator requests.
 - Support an expanding vision of both fundamental research and transfer of results to DOE needs through participation in strategic planning and by leveraging our NABIR and Environmental Management Science Program (EMSP) research.

Results: Progress was made on all FRC projects, both in setting up project infrastructure and in producing scientific results. For the two new projects, well installation and site characterization of two new Area 2 field plots were completed, large intact background cores were collected, and OSU conducted numerous push-pull experiments. In ongoing projects, the OSU team conducted dozens of push-pull experiments in the Area 1 field plot, and the Stanford/ORNL groundwater preconditioning system was set up and the in situ experiment started. The OSU project team demonstrated in situ microbial reduction of uranium and technetium-99. In addition, the FRC fulfilled all NABIR sample requests by collecting and shipping hundreds of high-quality groundwater and sediment samples to researchers at 16 national laboratories and universities. FRC activities and research results were communicated through meetings and workshops, research papers (to be published in peer-reviewed journals), and the FRC Web site.

Rating: Outstanding.

- Complete construction of the Laboratory for Comparative and Functional Genomics (LCFG) on time (see associated Performance Indicator 2.3.2) and within budget.

Results: The LCFG, a state-of-the-art vivarium that will house ORNL's genetically distinctive mouse colony, was completed on time and within budget.

Rating: Outstanding.

- Manage mouse genetics research program with no cost overruns.
 - Outsource animal care operation by October 1, 2003, as a major cost reduction measure.
 - Reduce costs of maintaining the mouse colony.

Results: Through a request for proposals (RFP), a contractor for the animal care operation at the new vivarium was selected. The contractor completed required negotiations with the bargaining unit staff, and full implementation of the outsourcing contract will coincide with the start of FY2004. The Mammalian Genetics program was tracked on a continuing basis against the goals of no cost overruns and ended the year with a balanced budget.

Rating: Excellent

Office of Science: Office of Advanced Scientific Computing Research

- Provide leadership in high-performance computing, networking, computer science, applied math, computational science, theory, and experiment to deliver outstanding science and new technology.

Results: ORNL led the U.S. response to the Earth Simulator through the acquisition and evaluation of the first scalable vector computer system in the U.S. We also led advances in application of computational sciences in climate, fusion, nanoscale science, biology, and national security.

Rating: Outstanding

- Provide information technology (IT) productivity and services, including IT modernization.

Results: We provided enabling IT infrastructure and completed the move to the new CSB facility.

Rating: Outstanding

Office of Science: Office of Fusion Energy Sciences

- Complete the conceptual design of the Quasi-Poloidal Stellarator (QPS) and hold conceptual design, cost, and schedule reviews.

Results: ORNL's project team successfully completed all conceptual design activities and the conceptual design report for the QPS, an innovative magnetic fusion experiment with an ultralow aspect ratio and desirable quasi-poloidal symmetry features. The integrated physics/engineering team delivered a major accomplishment by establishing a new plasma configuration and magnet coil set,

with more attractive features (better physics performance, simpler engineering, and reduced cost) than the previous baseline configuration. The DOE-SC Construction Management Support Division reviewed all aspects of the conceptual design (technical, cost, schedule, and management) in June 2003, with favorable results.

Rating: Outstanding.

- Begin test program for the High-Power Prototype (HPP) antenna to be installed on the Joint European Torus.

Results: The HPP antenna is a key element of an international project to develop an advanced antenna that can heat plasmas to high temperature with radio-frequency (rf) waves, in support of magnetic fusion experiments. The antenna design incorporates innovative features that are expected to simplify the control and improve the reliability of launching rf waves into high-performance fusion plasmas. Design, fabrication, and assembly are complete and the HPP antenna was successfully operated in the later half of FY 2003. Tests were conducted to determine performance limits for various components during high-current, high-voltage, long-pulse operation, and several recommendations for improvements in design, fabrication, and assembly were developed. Where practical, these will be incorporated in the final antenna design.

Rating: Outstanding.

Office of Energy Efficiency and Renewable Energy

- Complete construction and initiate monitoring of the Zero-Energy Buildings (ZEB) Program Habitat for Humanity House in Loudon, Tennessee.

Results: ORNL collaborated with two DOE Building America Teams to design and construct a Habitat for Humanity house equipped with innovative energy-saving technologies. The house incorporates structural insulated panels, a metal roof, a 2-kW solar photovoltaic system, high-efficiency windows, a weather barrier system, and a heat pump hot water heater, all donated by industry partners. Data have been collected for 9 months, demonstrating that the cost of electricity for the house is \$0.87 per day.

Rating: Outstanding.

- Complete Powerline Conductor Accelerated Testing (PCAT) Facility and initiate testing of 3M advanced conductor.

Results: The PCAT Facility was completed, representing the initial element of a new National Transmission Technology Research Center at ORNL. Testing of an advanced conductor, designed by 3M to address the problem of power outages caused by sagging transmission lines, has begun. ORNL researchers worked with their counterparts from the Tennessee Valley Authority and 3M to meet this goal.

Rating: Outstanding.

- Secure CD-1 authorization for the new Energy Reliability and Efficiency Laboratory (EREL).

Results: CD-1 authorization for the EREL was secured in July 2003. The EREL facility will support DOE's need for R&D on electricity transmission and distribution, distributed energy resources, and demand-responsive building systems.

Rating: Outstanding.

- Complete fabrication and installation of nickel aluminide rolls at Bethlehem Steel.
Results: More than 100 steel rolls made of a nickel aluminide alloy developed at ORNL were fabricated and installed at Bethlehem Steel Corporation's facility in Burns Harbor, Indiana, where they are used to carry steel plates into a furnace for heat treating.
Rating: Outstanding.
- Intermediate Strain Rate Test Machine fully operational.
Results: Through a collaborative effort between ORNL and the Automotive Composites Consortium, a new Interactive Physical and Virtual Test Machine for Automotive Crashworthiness (TMAC) was specified, procured, and installed at the National Transportation Research Center, a DOE national user facility. The TMAC is fully operational and meets all design specifications. Two years of future experiments have been scheduled.
Rating: Outstanding.
- Develop at least one 70% efficient heat exchanger and deliver to Argonne National Laboratory (ANL) for evaluation in ANL's Prototype Reformer System.
Results: ORNL produced a set of highly efficient heat exchangers for a fast start-up fuel reformer and delivered it to ANL for assembly and evaluation. Each heat exchanger contributed to an overall reduction in heat of the reformer exhaust from 800°C to <100°C. Compared to metal fin plate heat exchangers, the new technology provides a 70% improvement in efficiency and a 50% reduction the size and mass.
Rating: Outstanding

Office of Fossil Energy

- Develop a new Office of Fossil Energy (DOE-FE) Sensors and Controls Program with implementation in FY 2004.
Results: Following workshops at ORNL and the National Energy Technology Laboratory (NETL) to assess R&D needs for sensors and controls for fossil energy, priorities were established and proposals were prepared. Five sensor projects will be funded by DOE's Office of Energy Efficiency and Renewable Energy (DOE-EE), and the DOE-FE program will be initiated in FY 2004. ORNL staff were to meet with the NETL Product Manager in September 2003 to present the ORNL-developed program.
Rating: Outstanding.
- Obtain funding for at least two new projects for the NETL-ORNL Alliance on Computational Energy Systems.
Results: The NETL-ORNL Alliance on Computational Energy Systems secured FY 2003 funding for two new projects. The collaboration between NETL and ORNL has also provided an important linkage between DOE-SC and DOE-FE through the Scientific Discovery through Advanced Computing (SciDAC) Program.
Rating: Outstanding.
- Develop proposals and obtain funding for at least two catalysis projects based on the NETL-ORNL collaboration.
Results: A desulfurization catalysis project (jointly with NETL) has been funded by DOE-FE, and work has been initiated. A second desulfurization project has been funded by DOE-EE.
Rating: Outstanding.

- Functional Materials and Processes Laboratory established and funding for projects obtained.
Results: A new Functional Materials and Processes Laboratory has been established in renovated space, and equipment has been installed. Experiments for funded projects such as the desulfurization catalysis project will be conducted in this space.
Rating: Outstanding.

Office of Nuclear Energy, Science and Technology

- Staff and organize an expanded gas centrifuge technology team that is fully responsive to the multiyear Cooperative R&D Agreement (CRADA) with USEC, Inc.
Results: The technical team supporting the USEC CRADA in the development of an economically attractive gas centrifuge was expanded by 40% to respond to the scheduled development and activation of key demonstration facilities. Increased technical effort was provided in materials, modeling, motors, and instrumentation and control, drawing on resources from three ORNL directorates. All CRADA milestones were met on or ahead of schedule. Work for Others (WFO) agreements with a value of \$1.6 million were established to provide USEC with requested radiation program support and centrifuge code modifications.
Rating: Outstanding.

- Fabricate and characterize TRISO microparticle fuel for gas-cooled reactors with advanced coating systems and advanced kernel technology.

Results: ORNL has the lead for fuel technology within the Advanced Gas Reactor (AGR) Program. ORNL developed R&D plans for the Very High Temperature Reactor/Next Generation Nuclear Project in the areas of fuel kernel preparation, coating, compacting, and product characterization. Groundbreaking advances were made in each area:

- A state-of-the-art coating laboratory for uranium fuels was established, and a novel coating plan was developed. Depleted uranium oxide kernels were fabricated for use in coating development, and coating tests with nonradioactive surrogates were completed, with tests of depleted uranium oxide kernels scheduled to commence at the end of FY 2003.
- Plans for a comprehensive fuel characterization capability were developed, and a basic set of characterization tools was assembled to support the early fabrication studies. Advances were made in measuring key fuel properties, including improved techniques for measuring hydrocarbon anisotropy and evaluation of microstructural properties with nondestructive X-ray techniques.

A plan for compacting coated particles into a fuel element was developed and implemented, covering characterization of candidate materials, establishment of a laboratory-scale thermosetting compacting process line, and production of initial fuel compacts (using TRISO-coated surrogate fuel kernels). The carbon materials for this activity had to be requalified, since many of the traditional feedstocks no longer exist.

These activities also supported Nuclear Energy Research Initiative (NERI) projects on microstructural evaluation of silicon carbide coatings and new quality control techniques and the International NERI project on gas-cooled fast-spectrum fuels. Advances in nitride coating were made using surrogate kernels in the laboratories jointly supported by the Advanced Fuel Cycle Initiative (AFCI) and AGR programs, and work to fabricate uranium nitride kernels was begun. An LDRD proposal for a microwave-driven solvent-free kernel process is expected to receive funding.

Rating: Outstanding.

- Provide program management support and technology activities to assist DOE with the initiation of a new program for the NASA Nuclear Systems Initiative.

Results: ORNL completed and published the joint NASA/DOE Space Reactor Power System, documenting the multilaboratory technical screening (led by ORNL) of candidate space reactor power systems for outer planetary robotic missions. In addition, DOE assigned several lead roles in the new NASA Jupiter Icy Moon Orbiter (JIMO) project and the Prometheus program to ORNL:

- refractory metal and advanced materials technology development, and reactor control system strategy and technology development;
- conceptual design of the JIMO flight system nuclear shield;
- independent nuclear safety and mission assurance for JIMO;
- reactor module qualification and assembly, test, and launch operations planning;
- National Environmental Protection Act (NEPA) and environmental compliance planning; and
- program planning, including cost and schedule estimation.

Multiyear program cost and schedule plans were produced for these major programmatic elements, and technical work was initiated in all areas of responsibility. ORNL has been fully integrated into the JIMO project team at the Jet Propulsion Laboratory (JPL), and an ORNL project site office will be established at JPL.

Rating: Outstanding.

National Nuclear Security Administration: Office of Defense Nuclear Nonproliferation

- Provide two Oak Ridge staff for key assignments: a person for an Interagency Personnel Assignment (IPA), to work at the DOE Moscow Embassy in support of Russian nonproliferation activities; and a chemist candidate, for training to support International Atomic Energy Agency (IAEA) inspections of suspect sites in Iraq.

Results: An ORNL staff member was selected for the position at the Moscow Embassy, providing support to Russian nonproliferation activities. (The IPA was converted to a Federal position, and the staff member retired from ORNL to take the assignment.) Two ORNL chemists underwent training to support International Atomic Energy Agency (IAEA) inspections in Iraq and were ready to be deployed when the outbreak of hostilities precluded inspections. These employees are available to participate in assessments of possible weapons sites in post-war Iraq.

Rating: Outstanding.

- Extend the Material Protection, Control, and Accounting (MPC&A) program to nuclear warheads held by the Russian Federation military by conducting the first-ever site visit to a Strategic Rocket Forces (SRF) mobile site.

Results: As a first step in extending MPC&A program activities to protect Russian nuclear weapons and weapon systems from theft or diversion, ORNL staff visited two SRF mobile sites. The first visit, to a site near Novosibirsk, was the first ever by a team of MPC&A experts. A mobile launch area, a mating facility, and a rail-transfer point (RTP) were visited, and discussions to evaluate possibilities for cooperative protection of nuclear weapon locations were held. Designs for rapid security upgrades at the site were developed, and contracts were negotiated for implementation. The first security upgrades were for the RTP, where missiles and warheads are staged for shipment to dismantlement sites. The second site visit, to a previously unvisited SRF mobile launch facility, focused on reviewing the security at a warhead storage site, with the goal of verifying the need for safeguards and security upgrades at the facility. A design for rapid upgrades at the storage facility was reviewed, rapid security upgrades at the RTP were started, and a design for comprehensive upgrades was developed and reviewed. A follow-on site visit is planned for October. The results of these interactions demonstrate the willingness of the Russian Federation and the United States to work together to improve security at these facilities.

Rating: Outstanding.

- Accelerate DOE/National Nuclear Security Administration (NNSA) MPC&A Transportation Security Project activities by establishing a second vendor to provide vehicles and components in Russia. Results: ORNL staff established additional vendors to provide vehicles and components for the secure transportation of special nuclear material (SNM) within the Russian Federation. Contracts were placed with the Torzhok Transportation Facility to provide guard railcars (with the expectation of future contracts for cargo railcars and trucks) and with other vendors to provide snow removal equipment for the Russian Navy. NNSA managers asked the ORNL MPC&A transportation security group to provide SNM cargo and guard/escort rail cars and secure trucks for several Russian Navy projects. Representatives of the Defense Threat Reduction Agency (DTRA) discussed providing secure transportation for Russian nuclear weapons slated for dismantlement. ORNL was also tasked with providing modified trucks for the transportation of radiological dispersal device (RDD, or “dirty bomb”) materials. Additional funding of \$1.5 million was provided in the latter part of the year to support secure transportation for a number of Russian Federation nuclear facilities. Rating: Outstanding.

1.5 SPALLATION NEUTRON SOURCE

The fifth performance measure for the S&T critical outcome calls for delivery of the Spallation Neutron Source (SNS) on schedule, on budget, and with full scope. SNS is a next-generation short-pulse spallation neutron source that will be significantly more powerful than the best spallation neutron sources now in existence. The nation’s largest civilian science project, the SNS is being constructed by a team of six national laboratories. ORNL leads the project team. In FY 2003, the SNS project met or exceeded all schedule, cost, and technical requirements. Sections 1.5.1–1.5.3 describe ORNL’s performance against the indicators for this performance measure.

1.5.1 Schedule Performance

Score: 4

Rating: Outstanding

Schedule performance on SNS milestones is presented in Table I.2, which shows that only one milestone was not completed ahead of its scheduled completion date. SNS remains on track to deliver a facility that meets approved project requirements by the scheduled completion date of June 2006.

Table I.2. Schedule Performance on SNS Milestones

Milestone	Scheduled Completion	Actual Completion	Rating	Points
Submit revised Estimate to Complete (ETC) for Work Breakdown Structure (WBS) 1.4, 1.7, and 1.8	10/31/02	10/30/02	Outstanding	4
Beneficial occupancy of Front End Building	12/31/02	10/14/02	Outstanding	4
Complete global controls design	1/31/03	9/30/02	Outstanding	4
Front end beam available to drift tube linac	3/31/03	12/30/02	Outstanding	4
Submit revised ETC for WBS 1.2, 1.5, 1.6, and 1.9	4/30/03	4/29/03	Outstanding	4
Beneficial occupancy of 1000-MeV linac tunnel	4/30/03	12/18/02	Outstanding	4
Complete target design	6/30/03*	6/27/03	Outstanding	4
Start target installation	6/30/03	4/11/03	Outstanding	4
Start ring installation	8/31/03			
Beneficial occupancy of ring tunnel	8/31/03	6/6/03	Outstanding	4
Submit revised ETC for WBS 1.10 (Accelerator Systems Division, Site Operations Division, and Experimental Facilities Division)	8/31/03	7/3/03	Outstanding	4
Average score				4

1.5.2 Budget Performance

Score: 4

Rating: Outstanding

SNS budget performance has consistently been at a high level. The cumulative cost performance index for project work is expected to be >97% at the end of the fiscal year.

1.5.3 Technical and Managerial Performance and Continued Program Excellence

Score: 3.6

Rating: Outstanding

SNS construction was at its peak in FY 2003, with approximately 500 workers present on any given day. Since the beginning of the project to date (~ 2.5 million construction hours), there have been no lost work days and no environmental concerns. All major accelerator facilities are complete, steel erection for the Target Building is nearing completion, exterior siding and roofing are being installed on the Central Laboratory and Office (CLO) Building, all permanent utilities are complete, and paving is under way at the site.

Substantial technical progress was realized during the year in the procurement, testing, and commissioning of technical components. Major accomplishments included the successful on-time commissioning of the front end in December 2002 and the delivery of beam through the first drift tube linac (DTL) tank in August 2003. Installation and conditioning of cryomodules began on site, along with installation of ring components. Major procurements for target systems were awarded, and target installation activities are proceeding. Instrument design and initial procurements are progressing well, with delivery of their first major pieces of hardware in FY 2003.

Technical issues continue to be worked as they arise. Good progress was made in FY 2003 on resolving issues from the preceding year, including low-level rf system development and integration, target vessel design, and high-voltage converter modulator (HVCM) quality issues. Problems that arose in FY 2002 with fabrication of the DTL were aggressively dealt with, and much of the schedule slip for the start of DTL-3 installation was recovered by the time DTL-1 started commissioning. Full schedule recovery is expected by the start of coupled-cavity linac (CCL) commissioning. Issues that will continue to be worked in FY 2004 include fabrication of the remaining drift tubes, high-power rf deliveries, and timely delivery of the CCL modules.

Cost control continued to be a major area of emphasis. Contingency funds are being closely tracked and controlled. Cost reduction actions in FY 2003 included reducing the level of component testing, simplifying the bridge between the CLO and Target buildings, strengthening the processes for change control in the field, adding weekly reviews with senior project management, redesigning the telecommunications system for more cost-effective integration with ORNL, scrubbing target dimensional tolerances, and transferring work and associated risk to ORNL from other laboratory partners. Reviews of ORNL staffing assignments, overhead support for the Office of the Associate Laboratory Director for SNS, and the projected base for construction project overheads yielded savings that helped offset cost growth. A risk-based contingency analysis was performed monthly, and Estimates to Complete (ETCs) were prepared for all Work Breakdown Structure (WBS) elements to ensure the project cost estimate is current. Other options for maximizing project flexibility and contingency continue to be evaluated.

On the recommendation of the team that conducted the semiannual DOE “Lehman review” in May 2003, ORNL prepared a Project Completion (End Game) Plan, which was reviewed and accepted by a DOE-chartered team. This plan resequences work to match the approved funding profile and provides a smooth transition to operations, with no changes to the total project cost or the June 2006 finish date.

DOE-SC assessments of the project, via the Lehman reviews and the End Game Plan Review, found that the project continues to be on track to meet its Level 0 baseline cost, schedule, and technical objectives. These reviews have noted that the management team continues to manage the project effectively. Potentially significant technical issues that arose in FY 2002 were largely resolved and no comparable new issues have developed, although much work remains. The major new challenge that emerged in FY 2003 was the need to realign the schedule to the funding profile. The End Game Plan accomplished this, although it will be essential to closely monitor and adjust detailed plans given the tight funding through the end of the project.

Key focus areas and challenges for the coming year include maintaining safe, on-schedule construction, installation, and commissioning activities and solving technical issues, all within the cost envelope. Integration of civil/technical and technical/technical interfaces will also continue to receive SNS management attention, along with roll-off planning for partner laboratories.

1.6 WORK FORCE

Performance Measure 1.6 supports the S&T critical outcome by calling for enhancement of the Laboratory's ability to attract, develop, promote, and retain a diverse work force with strategic skills while maintaining reasonable costs. Sections 1.6.1–1.6.3 describe ORNL's performance against the indicators for this performance measure.

1.6.1 Diversity

Score: 0

Rating: Marginal

UT-Battelle was unable to fully meet its commitment to reduce underutilizations by 8% in the areas of science, technical, and managerial classifications/categories as it had hiring or promotional opportunities in FY 2003.

Nevertheless, significant progress was made in reducing minority underutilizations in the Officials and Managers (O&M) and Professionals job categories. A comparison of the EEO-2010 reports for October 1, 2002, and August 29, 2003, shows a reduction of 20% in the O&M category and 14% in the Professional category. Minority staff members with new positions included a Hispanic male division director, a black male division director, and three black male group leaders. One of the three group leaders was a former National Consortium for Graduate Degrees for Minorities in Engineering and Science (GEM) student intern, which demonstrates the return on our sustained investment in the GEM program student initiatives. Though the overall commitment was not met, the reduction rates for minority underutilizations far exceeded the stated goal.

We were not as successful in reducing underutilizations of women. We added one woman to the O&M category and three to the Professionals category, but overall hiring activity for women was insufficient to reduce underutilizations. However, through a significant recruitment effort and development of an attractive hiring package, we were able to make an offer to a woman candidate for the position of Life Sciences Division Director.

The summer program to bring faculty from Historically Black Colleges and Universities (HBCUs) and Minority Education Institutions (MEIs) to ORNL for a 10-week research visit continued for a second year. This effort is designed to establish long-term relationships with faculty members, who will then provide their students with encouragement and insight about internships and employment at ORNL. We also continued our sponsorship of several successful programs for middle school, high school,

undergraduate, and graduate students, including the Research Alliance for Minorities (RAM), the Southeastern Consortium for Minorities in Engineering (SECME), and GEM. These initiatives target both women and minorities.

1.6.2 Strategic Staffing

Score: 3

Rating: Excellent

UT-Battelle delivered excellent performance in recruiting and hiring of employees with strategic skills, as identified by our Strategic Hires Program. The acceptance rate for offers made to fill positions identified as strategic hires was 72%.

The Strategic Hires Program is designed to attract to ORNL new talent in scientific and technical areas that are of critical importance to executing the Laboratory Agenda. Each year, we identify a set of positions as strategic hires and devote considerable time to filling them. In FY 2002, 22 positions were identified as strategic hires. Of the 18 offers extended to candidates for these positions, 13 were accepted, for an acceptance rate of 72%. The new group of strategic hires included four division directors, one deputy division director, and one program director, as well as six diversity candidates.

Of the rejections, two were for the same division director position, with the candidates citing personal reasons (rather than the offer package) for their decision. A review of the interview process for this position identified opportunities to improve the staffing process, and resulted in the chartering of a team to improve the staffing process which address these opportunities. The other three rejections were for research staff positions; candidates accepted other offers that they thought would be more in line with their career interests and goals.

1.6.3 Human Resources Strategic Plan

Score: 4

Rating: Outstanding

UT-Battelle delivered on its commitment to publish a comprehensive Human Resources (HR) Strategic Plan. A comprehensive plan was developed by the HR Directorate and reviewed and approved by the Leadership Team. In pursuit of implementing the plan, we achieved our first year objective of redeploying the benefits plan which will have a number of positive results including enhancement of staff choices, ensuring competitiveness, addressing medical costs, and a projected cost avoidance of over \$65 million.

Development of the plan was conducted as part of a comprehensive “Strategic Initiatives Project” that comprised benchmarking, stakeholder input, and planning. For the first phase of this project, an external consultant was retained to assist with individual interviews and focus group sessions with Laboratory managers, HR Directorate staff, and internal and external customer and stakeholder representatives.

Phase II of the project included the development of mission, vision, and values statements for the HR Directorate; an analysis of strengths, weaknesses, opportunities, and threats; identification and organization of task team assignments, and publication of a draft strategic plan. HR Directorate staff reviewed customer feedback on the draft plan and conducted an organizational analysis and self-assessment.

The final strategic plan includes 13 task team assignments to be completed during the next three to five years. Each task team will address specific improvement opportunities identified during the Strategic

Initiatives Project. Significant progress has already been made in several of these projects, particularly in realigning the delivery of HR services and benefit plans.

2. EXCELLENCE IN OPERATIONS AND ES&H

Critical Outcome: We will sustain and improve ORNL's ability to serve the needs of DOE and the nation through responsible stewardship.

2.1 INTEGRATED MANAGEMENT

2.1.1 Standards-Based Management System

Score: 4

Rating: Outstanding

The Standards-Based Management System (SBMS) provides the Laboratory's underpinning systems and processes for conducting all of our activities and clearly defines expectations for our staff including our work control and risk mitigation strategies, processes, and tools that reflect our commitment to a safe and productive workplace. UT-Battelle committed to full deployment of our SBMS, including complete Requirements Decision Records (RDRs) for contract requirements, by June 30, 2003. This commitment included retirement of all alternative directives and guidance documents, completion of a customer survey to measure effectiveness and efficiency, and continuing focused evaluations of the maturity of management systems by UT-Battelle and DOE management until maturity is achieved.

All project milestone tasks for completion of RDRs and development of subject area procedures to retire old directives and guidance documents were completed on schedule. A determination by the DOE ORNL Site Office that these tasks had a significant favorable impact on the Laboratory's mission is pending. The four tasks and their outcomes are as follows:

- Completion of RDRs for contract requirements. RDRs reflect the effective dates of requirements in the contract; the management system and management system owner to which each requirement is assigned; implementation due dates; implementation methods; and actions necessary for compliance. RDRs for the 208 clauses in the UT-Battelle operating contract were completed on June 23, 2003, ending a 9-month effort.
- Subject area development. During FY 2003, 61 new subject areas were established, and 145 old directives and guidance documents were retired. All requirements and guidelines are now defined through subject area documents.
- Management system maturity evaluation. Consistently structured maturity evaluations were conducted for six management systems:
 - SBMS,
 - Performance-Based Management System,
 - Safeguards and Security Management System,
 - Acquisition Management System,
 - Facility Operations and Maintenance Management System, and
 - Technology Transfer and Economic Development Management System.
- SBMS customer survey: A structured customer survey, conducted in March and April 2003, gathered information from ORNL staff members on SBMS products and applications, subject areas, ease of navigation, training and information opportunities, and feedback methods. The results of this survey were analyzed to discern strengths and opportunities for improvement.

2.1.2 Integrated Safety Management

Score: 4

Rating: Outstanding

In the PEP, DOE and ORNL committed to jointly agree on a set of divisions for which Integrated Safety Management (ISM) Workplace Maturity Evaluation would be conducted, with a roll-up evaluation of divisions and directorates to be delivered to DOE.

With the completion of 34 ISM maturity evaluations, UT-Battelle delivered outstanding performance. The primary objective of these evaluations was to establish an effective ISM assessment process that would yield a baseline from which to measure future performance. The goal was continuous improvement, with a focus on performance and outcome rather than compliance. The primarily qualitative analysis tool used for the evaluations allowed for the assessment of a representative cross section of an organizations' work using a graded approach and a risk-based decision making process. Following the division assessments, ORNL directorates performed their own roll-up evaluations. A management evaluation of divisional and directorate collective evaluations pointed to a need for continued maturation of UT-Battelle's ISM program, as described in the report delivered to DOE in September. Specific annual maturity evaluations are expected to continue in FY 2004 and perhaps into FY 2005. The final objective of this evaluation process is its incorporation into each organization's ongoing self-assessment program.

2.1.3 Performance-Based Management

Score: 2.9

Rating: Excellent

This is the third full year of our effort to instill a culture that effectively utilizes self-assessment to drive continuous improvement. Our formal PEP commitments have focused on maturing the self-assessment program within line organizations, however, we have also made progress in developing the use of a variety of self-assessing processes and tools. We have modified our approach to leading and conducting event critiques. Senior managers have become increasingly involved in the conduct of management assessments. We have used external sources to further our assessment goals including participation by University of Tennessee students in narrowly-focused assessments and involvement by UT-Battelle and Battelle corporate resources in leading or participating in numerous assessment activities. In addition, we are improving the analysis capabilities we use to identify significant results and Laboratory-level implications from the information provided by the many external evaluations conducted at ORNL each year. Collectively, we believe we are seeing good progress in creating a culture that uses critical, unbiased self-assessment processes to identify problems so that they can be fixed.

The PEP performance indicator for performance-based management (PBM) was formulated to address the maturity of ORNL line organizations' implementation of the performance assessment element of the Laboratory's structured PBM system (PBMS). Performance was evaluated on the basis of a composite rating derived from evaluations of selected line management feedback and improvement programs.

Five ORNL divisions (Computer Science and Mathematics, Engineering Science and Technology, Environmental Protection and Waste Management, Facilities Management, and Physics) and four ORNL directorates (Business and Information Services, Energy and Engineering Sciences, Facilities and Operations, Human Resources and Diversity Programs) were evaluated. A member of ORNL's Office of Independent Oversight (IO) led each evaluation team, and a DOE ORNL Site Office representative participated in each evaluation. Each evaluation used the criteria and the framework for assessing effectiveness described in the IO document "Criteria for Evaluating Effectiveness of Performance Assessment Programs."

The effectiveness criteria are grouped into three categories: approach, deployment, and process improvement. Divisions were evaluated in all categories; directorates were evaluated on their approach and process improvement. The most common strengths and areas for improvement identified in the evaluations are summarized below for each category.

The FY 2003 rating of 2.9 is the highest rating attained in the first three years of evaluation and compares favorably with the rating of 2.4 in FY 2002. The range of scores (2.6 to 3.2) is much tighter than in FY 2001 or FY 2002. General strengths of the performance assessment process are the identification of organizational strengths and corrective actions taken to improve weaknesses and the use of performance assessment information in Level 1 and Level 2 decision-making. General areas that need improvement are the development of an overall approach (critical outcome tree) to the identification of performance objectives and the lack of documented guidelines for conducting performance assessments based on experiences of the individual organization.

The single most notable improvement in the performance assessment process in FY 2003 was the clear ownership of performance objectives and associated actions exhibited by Level 3 managers.

Approach: Strengths and Areas for Improvement

- Self-assessment programs verify that organizational performance objectives are established, formalized, and linked to Laboratory critical outcomes.
- Organizational performance measures and performance indicators are effectively measured.
- Line management's role in the self-assessment process is essential, obvious, and consistent.
 - Roles, responsibilities, authorities, and accountabilities for conducting self-assessments are not fully assigned, documented, or understood by those performing them.

Deployment: Strengths and Areas for Improvement

- Self-assessment activities and performance measurement are tailored to the function that is being evaluated, are performance-based, and are documented.
- Self-assessment activities produce findings that reflect documented measures of performance and/or corrective actions are identified.
 - Guidelines for conducting self-assessment activities are not always documented, accepted, or well understood.

Process Improvement: Strengths and Areas for Improvement

- The corrective action management process prevents recurrence of similar events.
- An effective method for addressing external assessment results is incorporated into the self-assessment process.
- Management decisions are based, in part, on the results of self-assessment.
 - Self-assessment results, related performance information, and customer feedback are not always used to structure and prioritize future self-assessment activities.
 - Results of the self-assessment process are not always communicated to internal and external organizational elements, as appropriate.

2.1.4 Integrated Safeguards and Security Management

Score: 4

Rating: Outstanding

DOE's Integrated Safeguards and Security Management (ISSM) Initiative was fully deployed in the ORNL workplace in FY 2003 through full execution of the ISSM implementation plan formulated in calendar year 2002. Components of the plan include:

- Demonstration of an ISSM framework that includes agreed-upon sets of applicable safeguards and security requirements,
- A functional change control infrastructure for maintenance of applicable safeguards and security requirements,
- Implementation of a process for self-assessing ISSM, using ISSM expectations and attributes to determine the efficacy of implementation,
- Conduct of an initial self-assessment,
- Acceptance of ISSM ownership by UT-Battelle line managers at all levels,
- Incorporation of ISSM guiding principles and core functions are incorporated with the ORNL Standards-Based Management System (SBMS),
- Deployment of effective ISSM awareness tools, and
- Deployment of ISSM feedback mechanisms at worker levels.

2.1.5 Establishment of Nonreactor Nuclear Facilities Division

Score: 4

Rating: Outstanding

UT-Battelle committed to establish a new organization, the Nonreactor Nuclear Facilities Division (NNFD), and commence NNFD operations through development, implementation, and validation of processes; assignment of staff; and assumption of responsibilities in accordance with the schedule documented in the PEP.

All of the eight requirements established for this performance indicator were completed, seven of them by their designated completion dates.

- A single work control and scheduling process for managing work across the NNFD complex became operational on April 1, 2003, the due date for this action. The process was validated through management assessment on June 13, 2003, ahead of the due date of June 30, 2003. This process consolidation will result in a more rapid and uniform implementation of the processes to plan work and mitigate associated hazards. The division will also benefit from groups and personnel pooling experience and lessons learned that result from performing various types of work activities.
- Performance planning and assessment was implemented on December 4, 2002, well ahead of the due date of April 30, 2003. As we mature our performance assessment processes, we will be able to discern problems at lower levels, and learn and share associated lessons at a level that provides a much higher rate of return.
- An Action Center was established and implemented to provide financial management integration (variance management) and consolidation of NNFD senior management processes on December 2, 2002. The due date for this action was January 31, 2003. Through this effort, we will be able to achieve demonstrated economies of scale based upon the sharing of best financial practices information from our facility staff.
- NNFD staffing requirements were finalized on February 28, 2003, the due date for this action. This accomplishment will promote a common, shared set of management expectations that fully enable staff to carry out their duties on a consistent basis.
- The goal of filling 75% of the organization slots was achieved on May 1, 2003, well ahead of the due date of June 30, 2003.
- Responsibility for operations procedures was turned over to NNFD on August 14, 2003, one day ahead of the due date of August 15, 2003. Establishing a set of common expectations for the development, review, approval, and use of all internal operating procedures will promote a uniform understanding of work control and hazard mitigation practices and processes.
- Three of four division performance assessments (self-assessments) were completed ahead of the schedule established by the NNFD Performance Assessment Plan:

- Regulatory compliance, completed on December 23, 2002 (target date: January 15, 2003).
- Configuration control, completed May 22, 2003 (target date: June 15, 2003).
- Conduct of maintenance, completed June 18, 2003 (target date: June 30, 2003).
- Facility condition, completed September 16, 2003 (target date: August 31, 2003).
- Safety Basis documentation was transferred to NNFD on December 18, 2002, ahead of the target date of December 31, 2002.

NNFD also self-identified several action items, all of which were completed during FY 2003:

- validation of qualifications for NNFD Facility/Project Leaders,
- validation of qualifications for NNFD Facility Supervisors,
- Safety Basis reviews/validations,
- assumption of Bethel Valley Hot Cell Facilities Program Plan management,
- assumption of Material Balance Area responsibilities for NNFD facilities,
- assumption of space management responsibilities for NNFD facilities,
- validation of and assumption of responsibility for NNFD facility information in the Active Facilities Data Collection System (AFDCS), the ORNL Facility Index, the Condition Assessment Survey (CAS) system, SAP, the Space Allocation Management System (SAMS), and the Facility Information Management System (FIMS),
- validation and assumption of responsibility for the activity data sheet (ADS) and Operational Improvement Program (OIP) databases,
- performance assessments for cranes, facility hazards, backup/emergency generators, and rigging and hoisting, and
- assumption of ES&H responsibilities for NNFD facilities.

Work control processes that were developed within NNFD have become a model for other ORNL operations. Craft scheduling and resource sharing processes have resulted in higher efficiencies through the consolidation of effort. A standard work control process adds rigor in work planning and execution while providing improved efficiency in the use of craft resources across all nuclear facilities. Initiatives to improve operations procedures and to normalize and improve conduct of operations are under way. Our standard Plan of the Day/Plan of the Week process includes the implementation of resource-loaded schedules. Operating procedures and Safety Basis documentation were completed ahead of planned schedule.

NNFD's implementation of consolidation has provided a basis for sharing engineering, craft, and support resources across all facilities. In addition, consolidation efforts have provided a uniform and consistent management approach to addressing considerations associated with our processes, issues, and related trends. The result has been a dramatic improvement in our support of all facilities and a significant positive impact on several cross-cutting Laboratory processes and issues.

For example, the implementation of NNFD's management approach has delivered consistent and rigorous safety documentation and procedure-related technical reviews, as well as improved documentation administration and control. We have improved our Safety Analysis Reports, Technical Safety Requirements, Safety Evaluation Reports, Unreviewed Safety Question Determinations, Fire Hazards Analyses, Nuclear Criticality Safety Approvals, EMHAs, local emergency manuals, configuration item (CI) lists, and CI drawings.

NNFD has placed significant emphasis on management performance assessment and use of aggressive investigative techniques for potential issues. All scheduled assessments have been completed on time and have delivered valuable information that has led to process improvements (e.g., work control). Additionally, the division assessment program has directly contributed to Laboratory-wide improvements

in fire hazard assessment, hoisting and rigging activities, crane maintenance, and maintenance of backup and emergency diesel generators.

2.1.6 Completion of Facility Strategic Improvements

Score: 4

Rating: Outstanding

An aggressive set of 12 strategic improvements to ORNL’s nuclear facilities, listed in Table I.3, was identified in the PEP, and 9 of these were completed during FY 2003. One improvement, installation of a new inductively coupled plasma/mass spectrometry (ICP/MS) system in Lab 138 of Building 2026, was changed to meet researcher needs, with a new system installed in Lab 133 instead. Budget constraints forestalled the completion of two improvements: replacement of a vessel off-gas (VOG) fan in the Radiochemical Engineering Development Center (REDC) and refurbishment of Cave A in Building 7920.

Table I.3. Strategic improvements to ORNL nuclear facilities identified in the PEP

Location	Description	Status
3019A	HEPA filter efficiency test line upgrade	Completed May 2003
2026	Install new ICP/MS in Lab 138	Completed September 2003
3047B	Hot offgas (HOG) HEPA changeout (3039 stack)	Completed April 2003
5505	Lab 25 renovation for mass spectrometers	Completed January 2003
3019A	Installation of new VOG HEPA filter in 3039 stack line	Completed May 2003
2026	Hot cell 4 window replacement	20% complete; engineering study completed
3047B	Actinium glove box on line	Completed July 2003
7920	HEPA filter replacement (roof)	Completed November 2002
REDC	Vessel offgas fan replacement (capital project)	75% complete; on hold because of budget constraints (should resume in October 2003)
7920	Refurbishment of Cave A	On hold because of technical problems and budget issues
3525	K8 HEPA filter replacement	Completed September 2003
7920	LLA steam supply upgrade (capital project)	Completed August 2003

NNFD self-identified another 23 items, listed in Table I.4, that also represent strategic improvements to nuclear facilities and all were completed during FY 2003. With the completion of both sets of improvements, we have enhanced both the systems reliability of our facilities and their general appearance.

An evaluation of our performance against the PEP indicator in this area yields a rating of excellent. Given the breadth of our FY 2003 accomplishments, however, we believe that our performance should be viewed as outstanding.

2.1.7 Housekeeping and Operational Improvements

Score: 3

Rating: Excellent

UT-Battelle committed to the demonstration a high standard of operational performance by implementing housekeeping and operational improvements in NNFD facilities. A set of five improvements, listed in Table I.5, was identified in the PEP. Three of these were completed during FY 2003, and the other two are in process. NNFD self-identified another 20 items, listed in Table I.6, that also represent housekeeping and operational improvements and completed most of these during FY 2003.

Table I.4. Strategic improvements to ORNL nuclear facilities self-identified by NNFD and completed in FY 2003

Location	Description
3019A	Refurbish GBOG fan 1/deck repair
3047B	Replace damper on AJ-102B fan
3025E	Change K18 filter
2026	Replace flexible connectors on K-2 exhaust system fan
3047B	Install crane over west blister
4501	Replace south sump pump
3019A	Replace expansion joint on the supply fan
3019A	Move 2 sprinkler inspection test valves to 6 ft
3019A	Replace Room 150 light fixtures
3019A	Install heat in Room 147
5505	Repair heat in Lab 37
3019A	Install VOG HEPA unit in Penthouse D
3525	Repair bridge crane brake
3019A	Install DOP/POA test lines
2026	Repair hydraulics on main personnel entrance door
7920	Prerequisite Limited Access Area (LAA) maintenance/modifications to enable fire system testing
3047B	Repair steam leak in west-end plenum chamber, Room 315
4501	Replace hood filter on Fan EF-77 in attic
3025E	Unstop roof drain
7930	Repair Shield DR1 controls
5505	Troubleshoot and repair supply dampers
3025E	Replace cell access area roof HEPA filter
3025E	Replace CAA lighting fixtures

Table I.5. Operational and housekeeping improvements to ORNL nuclear facilities identified in the PEP

Location	Description	Status
REDC	Limited Access Areas cleaned out	On hold because of priority conflicts and budget issues
4501	Satellite Accumulation Area cleaned out	Completed in September 2003
5505	Vacuum pumps removed from the facility for disposal	Completed in April 2003
REDC	Technical safety requirements (TSR) surveillance procedures rewritten, issued, and in use	50% complete; projected to be complete by December 31, 2003
REDC	Operational procedures improvement plan developed and issued, and the first procedure written, verified, validated, and implemented	Completed in August 2003

Table I.6. Operational and housekeeping improvements to ORNL nuclear facilities self-identified by NNFD

Description	Status
Compile and verify an integrated maintenance backlog list for all NNFD facilities	Completed
Implement a Web-based Maintenance Resource Scheduling (MRS) configuration that uses maintenance job requests (MJRs) to track work and provide scheduling/approval of work and resource utilization	Completed
Review overhead and "powered" cranes used in hot cells	Completed; identified the need for a Laboratory-wide crane assessment

Table I.6 (continued)

Description	Status
Review and resource load NNFD facility preventive maintenance items into MRS system	Completed
TSR verification for all NNFD facilities	Completed
“Bluesheet” all NNFD facility procedures (more than 400 procedures total)	Completed
Review/update local emergency manuals for all NNFD facilities	Completed
Establish Safety Basis programs for Combustion Control Program, In-service/Inspection of Design Features, and Inventory Control	Completed
Conduct nuclear criticality safety (NCS) self-assessments on all NNFD facilities	Completed
Review NNFD HEPA filter storage areas and DP monitoring to meet requirements defined in new SBMS Subject Area for HEPA filters	Completed
Review and edit all Facility Use Agreements (FUAs) for NNFD facilities	FUAs for 2026 and 5505 have been approved; remaining FUAs are in final stages of completion
Develop and finalize an NNFD Training and Qualification Plan	Completed
Implement Safety Training Observation Program (STOP Program) in NNFD	Completed
Consolidate craft personnel used by NNFD into Building 3104	Completed
Identify and develop legacy waste lists for each NNFD facility	Validation process in progress; completed for 3027 and 3019A
Supply input to FY 2003 Strategic Plan for Nonreactor Nuclear Facility Consolidation	Completed
Transuranic (TRU) waste strategy and implementation plan	Implementation under way
Update 830 SAR	Completed
Complete washdown on Cell B in 3047B	Completed
Complete assessment of hot cell procedure for 3025E	Completed

Results of our operational improvements are evident in all NNFD facilities. The most significant improvements were the deployment of standard work control processes, added discipline in deployment of craft, and implementation of a standardized Plan of the Week and Plan of the Day. Operational improvements are also evident in management involvement, conduct of critiques, aggressive investigation of issues, and systematic event management. NNFD has been recognized as a driver for operational excellence. HFIR lessons learned have consistently been incorporated into NNFD operational improvement plans, and NNFD process improvements have been shared with Research Reactors Division (RRD) staff as potential solutions for HFIR issues.

2.1.8 Initiation of Nonreactor Nuclear Facility Consolidation

Score: 3

Rating: Excellent

UT-Battelle committed to deliver to DOE an action plan for consolidating nonreactor nuclear facilities at ORNL. Total funded research in these facilities has declined in recent years. As a result, facilities have been underutilized and have not always been operated and maintained to current DOE expectations. Significant system upgrades are needed, and there is significant deferred maintenance.

The consolidation plan was completed and transmitted to the DOE Site Office for review and comment on June 30, 2003. The plan defines a path forward for matching our facility assets to expected nuclear missions. A reduction in the number of facilities, from the present ten to five or six by the end of FY 2007, is recommended to allow ORNL to address system upgrades, the maintenance backlog, and operational improvements in a prioritized manner.

In recognition of constraints on near-term funding, the consolidation plan minimizes the cost of implementing the proposed consolidation. The plan also minimizes both the number of ventilation stack upgrade projects needed to address the future shutdown of the 3039 stack and the overall ORNL presence in the Isotope Circle area. We have begun the detailed planning for implementation of this plan during the fourth quarter of FY 2003 based on our knowledge of current funding limitations, and this effort will continue in FY 2004.

2.2 IMPROVED ES&H PERFORMANCE

2.2.1 Safety and Health Performance

Score: 3

Rating: Excellent

UT-Battelle delivered demonstrable gains in safety and health performance in FY 2003. In comparison with FY 2002, we saw a 37% reduction in the recordable injury and illness (RII) case rate and a 47% reduction in the lost time away case rate. We also celebrated a period of more than 2 million safe work hours without a lost time away case. In addition, notable improvements were made in the area of fire protection assessments.

The composite score for safety and health performance combines results for nine indicators. Highlights for each indicator are reported below.

- The total recordable case rate is the rate of work-related injuries and illness requiring medical treatment (beyond first aid) for every 200,000 hours worked. For FY 2003, the rate was 2.3, which is outstanding.
- The lost time case rate is the rate of work-related injuries that result in restrictions on worker activity or days away from work. The significant reduction in the lost time case rate, which reflects outstanding performance, can be attributed to Laboratory initiatives aimed at
 - delivering an overall reduction in the recordable case rate,
 - returning employees to work through an aggressive case management program,
 - effectively treating ergonomic injuries with progressive physical therapy, and
 - developing alternative work programs with management.
- Exposures to toxic and physical hazards were kept below permissible exposure limits (PELs) or threshold limit values (TLVs) by the use of engineering controls, administrative controls, and personal protective equipment. Medical surveillance found no exposures above the assigned biological exposure indices for monitored materials. With no exposures to toxic and physical hazards for FY 2003, performance was outstanding.
- The subcontractor lost time away case rate continued to improve throughout FY 2003. With no lost time injuries resulting in days away from work for any of the on-site subcontractors, performance was outstanding.
- In the area of nuclear safety, performance was negatively affected by three Category 4 nuclear criticality safety (NCS) violations at Building 3019 and three Technical Safety Requirement (TSR) violations, one each at Building 3019, Building 7920, and HFIR. The value attained on the Nuclear Safety Violation Index [a composite measure that captures NCS violations, TSR and OSR violations, and Price-Anderson Amendment Act (P-AAA) noncompliances resulting in enforcement action] was 21, which is in the marginal range.
- The worker radiation dose [the average measurable dose in millirem (mrem) to DOE workers, calculated by dividing the collective total effective dose equivalent by the number of individuals with measurable doses] for FY 2003 was 77 mrem, which is outstanding.

- UT-Battelle delivered outstanding performance in protecting radiological workers from unnecessary exposures. The calculated Radiological Operations Index was 3.2.
- Performance on fire protection engineering assessments improved significantly in FY 2003. These assessments are scheduled every 12, 36, or 60 months, depending on the type and replacement value of the facility. The 12-month assessments are given the highest priority for completion, followed by 36- and 60-month assessments. In FY 2003, UT-Battelle completed all 12-month assessments on time, and 91% of the remainder were completed on time, delivering outstanding performance.
- Safety Basis performance is assessed on the basis of completion of and submittal to DOE, in accordance with an agreed-upon schedule, all 10 CFR 830, Subpart B compliant Documented Safety Analyses (DSAs) and completion of 420.1 Compliance Implementation Activities (CIAs). FY 2003 performance met Criterion 2, which requires submittal of all updated DSAs with no more than a 30-day delay. All updated DSAs were submitted by April 10, 2003. CIAs are completed as outlined in the ORNL Integrated Safety Analysis Schedule Milestones.

2.2.2 Environmental Performance

Score: 4

Rating: Outstanding

ORNL's environmental performance during FY 2003 was outstanding.

- There were no reportable releases to the environment.
- No significant findings resulted from inspections conducted by regulators, indicating that UT-Battelle is consistently meeting the expectations of these regulators. Compliance inspections were conducted in seven regulatory areas: the Clean Water Act (CWA), the Clean Air Act (CAA), the Resource Conservation and Recovery Act (RCRA), underground injection control, the Emergency Planning and Community Right-to-Know Act, underground storage tanks, and drinking water. Positive observations were made by the regulators in all compliance areas. ORNL also underwent a multimedia compliance inspection by Region IV Environmental Protection Agency (EPA) representatives.
- No National Pollution Discharge Elimination System (NPDES) permit nonconformances were attributed to UT-Battelle activities.

This is the first performance period during which all three indicators have been simultaneously held to zero. UT-Battelle has been able to deliver this performance as a result of organizational effectiveness in combination with the maturity of our regulatory compliance and waste management programs.

UT-Battelle operating and research organizations once again delivered outstanding performance in environmental compliance, despite challenges in the form of reduced Environmental Protection and Waste Services (EPWS) oversight of UT-Battelle activities, as well as diversion of key EPWS core resources to the development of an Environmental Management System (EMS) and major legacy material removal initiatives. This sustained level of performance is attributed to the line organizations' increased ownership and use of deployed resources such as Environmental Compliance Representatives (ECR), Generator Interfaces (GI), and other technical support personnel, and the strengthening of the SBMS subject areas and procedures associated with the EMS.

In support of the Legacy Materials Disposition Initiative (LMDI), Laboratory Waste Services (LWS) characterized and packaged 1915 pumps and motors for disposal. Approximately 10^3 m³ of low-level liquid waste (LLW) was disposed of directly at Envirocare of Utah in support of LMDI initiatives. LWS also supported facility cleanout and closure activities at seven ORNL facilities (Buildings 1560, 1561, 2024, 3503, 3597, 4500N, and 5500) and four Y-12 National Security Complex facilities (Buildings 9204-1, 9201-2, 9201-3, and 9201-3) and dealt with contaminated mimosa tree waste at ORNL. Removal

of legacy gas cylinders continued during FY 2003, with the disposition of 1158 non-radioactive (823) and radioactively (335) contaminated gas cylinders at Integrated Environmental Services. LWS also supported the cleanout of legacy chemicals in laboratories across ORNL, transferring many items to the Chemical Management Center (CMC) for reuse and disposing of the remainder as waste. LWS also supported division-sponsored facility cleanouts for the Chemical Sciences, Environmental Sciences, Life Sciences, Metals and Ceramics, Nonreactor Nuclear Facilities, and Nuclear Science and Technology divisions. LWS activities in disposition of newly generated waste supported ongoing research and development and operations.

During FY 2003, LWS delivered the following accomplishments:

- Certification of approximately 305 m³ of newly generated LLW for disposition through Bechtel Jacobs Company and its subcontractors.
- Direct disposal of approximately 103 m³ of legacy LLW through the LMDI.
- Certification of approximately 3.7 m³ of newly generated transuranic (TRU) waste for disposition through Bechtel Jacobs and its subcontractors.
- Certification of approximately 25,830 kg of newly generated mixed waste for disposition through Bechtel Jacobs and its subcontractors.
- Direct disposal of approximately 54,000 kg of newly generated hazardous waste.
- Recycling of
 - 115 tons of white paper, 55 tons of mixed paper, and 100 tons of cardboard;
 - 3.6 tons of aluminum cans;
 - 3,500 toner cartridges; and
 - 27 kg (60 lb) of foam peanuts.
- Response to and management of approximately 75 hazardous materials spills at the Laboratory. The overwhelming majority were minor in nature with quick recovery and issues resolution.
- Response to approximately 10 events involving shock-sensitive, reactive, or explosive chemicals discovered in generator areas. Of particular note was the stabilization of aluminum flake material in the Metals and Ceramics Division.
- Operation of the consolidated hazardous, mixed, and LLW staging areas with no compliance or safety violations.
- Transfer of approximately 2,800 items to new users through the CMC, representing a total estimated value of \$1,015,000 (the avoided purchase price plus the avoided waste disposal cost).

Looking forward to the expected transition of responsibility for managing newly generated waste from the Office of Environmental Management (DOE-EM) to the Office of Science (DOE-SC), we submitted a revised transition plan to DOE-SC and developed budget estimates supporting transition, which were submitted to DOE-SC and the chief financial officer of DOE's Oak Ridge Operations Office (ORO) in response to a DOE-EM request. However, the decision to proceed was deferred by DOE. The Hazardous Waste Pilot Project was fully implemented during FY 2003 and approximately 54,000 kg of waste was disposed of during the fiscal year. In addition, planning for a LLW Pilot Project to enable UT-Battelle to direct-ship LLW for disposal was initiated to support implementation in FY 2004

LWS also implemented a Work Breakdown Structure (WBS) for its operations, and now charges back approximately 66% of its operating budget, covering virtually all generator-specific costs. Working with the Facilities and Operations Directorate, LWS is executing a second round of Facility Use Agreements (FUAs) that include more specific safety-driven limits on the quantities of stored hazardous wastes in LWS-operated consolidated staging facilities. Finally, in order to provide the required emergency response, members of the LWS Hazardous Materials Response Team have been trained to respond to events involving weapons of mass destruction, and additional team members have received State of Tennessee training in Incident Command.

2.2.3 Reduce Hazardous Materials Footprint

Score: 4

Rating: Outstanding

UT-Battelle delivered outstanding performance in completing a 3-year effort to reduce its holdings of hazardous materials and in assessing the Hazardous Materials Inventory System (HMIS).

In 2001, UT-Battelle identified 650 hazardous material control areas to be assessed for excess inventory in an effort to reduce the hazardous material footprint of the Laboratory. Excess items were to be retained for use, submitted to the CMC, or actively managed as waste. Over the 3-year life of this program, 725 control area assessments have been completed, including 127 areas during FY 2003. This represents outstanding performance.

To determine the field deployment status of HMIS, as outlined in the Chemical Safety subject area of SBMS, UT-Battelle committed to assess the results of 10% of its completed hazardous material control area evaluations in FY 2003. The control areas were picked at random, with the intention of capturing all sizes of control area inventories. For each reassessment, a numerical rating was assigned to indicate how well the HMIS inventory matched the field inventory. The ratings were combined and assigned a final score for comparison with the PEP commitment. The overall rating was 85%, which represents outstanding performance.

2.2.4 SNS Construction Safety

Score: 4

Rating: Outstanding

The Spallation Neutron Source (SNS) project continued to deliver outstanding safety performance, with ~2.5 million hours of construction work completed with no lost workday cases. This far exceeds the average for DOE or industry. In addition, there have been no environmental violations attributable to SNS construction activities. ES&H is well integrated into project activities, and performance continues to be outstanding.

2.3 FACILITIES MODERNIZATION AND UPGRADES

2.3.1 Vacating Excess Space

Score: 4

Rating: Outstanding

UT-Battelle continued to move toward its goal of vacating at least 1.8 million square feet of excess space, with 370,000 square feet of space vacated in FY 2003. This included the following actions:

- Five facilities (227,891 square feet) at Y-12 were transferred to the National Nuclear Security Agency (NNSA) for reuse.
- Five trailers and three buildings (6,075 square feet) were transferred to Bechtel Jacobs.
- Seven miscellaneous structures (360 square feet) were sold.
- Six facilities (127,984 square feet) were deactivated.
- Four buildings (6,813 square feet) were demolished.
- Cleanout of the Building 9204-1 Scrap Yard (~1 acre) was completed, supporting the needs of Y-12's modernization program.

An extensive program review tour was conducted during September for the DOE-SC program manager. The program manager was very complimentary of the excellent progress that has been made.

2.3.2 Construction of New Facilities

Score: 4

Rating: Outstanding

UT-Battelle delivered outstanding performance in delivering new facilities.

- The construction subcontract for the Research Support Center (RSC) was awarded on May 21, 2003, meeting the PEP requirements for an outstanding rating. Three bids were submitted for this project, but only two could be considered because of concerns about a possible conflict of interest associated with the third bid. A team composed of UT-Battelle Engineering, Contracts, and programmatic staff evaluated the bid proposals for technical content and made a recommendation. Bid prices were then considered, with a cumulative score to identify the preferred subcontractor. DOE's selection of Turner Universal was based in part on the team's evaluation.
- The construction subcontract for the Center for Nanophase Material Science (CNMS) was awarded to Caddell/Blaine on July 25, 2003, meeting the PEP requirements for an excellent rating. The two bids received on the CNMS construction request for proposal (RFP) were more than 25% above the baseline estimate. The project team worked with both bidders and their proposed subcontractors to review their bids and to make sure the scope of the project was well understood. After extensive discussions, the bidders submitted revised bids, which remained above the baseline estimate. Although contingency in the baseline estimate was adequate to award a contract, the project team decided not to reduce the contingency by the necessary amount. Therefore, the estimators from both bidders were brought in for extensive meetings to compare the bidders' estimates to the baseline estimate, and areas for reductions were identified. After receiving "Best and Final" bids with improved prices, the team felt that further reductions could still be achieved. Additional discussions on mobilization costs were held with the bidders and revised Best and Final bids were received. Although the contract negotiations were not completed until after the target date of June 30, the process resulted in a \$2 million reduction in the award price of the contract.
- Parking lot construction and traffic upgrades to implement the open campus concept were completed, meeting the PEP requirements for an outstanding rating. The scope of this milestone was modified through discussions with DOE early in the year to accommodate the delay in completion of the Surface Impoundment Operable Units (SIOU) remediation project by Bechtel Jacobs. This project, which will create a paved area for use as a parking lot, missed its completion date of March 2003 and was still in progress at the end of FY 2003. As a result, some planned subtasks had to be delayed, including completion of sidewalks, parking lot lighting, and striping of the SIOU lot. The amount of work delayed was relatively small in the context of the overall effort.
- Construction of the Laboratory for Comparative and Functional Genomics (LCFG) was completed, and the ORNL Inspection and Acceptance Report for the LCFG was signed on September 11, 2003, meeting the PEP requirement for an excellent rating. The final stages of construction on the LCFG were delayed by rain. The project had essentially reached the "Substantial Completion" stage by August 13 (the date set for an outstanding rating), but absent a definition of "Substantially Complete" and with no driver for occupancy of the facility, it was decided to devote the remainder of August and early September to some final commissioning activities and completion of the contractor's punch list. Project completion was supported by a dedicated design/build project team, which took several steps to ensure timely completion of the project:
 - The team developed an excellent design/build specification. Experts in the field of animal care were engaged under subcontract to assist and guide this effort.
 - The team used a three-phase procurement process to award the contract. A solicitation of expressions of interest from a broad spectrum of potential contractors was followed by the

selection of three teams to prepare a proposal that included preliminary design concepts. Award of the contract was based on a rigorous evaluation of the proposals. The selected team was highly motivated and dedicated to meeting all project requirements, including the project schedule.

- The team worked diligently to assist the contractor, conduct timely reviews, and provide assurance that the constructed facility would meet the requirements of the specification.
- Sustainable design was incorporated into both the RSC and LCFG construction projects, meeting PEP requirements for an outstanding rating. An evaluation using the Sustainable Measurement and Rating Tool (SMART) yields a rating of 53 points for the LCFG and 54 points for the RSC. The total of 107 points exceeds the 90-point requirement established for the outstanding rating.

2.3.3 Life Cycle Asset Management Performance

Score: 3

Rating: Excellent

UT-Battelle improved its operational performance, as demonstrated by three life cycle asset management (LCAM) measures: project management (PM), Operations and Maintenance (OM), and real and personal property (RP). Cumulative scores for these measures are 97.0% for PM, 94.8% for OM, and 96.0% for RP. Highlights in each category are as follows:

- Of six measures in the PM category, five are exceeding expectations and one is not meeting expectations because of delays in meeting project baselines, caused by excessive rain.
- Of 20 measures in the OM category, 14 are exceeding expectations, 3 are meeting expectations, and 3 are not meeting expectations. The measures not meeting expectations are preventive maintenance jobs completed on schedule (3% below the level that would meet expectations), programmed maintenance of heavy equipment (5.9% below the level that would meet expectations), and reduction in site energy use (not meeting expectations because last winter was 16.9% colder than the previous winter, based on heating degree day statistics).
- Of eight measures in the RP category, five are exceeding expectations, two are meeting expectations, and one (percentage of inventory equipment confirmed) is expected to meet or exceed expectations by the end of FY 2003.

2.3.4 Personnel and Equipment Move Composite

Score: 4

Rating: Outstanding

The UT-Battelle Facilities Revitalization Program (FRP) is moving toward completion, and FY 2003 performance in moving personnel and equipment into new facilities has been outstanding.

Two PEP metrics were established for evaluating performance in this area: complete the detailed move schedule for personnel and equipment before beneficial occupancy of the facilities in support of the accomplishment of priority moves planned for FY 2003, and execute personnel and laboratory moves on schedule.

The FRP Consolidation and Campus Integration Plan was issued on May 7, 2003, and included the detailed schedule for personnel and laboratory moves in FY 2003. This was six weeks ahead of the baseline beneficial occupancy date of June 19, 2003, for the Computational Sciences Building.

More than 95% of personnel and laboratory moves in FY 2003 were executed on schedule in support of East Campus consolidation activities, as outlined in the FRP Consolidation and Campus Integration Plan. The move schedule was established to meet the contracted dates for beneficial occupancy of the new facilities and called for completion of 412 personnel moves in FY 2003.

Beneficial occupancy of the Research Office Building (ROB) was attained on July 15, 2003, well ahead of the contract schedule date of August 9, 2003, and installation of demountable walls and furniture was initiated to permit earlier occupancy of the ROB. This made it possible to increase the number of personnel moves completed by the end of FY 2003. As shown in Fig. I.1, the number of personnel moves completed by September 30, 2003, was 575 (163 more than planned). In addition, all laboratory moves were completed as planned, except for the Nanoparticle Laboratory move, which was eliminated because the program was no longer funded, and the SCALE Training Laboratory move, which was eliminated because no existing equipment had to be moved

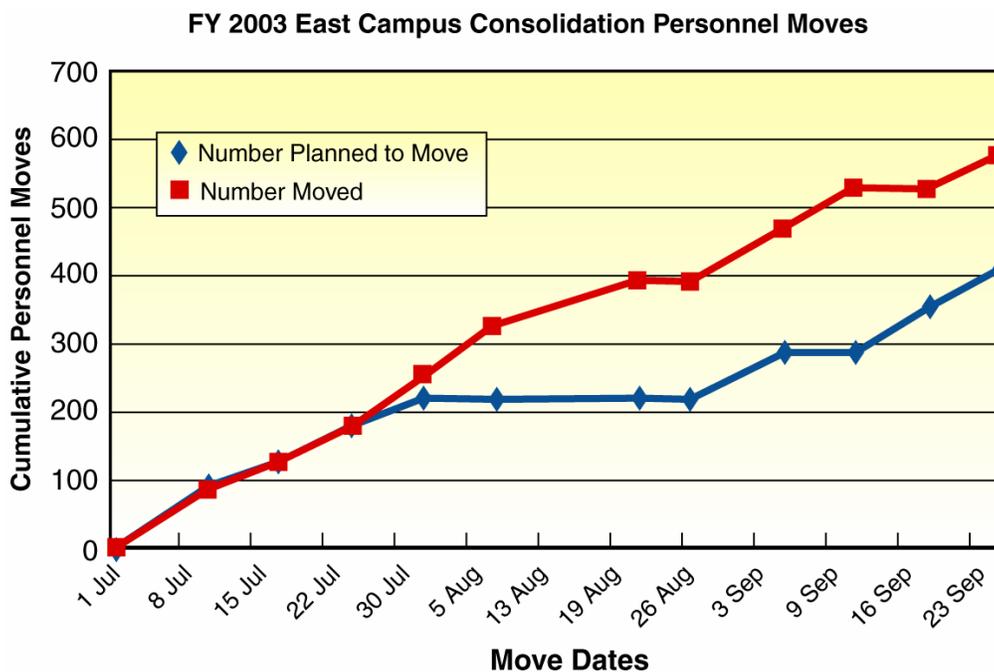


Fig. I.1. Planned and actual personnel moves in FY 2003.

2.3.5 Planning for Waste Treatment Systems

Score: 4

Rating: Outstanding

UT-Battelle committed to develop a risk-prioritized strategic plan for the liquid and gaseous waste treatment systems and associated infrastructure required to support current and future ORNL missions, prepare ADS requests for operating or capital project funding to implement these systems, and complete a preliminary proposal for FY 2004 General Plant Project (GPP) funding by August 31, 2003.

The plan was submitted in August 2003. It identifies a series of expense and capital projects with a total cost of \$79.9 million to build the new liquid and gaseous waste treatment systems required to support the DOE-SC's mission for the next 50 years. Replacing the existing set of aging and inefficient collection and treatment systems with new facilities is projected to yield annual savings in operating cost of more than \$14 million per year. It would also allow the disconnection of DOE-SC facilities from the existing treatment facilities operated by DOE-EM by 2010, when DOE-EM plans to begin remediation in Bethel Valley.

2.4 REDUCE COST AND MAXIMIZE RESEARCH EFFECTIVENESS

2.4.1 Improvement in Core Composite Rate

Score: 3

Rating: Excellent

UT-Battelle is committed to driving down core operational costs at ORNL, thus making available more resources for discretionary investments in capability development and infrastructure revitalization.

UT-Battelle's strategy for improving cost performance includes two key elements: (1) reducing indirect cost through efficiency improvements and implementation of best practices, and (2) growing the business, thereby increasing the base for spreading fixed overhead costs and realizing economies of scale. In that regard, ORNL developed a new cost metric for FY 2003 that measures our performance in both of these areas. This metric, called the Core Composite Rate (CCR), is based on the following principles:

- relates indirect cost to the size of the Laboratory,
- focuses on administrative and operational indirect costs,
- recognizes the Laboratory's investments to address legacy issues and infrastructure improvements,
- supports monthly and annual reporting and offers a reasonable level of predictability, and
- excludes from the business base items that do not recover much overhead (materials, subcontracts, travel).

The CCR is a percentage, with a lower value indicating better performance. It is calculated by dividing the amount of funding in the indirect cost stack (less certain items, noted below) by the value-added base [i.e., the base for recovering general and administrative (G&A) overhead]. Consistent with our principles and focus on core operational costs, the numerator of the CCR metric excludes:

- the cost of the Laboratory Directed R&D (LDRD) program, which represents an investment in R&D,
- the legacy tax (used to address legacy issues),
- the cost of infrastructure revitalization (Institutional GPP and moves),
- fee (related to profit, not cost),
- the cost of material handling and subcontract administration (cost related to third-party transactions),
- staff separation costs (one-time, non-core costs), and move costs

In FY 2003, ORNL achieved an excellent rating on its Core Composite Rate metric. As shown in Fig. I.2, the rate of 63.5% was slightly above our stretch target of 63.4%, but 1.5 points less than our FY 2002 percentage of 65.0% (as noted above, the lower the rate the better). The components of the rate reflect ORNL's strategy to grow direct-funded work while constraining indirect costs. Core indirect cost (the numerator for the CCR) grew 2.7% in FY 2003, which represents a real reduction in cost given salary escalation of approximately 4.6% and nonlabor escalation of 2%–3%. During this same period, the value-added base (the denominator for the CCR) grew 5.0%. Though base growth was modest, it exceeded the growth in our indirect cost, which translates into a lower CCR.

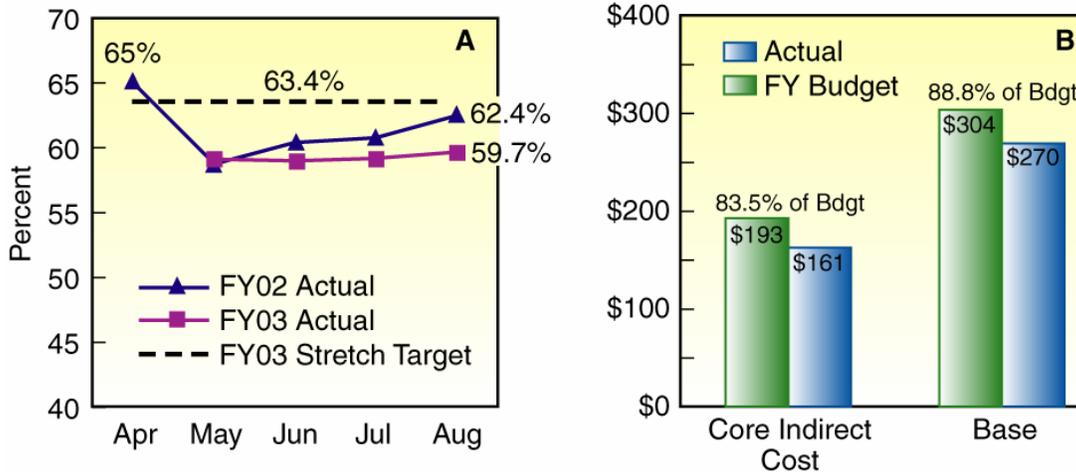


Fig. 1.2. Core composite rate (CCR) performance. (a) CCR during a 5-month window in FY 2002 and FY 2003. (b) Performance of core indirect cost and value-added base funding.

2.4.2 Effective Purchasing System

Score: 3

Rating: Excellent

UT-Battelle delivered excellent performance in maintaining an effective purchasing system to support ORNL's mission and to accomplish the purposes of the management and operating (M&O) contract between UT-Battelle and DOE.

The ORNL Contracts Division maintains high-quality procurement files that meet the requirements of the M&O contract, comply with ORNL's procurement procedures, and reflect sound business practices. Subcontract files contain documents that are essential to present an accurate and adequate record of all purchasing transactions. The scope and detail of procurement documentation are consistent with the nature, dollar value, and complexity of the purchase. During FY 2003, a DOE representative met with the director of the ORNL Contracts Division each month to review the procurement documentation. These reviews have consistently produced positive results.

The Contracts Division was reorganized with management changes during FY 2003 to assure professional and effective procurement operations by providing timely acquisition support to meet ORNL's programmatic goals and plans. Procurement processes were improved and communications within the Contracts Division were enhanced to reduce the cost of contract operations. The Contracts Division began initiatives to develop standard contract forms to improve the quality of procurement files and recompute AVID contracts to give customers a more efficient purchasing method that minimizes cost and reduces the number of requisitions requiring procurement involvement.

3. EXCELLENCE IN COMMUNITY SERVICE

UT-Battelle is committed to ensuring that ORNL is viewed by its neighbors as a highly valued partner in the region. We deliver on this commitment through active participation in economic development, efforts to strengthen science and math education, and support of the community's civic and cultural activities.

3.1 GOOD CORPORATE CITIZENSHIP

Score: 4

Rating: Outstanding

3.1.1 Enhancing Community Relationships

In this year's PEP, the focus was on recognition of ORNL as a good corporate citizen, with an emphasis on improving the teaching of science in the region and strengthening UT-Battelle's value as a partner in the region.

To improve science teaching in the region, UT-Battelle placed 40 uncertified science teachers from the Knoxville–Oak Ridge region in the University of Tennessee's Collaborative for Enhancing Education in Math and Sciences (formerly the Academy for Teachers of Science and Math) during the 2003 summer session, meeting the PEP requirements for an outstanding rating.

To assess its value as a partner in the region, UT-Battelle conducted a focus group that engaged a group of Oak Ridge stakeholders on December 16, 2002. The report on the focus group stated that respondents were "overwhelmingly positive about the role UT-Battelle had played since assuming management of the Lab." As a follow-up to the report, UT-Battelle immediately implemented a plan to involve more members of ORNL's Leadership Team in community activities. DOE's evaluation of UT-Battelle's performance in implementing this plan will determine the rating for this indicator.

3.2 TECHNOLOGY TRANSFER AND ECONOMIC DEVELOPMENT

3.2.1 Encouraging Business Growth

Score: 3.4

Rating: Outstanding

UT-Battelle's commitment to excellence in community service includes encouraging the growth of businesses based on ORNL technology and resources to enhance the economy. Activities in this area include the filing of invention disclosures and patents; the development of nondisclosure agreements to facilitate the exchange of proprietary information for the purpose of evaluating technologies; the negotiation of licenses for ORNL technologies, which may include the payment of royalties to ORNL; and the development of Cooperative R&D Agreements (CRADAs) and Work for Others (WFO) agreements. ORNL's Technology Transfer and Economic Development (TTED) organization also supports the start-up of new companies based on ORNL knowledge and technologies and the maturation of these companies.

Performance in each of these areas was assessed against four criteria:

- implementation of a holistic approach,
- full deployment of processes without significant weaknesses or gaps,
- use of innovative solutions as a key management tool, and
- active tracking and analysis of benchmarking/trending as a management tool.

As indicated in Table I.7, UT-Battelle's performance in each area indicates a successful effort for a composite score of 3.4 meeting the PEP requirement for an outstanding rating. An in-depth discussion of the activities associated with each indicator is provided in Part II of this report.

Table I.7. Performance criteria and results for technology transfer and economic development

	Invention disclosures	Nondisclosure agreements	Patents	Licenses	CRADAs and WFOs	Income royalties and equity	Company startups	Company maturation	Scoring
A	✓	✓	✓	✓	✓		✓	✓	7/8 = .875
B	✓	✓		✓	✓		✓	✓	6/8 = .75
C			✓	✓	✓	✓	✓	✓	6/8 = .75
D	✓	✓	✓	✓	✓	✓	✓	✓	8/8 = 1.0
									Sum=3.4

SCORING: Outstanding = Sum 3.1 Good = 2.1 > Sum 1.1
 Excellent = 3.1 > Sum 2.1 Marginal = Sum < 1.1

PART II

SUMMARY OF RESULTS FROM LABORATORY-DIRECTED RESEARCH AND DEVELOPMENT, PROGRAM DEVELOPMENT, AND TECHNOLOGY TRANSFER INITIATIVES

1. INTRODUCTION

Investment decisions made by UT-Battelle in FY 2003 have resulted in outstanding science and technology (S&T) discovery, program growth, and movement of intellectual property (IP) into the marketplace. The investments position the Oak Ridge National Laboratory (ORNL) for leadership of next-generation S&T thrusts and for the transfer of this new knowledge to the commercial sector for the benefit of all. Additional analysis has indicated an improved path forward, used in the selection of proposals for FY 2003 investment funding that looked for tighter linking of proposals with the Laboratory Agenda, investing Laboratory-Directed Research and Development (LDRD) resources for strategic hires, and involving the UT-Battelle core universities in these highly leveraged initiatives.

2. LABORATORY-DIRECTED RESEARCH AND DEVELOPMENT

The objective of the LDRD program is to conduct research and development (R&D) for the purpose of:

- maintaining the scientific and technical vitality of the Laboratory,
- enhancing the Laboratory’s ability to address future Department of Energy (DOE) missions,
- fostering creativity and stimulating exploration of forefront S&T,
- serving as a proving ground for new research, and
- supporting high-risk, potentially high-value R&D.

To meet these objectives, the Laboratory has established an LDRD program with two components: the Seed Money Fund and the Director’s R&D Fund. As summarized in Table II.1, the purpose of the Seed Money Fund is to provide an avenue of support for innovative, risky ideas that “bubble up” during the course of normal DOE programmatic and Work for Others (WFO) activities, while the Director’s R&D Fund is used to develop new capabilities in support of the Laboratory Agenda. All projects funded through LDRD must go through a review process, meet the requirements of DOE Order 413.2A and associated requirements, and be approved by the Deputy Director for Science and Technology. In addition, the ORNL LDRD management process is reviewed and approved by DOE annually.

Table II.1. ORNL LDRD Program

	Seed Money Fund	Director’s R&D Fund
Purpose	Supports risky ideas	Supports Strategic Plan
Year established	1974	1983
Funding cycle	Continuous	Annual
Proposal review	R&D staff members	Senior management
Project budget	\$125K	\$800K
Project duration	12 to 18 months	24 to 36 months
LDRD outlay	20%	80%

2.1 RESOURCES PROVIDED BY THE LABORATORY

In FY 2003, the LDRD budget authorized by DOE was \$19,550,000, including \$250,000 for capital equipment. As summarized in Table II.2, actual allocations totaled \$16,250,000: \$3,580,000 to the Seed Money Fund, \$12,600,000 to the Director's R&D Fund, and \$68,000 for capital equipment. All capital funds were allocated to Director's R&D Fund projects. Overall, 98.8% of the allocated funds were spent. The expenditure of \$16.1million was about 2.3% of the Laboratory's total budget of \$691 million for operating expenses and capital equipment, well below the maximum of 6% allowed by DOE Order 413.2A.

Table II.2. FY 2003 ORNL LDRD Allocations and Costs

	Allocations	Costs
Seed Money Fund	\$3,580,000	\$3,557,000
Director's R&D Fund	\$12,603,000	\$12,340,000
Capital equipment	\$68,000	\$68,000
Total	\$16,251,000	\$16,055,000

2.2 PROGRAM OUTCOMES

LDRD supported 123 projects in FY 2003, 69 through the Seed Money Fund and 54 through the Director's R&D Fund. Additional project statistics for each fund are profiled in Table II.3.

Table II.3. FY 2003 ORNL LDRD Breakdown by Fund

	Seed Money Fund	Director's R&D Fund
Costs	\$3,580,000	\$12,600,000
Number of projects	69	54
Number of new starts	40	21
Number of continuing projects	29	33
Average total project budget	~\$88,000	~\$527,000
Average project duration	14 months	25 months

The FY 2003 Director's R&D Fund projects were selected to provide support for the R&D needs of the Laboratory's major initiatives in advanced materials, terascale computing and simulation science, complex biological systems, energy systems of the future, neutron sciences, and national security.

These initiatives and the associated research thrust areas are described in the *ORNL Institutional Plan for FY 2003–FY 2007* (ORNL/PPA-2002/2). In addition, the Laboratory used LDRD to recruit strategic staff into positions critical to the success of the Laboratory Agenda. The levels of investment for each initiative and the strategic hires are summarized in Fig. II.1. Note that some funds went to a general category to support projects that did not specifically address a major Laboratory initiative, but were considered important to meeting a need of the strategic plan, such as R&D relevance to upgrading the Holifield Radioactive Ion Beam Facility.

In FY 2003, about 20% of LDRD resources were apportioned to the Seed Money Fund to support 69 projects, of which 40 were new (see Table II.2). Of these, 32 were reviewed by the fund's Proposal Review Committee, and the remaining 8 were small projects recommended by the LDRD manager. As shown in Fig. II.2, the Seed Money Fund supported projects across all S&T areas of the Laboratory.

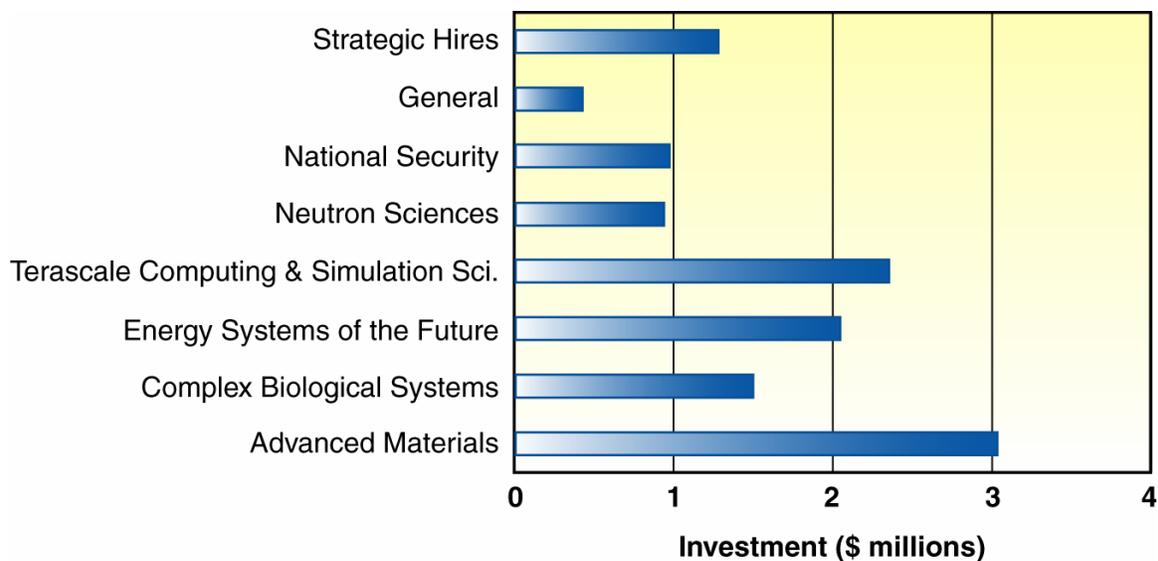


Fig. II.1. FY 2003 Director's R&D Fund investments in the major Laboratory initiatives, strategic hires, and general needs.

FY 2002 Seed Money Fund Investment by S&T

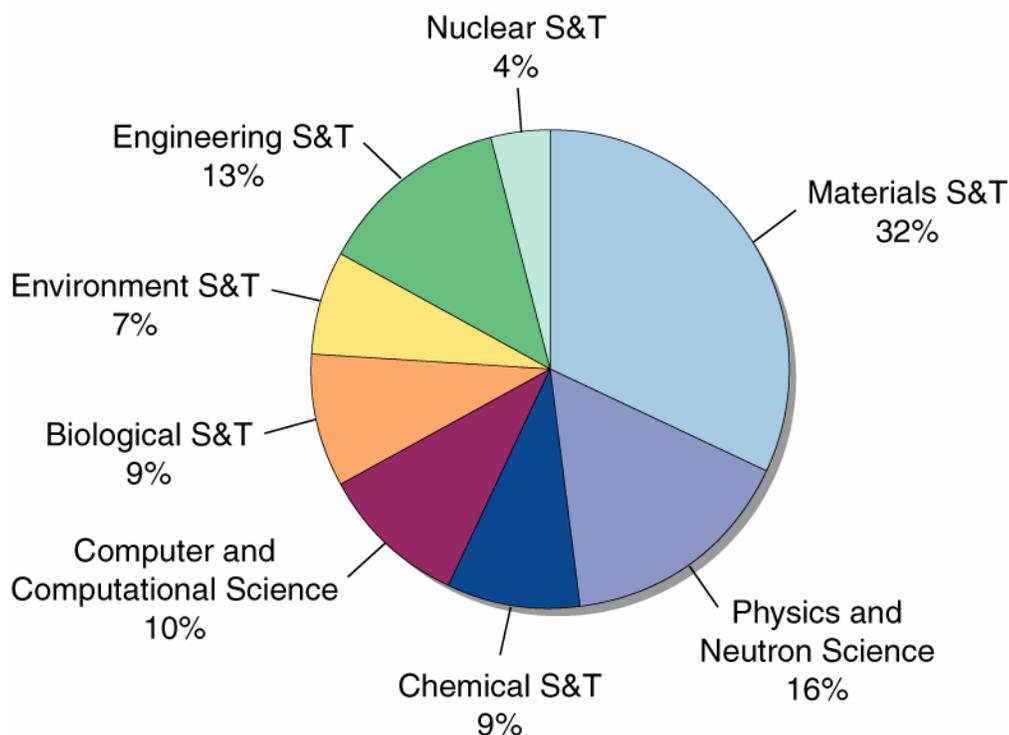


Fig. II.2. Distribution of FY 2003 Seed Money by S&T area. The assignment of projects to specific areas is not meant to be definitive, since many projects can be categorized by more than one discipline.

2.3 ANALYSIS OF THE OUTCOMES

Our assessment is that the LDRD program is achieving its objectives. This assessment is based on the following actions and activities:

- The FY 2002 LDRD Annual Report (ORNL/PPA-2003/1) and Self-Assessment (ORNL/PPA-2003/3), which were submitted to DOE on March 31, 2003. The Self-Assessment includes a favorable estimate of the output of the LDRD program compared to that for the Laboratory as a whole and discussions on the relation of the LDRD portfolio to ORNL's strategic plan and initiatives.
- The rigorous review and careful selection of Director's R&D Fund projects during the summers of 2002 and 2003, which ensured that the R&D needs of all the major Laboratory initiatives were being addressed to build the technical foundations for meeting future DOE needs.
- The use of LDRD funds to support strategic hires in the critical areas of advanced materials, complex biological systems, neutron sciences, and terascale computing and simulation science.
- The high level of participation by the research staff in the Seed Money Fund, leading to a portfolio of innovative and risky projects at the forefront of ORNL's S&T areas.
- DOE concurrence on all new and continuing projects for FY 2003.
- The establishment of a process to improve the LDRD Annual Report, which requires that all individual progress reports and final reports must now be reviewed and cleared by the principal investigator's division director or division clearance officer. This process will ensure that all reports meet division standards for technical quality and that reports can be released to the public.
- Implementation of actions to address four of the five areas identified for improvement in the FY 2003 Self-Evaluation:
 - Through more rigorous and disciplined planning and financial analysis, the Director's R&D Fund was better aligned to be more consistent with the Laboratory Agenda. With better alignment, the focus of our initiatives is more consistent with the customer's focus.
 - We encouraged collaboration with the core universities in Seed Money Fund R&D projects. In FY 2003, a joint ORNL/University of Tennessee (UT) project was started in theoretical astrophysics, and a collaboration with North Carolina State University is expected to be approved during the first quarter of FY 2004. The small "proof-of-principle" scale of these initiatives is more compatible with our university partners' capabilities.
 - LDRD was used to support nine strategic hires to reinforce our efforts in several major Laboratory initiatives.
 - External members from the UT-Battelle core universities were included in all of our Director's R&D Fund review committees.

In analyzing the LDRD outcomes for FY 2003, one area was identified that could be improved:-

- The development of program measures, specifically the tracking of publications derived from LDRD, that would assist in measuring overall performance. In the FY 2001 LDRD Self-Assessment, it was noted that there was a large discrepancy between the numbers of publications and presentations reported in the LDRD survey and the numbers in the Laboratory's Comprehensive Publications and Presentations Registry (CPPR) database, in which very few publications are attributed to LDRD. Most of the difference between the two sets of data was probably due to the difficulty of getting the Laboratory's researchers to register their work in the CPPR. Not having all publications and presentations registered in the CPPR makes it difficult to accurately assess the output of the LDRD program; however, this is a Laboratory issue rather than an issue specific or exclusive to LDRD. The Laboratory is currently developing a new publications database that should capture LDRD-derived publications. In the meantime, the annual survey of LDRD projects will continue to include a question asking for the number of LDRD-derived publications.

2.4 IMPACT AND BENEFIT

In attempting to estimate the impact and benefit of LDRD, it must be kept in mind that LDRD is a continuing R&D program that supports more than 100 projects annually, many of which run for more than a year. In addition, these projects are at the forefront of S&T; as a result, their impact may not be felt for years. Finally, the collection of data for the FY 2003 LDRD Annual Report and Self-Assessment projects has just begun, and data are not available at this time. Therefore, the following assessment is not specific to FY 2003 projects.

The LDRD program benefits ORNL and DOE by providing the Laboratory with resources for developing new R&D capabilities to better meet the Department's needs; for seeding innovative, staff-initiated research; and for attracting and retaining research staff to maintain the vitality of the Laboratory. The program has a demonstrated record of excellence for innovation and for building the scientific and technological foundations for future programs.

A principal benefit of the LDRD program is that it allows the Laboratory to develop new R&D capabilities in anticipation of future DOE and national needs. In FY 2003 and FY 2004, ORNL will invest about 80% of its LDRD budget to support the R&D needs of the Laboratory's major S&T initiatives in neutron sciences, complex biological systems, terascale computing and simulation science, electricity grid modernization, S&T for a hydrogen economy, fission to fusion, advanced materials, and national security technologies. All of these are key to DOE mission areas. The intent is to position the Laboratory to effectively support DOE in carrying out its overarching mission of national security through its programs in science, energy resources, environmental quality, and national security. Without LDRD, ORNL would not be able to carry out the cutting-edge R&D needed to accomplish the objectives of the initiatives and position the Laboratory for addressing future DOE and national needs.

In addition to supporting the Laboratory's initiatives, about 20% of the LDRD program budget is used to seed innovative ideas that often arise unexpectedly in the midst of research focused on other objectives. Such an avenue of funding fosters creativity and stimulates exploration at the forefront of S&T and makes it possible to pursue novel research ideas that may have high risk for failure but high potential for making significant advances if the novel concepts are proven. Consequently, such research often leads to new sources of support from DOE or other federal agencies strengthening the core S&T competencies of the Laboratory.

The LDRD program also contributes to maintaining the scientific and technical vitality of the Laboratory by supporting staff-initiated R&D. Such research facilitates high morale in the Laboratory staff by giving them the opportunity to initiate and conduct their most innovative research while their ideas are still fresh and enthusiasm is high. Consequently, the program is a major factor in achieving and maintaining staff excellence at the Laboratory. The LDRD program is also an important tool in the recruiting of new staff to help develop key R&D capabilities critical to the success of Laboratory initiatives.

The ORNL LDRD program is recognized both within the Laboratory and at DOE as an important stimulus for new developments. For example, LDRD has been a contributing factor in about a third of the 44 R&D 100 Awards garnered by the Laboratory during the last decade. Also, about half of LDRD projects report receiving follow-on funding from DOE or other federal agencies.

The LDRD program has been and continues to be of benefit to the Laboratory and DOE. It is a resource for developing new capabilities, for seeding innovative ideas, and for maintaining the vitality of ORNL, and it has a record of excellence for innovation and attracting new support. Through DOE oversight and self-assessments, the LDRD program is continually evolving and improving to ensure the quality of its S&T.

3. PROGRAM DEVELOPMENT

Each year the Laboratory invests a relatively small portion of its overhead stack (usually less than 3%) on program development activities aimed at growing ORNL's budget. These funds are used in areas where program support is not available to perform business development activities (such as writing proposals, developing white papers, conducting workshops, traveling to meetings, and developing marketing materials as appropriate) to secure new work. Most of the program development funds are used on WFO projects. These funds cannot be used to perform R&D.

In FY 2003, the Laboratory's program development budget totaled about \$7.4 million, with about 75% invested directly in support of the Laboratory Agenda S&T initiatives and the remainder used to support the Laboratory's other core competencies. The Laboratory's FY 2003 budget is expected to grow as a result. The National Security Directorate estimates that 85 new FTEs could be hired during FY 2004 as a result of FY 2003 program development efforts. An analysis of the process indicates that an opportunity for improvement lies in the precision of the determination of "return on investment." Emphasis needs to be placed on the rigor of tracking the source of enabling funds and the resultant new activity.

The emphases for program development investment in each initiative were as follows:

- Neutron Sciences. Develop a world-class user program; plan user support facilities; grow neutron scattering programs across ORNL and with university partners; develop the Joint Institute for Neutron Sciences (JINS).
- Complex Biological Systems. Support the design of the Joint Institute for Biological Sciences (JIBS) and the Center for Systems Biology; invest in new strategic hires; and pursue proposal development opportunities at DOE and the National Institutes of Health (NIH) using the Tennessee Mouse Genome Consortium and other strategic partnerships. Support collaboration across ORNL and other partners in advanced measurement technologies and computational biology.
- High-Performance Computing. Plan for 100-teraflops initiative; develop strategic partnerships; strengthen computational science infrastructure; develop plan for mathematical biology and enabling technologies for DOE's Genomes to Life (GTL) program.
- Energy Programs. Expand energy efficiency R&D (distributed power systems, transportation); expand clean power R&D (fuel cells, methane hydrates, biomass); grow carbon sequestration program; and establish key S&T partnerships.
- Advanced Materials. Secure construction funding for the Center for Nanophase Materials Sciences (CNMS); build a nanoscience and engineering program; strengthen soft materials research; and accelerate industrial investments in ORNL.
- National Security. Grow the national security programs across all fronts. Specific targets include homeland security, intelligence community, defense transformation initiatives, and nuclear nonproliferation.

Some notable program wins were the CNMS in the physical sciences, key projects supporting the GTL program in the biological and environmental sciences and computational sciences, the Earth Simulator Response in the computational sciences, the Quasi-Poloidal Stellarator and the USEC Cooperative R&D Agreement (CRADA) on gas centrifuge technology in energy and engineering sciences, and the Nuclear Nonproliferation Program in national security. Although the final numbers are not yet available, the average return on investment on program development funds for this year is expected to exceed 30 to 1. The Laboratory's FY 2003 budget is expected to grow as a result. In summary, the program development activity is well worth the investment.

4. TECHNOLOGY TRANSFER

The achievements of Technology Transfer and Economic Development (TTED) during FY 2003 provide a wealth of evidence of our commitment to “Putting Science to Work” in all of our activities. Our work builds on a strong foundation of technology transfer successes as we develop new relationships that can help us bring the national resources of ORNL to bear on economic development activities throughout the region.

4.1 MAJOR ORGANIZATIONAL INITIATIVES

TTED took several productive steps toward achieving a more efficient and effective organization. Early in FY 2003, we restructured and “right-sized” our directorate to gain a stronger business focus.

In addition, TTED conducted one of the Laboratory’s first integrated management system maturity evaluations that included both internal and external reviews. In preparation, we revised the management system description and clearly defined inputs, responsibilities, and outputs. This activity inspired us to create a comprehensive business plan completely integrated and aligned with our management system.

4.2 COMPANY STARTUPS AND MATURATION

ORNL’s technology transfer directorate continues its great success in transferring scientific research to private businesses. Through our technology transfer program, we increase competitiveness within the private sector and promote the use of ORNL’s vast resources, technical expertise, and research. Eleven new companies or new product lines emerged through ORNL technology and/or capabilities.

To support start-up businesses, UT-Battelle sponsors the Center for Entrepreneurial Growth (CEG), an incubator/mentoring organization. Because becoming a member of an incubation program is critical to the success of new startups, ORNL encourages membership in such a program as part of the license agreement.

Ten CEG clients either moved to the next stage of maturation or completed significant milestones or validation events during FY 2003. Two companies, based on ORNL technology, have over \$3M in revenues and have graduated from the CEG. Both companies are operationally funded and have over 20 employees.

We positively stimulate the local economy. In FY 2003, eight local companies or business lines developed through ORNL technologies.

We promote regional awareness too. At the City of Chattanooga Mayor’s Town Hall Forum, we presented partnership opportunities of available ORNL technologies. Approximately 250 people representing industry, government, and economic development agencies attended this meeting.

On the leading edge of technology. ORNL expanded its technology transfer influence in the western part of the state by partnering with the FedEx Institute in Memphis. The Institute places researchers from wide-ranging areas of study in shared office and research space to promote the intermingling of disciplines. As researchers spend more time close to other researchers, we anticipate an increase in the quality and pace of R&D, leading to groundbreaking research. The Institute will also enjoy a connection

to ORNL's high-speed, 2.5-gigabit supercomputer, which will allow the Institute to tap the largest supercomputer in the country and the largest automated microscope in the world for quantum experiments.

An ORNL technology transfer representative serves on the board of the newly organized UT Research Foundation. The UT Research Corporation will handle intellectual property and commercialization activities at the University of Tennessee, Knoxville. This new organization hopes to become a hotbed for funding and commercializing the university's research.

4.3 INVENTION DISCLOSURES, PATENTS, LICENSES, AND ROYALTY INCOME AND EQUITY

ORNL is a leader in patents issued. During, FY 2003, we filed 86 patent applications. The number of patents issued is up from 62 in FY 2002 to 74 in FY 2003.

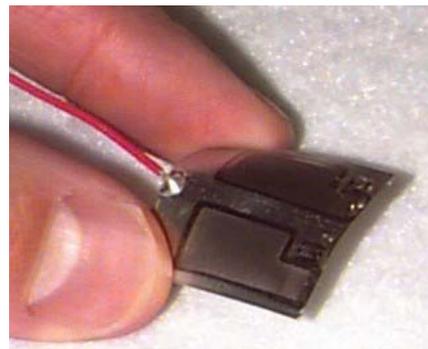
ORNL uses an integrated intellectual property approach to maximize the value of our technology. We now initiate a first-level market analysis before electing inventions. This new level of selectivity results in a more efficient process. Although fewer in number, the inventions for which we request rights from DOE have a higher probability of commercialization.

Further market analyses, at both a second and third level, contribute to our licensing strategy and to specific license negotiations. These include evaluating target markets, projecting applicability of existing commercial technology, conducting gap-analyses of unavailable technologies, and projecting market readiness.

As one of the country's preeminent technology transfer organizations, we are serious about our national responsibilities, including homeland security. ORNL-developed technologies, such as SensorNet, are being used in the fight against terrorism. SensorNet, installed on cell phone towers, detects and provides warnings in the event of chemical, biological, radiological, and nuclear threats.

We continue to encourage invention disclosures in technical areas that have historically had low numbers, such as biotechnology. We improved the efficiency of our patent application prosecutions by establishing criteria for and continually assessing when to engage outside counsel rather than prosecuting internally.

We proposed a major revision of the current royalty distribution system to the ORNL Leadership Team that met with approval. The new distribution strategy will bridge funding gaps in early stage technologies and lead to inventions that have greater market relevance. For example, each year the flood of counterfeit clothing costs American manufacturers billions of dollars. ORNL researchers developed an early stage ultra-violet fluorescence "marker" capable of exposing counterfeit textiles; however, more research and funding are needed to stabilize the marker in fabric and make the technology commercially viable. The new royalty distribution system can make the funds available for technologies like this.



ORNL has licensed the thin-film lithium battery technology to six different companies for applications in several areas, including electronics, smart cards, and medical devices

ORNL takes pride in its technology transfer leadership role. TTED staff are positioned in national organizations to raise the level of awareness of ORNL technology. In this way, not only do we share, but we also benchmark and stay abreast of advances in technology transfer practices. An ORNL staff member serves as vice chair of the Federal Laboratory Consortium (FLC), and another staff member is on the executive committee of the DOE Technology Partnership Working Group (TPWG).

ORNL staff facilitated benchmarking and networking through participation in the following organizations:

- Technology Partnership Working Group
- Federal Laboratory Consortium
- Association of University Technology Managers
- Licensing Executive Society
- Tennessee Biotechnology Association
- Southeast Region Technology Transfer Directors
- Tennessee Technology Transfer Directors
- PNNL and NREL technology transfer staff

We are integrating lessons learned and other beneficial business practices into the commercialization process. This includes sharing the terms of newly executed agreements and any other unique or unusual elements among all licensing negotiators. We track and manage patent budgets based on income projections for each executed license, and we work closely with licensees after the license is signed to ensure successful commercialization.

4.4 CRADAS AND WFOS

We are processing CRADA agreements more quickly. We decreased the number of days required to execute Cooperative Research and Development Agreements (CRADAs). In FY 2003, the number of CRADAs completed in 20 days or less was 42.9%; this compares to 14.8% in FY 2002. The number of FY 2003 CRADAs completed in 30 days or less was 57%, as compared to 33.3% in FY 2002. CRADA funds-in is up approximately 20% from the previous year. The return on investment from partnerships (funds-in) and royalties was \$22,435,660 for FY 2003. The overall amount is down approximately 6% from the same date last year.

The TTED reorganization created our Sponsored Research Division, which gives us a clearer focus on and identification of opportunities for management of the CRADAs and Work for Others. The Sponsored Research Division has an Operational Plan, available on the ORNL internal web site, which addresses topics such as roles and responsibilities, workflow process maps, and operational guidelines.

The Sponsored Research Division also uses a centralized tracking system for agreements, a gap analysis for system solutions, and an innovation's list for implementing improvements to our processes.

KEY ACHIEVEMENTS

ORNL won four (the maximum allowed) of the 22 National Federal Laboratory Consortium (FLC) awards



At this year's Southeast Regional FLC awards, ORNL won:

- Project of the Year: Robust Wireless Technologies

Excellence in Technology Transfer:

- Thin-Film Rechargeable Lithium Batteries
- Microcantilever-Based Biosensors

Honorable Mentions:

- Lab-on-a-Chip
- New Ion Exchange and Regeneration Technology for Water Treatment

Responsibilities for the actions are assigned, and a schedule for completing the actions is closely monitored by the SRD Director.

We engaged in a major benchmarking exercise, including cost estimates, regarding intellectual property databases.

CRADA and WFO agreements can lead to technology commercialization and Laboratory recognition. Coordinating these endeavors requires a holistic approach to technology transfer and economic development. ORNL's "New Ion Exchange and Regeneration Technology for Water Treatment" is the basis of a \$340K Work for Others agreement for treating Perchlorate-contaminated groundwater. The inventors received an FLC award for this technology. ORNL licensed this technology to a second company that is working with the WFO sponsor to further develop and apply the technology. A technology from the same portfolio has also been licensed to a third company.

Today, some of the most exciting technology transfer at ORNL involves collaborative projects with industry. An exciting teaming effort with Isotron, Inc., delivers a powerful dose of cell-killing neutrons directly into a cancer tumor. Using a CRADA agreement, the Laboratory and Isotron are developing a computer controlled delivery system for a miniature californium-252 wire. The smaller wire is funneled through a catheter to reach previously inaccessible tumor sites. This CRADA is expected to extend well in to 2005.

4.5 NONDISCLOSURE AGREEMENTS

TTED is serious about its trade secrets. We interviewed the top two producing Principal Investigators in each technical directorate and established a baseline performance score for TTED in the negotiation and processing of NDAs. The results of this trending will be used for process improvements and as a point of comparison in FY 2004.

During FY 2003 TTED also presented briefings to all technical divisions, encouraging the exchange of information using Nondisclosure Agreements.

PART III

SUMMARY OF RESULTS FROM INFRASTRUCTURE IMPROVEMENT, OPERATIONS IMPROVEMENT PROGRAM, AND LABORATORY RESERVES-FUNDED INITIATIVES

1. INTRODUCTION

UT-Battelle continues to demonstrate an aggressive approach in implementation of the long-term strategic plan to upgrade the Oak Ridge National Laboratory (ORNL) infrastructure. The physical improvements are the most obvious and tangible of the many demonstrations of our continuing pursuit of growth at the Laboratory. Major accomplishments include

- beneficial occupancy of the new Computational Sciences Building (CSB) and Research Office Building (ROB);
- completion of the Laboratory for Comparative and Functional Genomics (LCFG);
- relocation of 575 personnel in support of our consolidation efforts;
- initiation of construction efforts on two major facilities;
- reduction of an additional 370,000 square feet of space, for a total reduction of 900,000 square feet to date, which puts us halfway to our goal of 1.8 million square feet;
- development and submission of the Liquid and Gaseous Waste Program Plan;
- completion of the Chemical Management Center initiative; and
- submission of upgraded safety documentation for Building 3047.

These initiatives were accomplished in addition to activities associated with the core mission objectives of the Laboratory. The successful execution of these efforts and others demonstrate an effective and strategic management philosophy for positioning the Laboratory for sustained world-class growth in support of the Department of Energy (DOE).

2. INFRASTRUCTURE IMPROVEMENTS

The focus on infrastructure improvements continues to produce dramatic changes at ORNL. Most visibly, beneficial occupancy of the ROB was achieved on July 15, 2003. This represents completion of another milestone in a series of extremely successful modernization activities. Additionally, 575 personnel moves (163 more than planned) were completed, allowing the ROB to become integrated with the rest of the Laboratory. These moves also facilitated the vacating of older facilities that consume large amounts of energy, cost more to maintain, and present higher risk.

Other UT-Battelle infrastructure improvement efforts made outstanding progress toward the goal delivering new facilities to the Laboratory. Construction subcontracts have been successfully awarded for the Research Support Center and the Center for Nanophase Material Science. Construction of the LCFG was completed and the facility was accepted on September 11, 2003. In support of the initiative to provide open access to ORNL's facilities, upgrades were made to parking lots and traffic patterns. These upgrades significantly improve the safe and efficient access to and from our facilities.

UT-Battelle vacated 370,000 square feet of space in FY 2003. The combined strategy of returning usable space at the Y-12 National Security Complex to the National Nuclear Security Administration (NNSA), transferring space to other site contractors, selling appropriate space, and demolishing unusable facilities

continues to be effective in moving us toward our goal of vacating 1.8 million square feet by the end of the campaign.

An aggressive, risk-prioritized strategic plan has been developed for the upgrading of ORNL's liquid and gaseous waste treatment systems and the associated infrastructure. The plan identifies a series of expense and capital projects with a total cost of \$79.9 million for the new systems needed over the next 50 years to support the missions of DOE's Office of Science. The proposed plan will yield annual savings of more than \$14 million per year in operating costs. Improvement initiatives of this type are part of the UT-Battelle strategy to keep ORNL in a position to support DOE goals into the foreseeable future.

3. OPERATIONS IMPROVEMENT PROGRAM

The objective of the Operations Improvement Program (OIP) is to invest in a set of operational improvement initiatives, identified through self-assessment, that significantly improve the Laboratory's work processes. Proposals are reviewed by a team of mid-level managers and by the ORNL Risk Ranking Board. Overall, the selected proposals are well executed and provide outstanding return on investment. An analysis of the OIP selection process indicates that the Performance-Based Management System (PBMS) could be used more effectively to identify potential projects throughout the year, rather than relying on a single call for projects.

Prior to the start of the fiscal year, the funding available for OIP projects was set at \$2 million by the Leadership Team. The 18 proposals submitted for consideration requested a total of \$10.2 million. Using recommendations supplied by a group of science and technology (S&T) support managers and by the ORNL Risk Ranking Board, the Leadership Team selected seven proposals for funding. Two proposals were added during the year. Throughout FY 2003, funding levels within ongoing projects were adjusted to take advantage of new opportunities. The final amount costed for the nine investments described below remained at \$2 million.

3.1 CHEMICAL MANAGEMENT CENTER

The Chemical Management Center (CMC), a three-year project completed in FY 2003, received \$216,000 of OIP funding. The total OIP investment is \$666,000. The CMC provides a focal point for reducing the hazardous material footprint and for managing the operational risk of these materials at the Laboratory.

3.2 STANDARDS-BASED MANAGEMENT SYSTEM

The Standards-Based Management System (SBMS), a three-year project completed in FY 2003, received \$133,000 of OIP funding. The total OIP investment is \$633,000. Deployment of SBMS, which captures applicable internal and external requirements and translates them into usable, effective, and cost-efficient procedures and guidance for the worker, is now complete. The OIP funds assisted this effort by allowing additional facilitation support to meet an expedited schedule for document development and programming support for internal systems and applications, which will provide an integrated, easy-to-maintain product. The SBMS provides ORNL staff with on-line tools for easy access to accurate, current, concise information relevant to the work they perform. It also gives them mechanisms for providing feedback on improvements to ORNL systems and processes. SBMS has been extremely beneficial in ensuring safe and compliant operations.

3.3 LIQUID AND GASEOUS WASTE TREATMENT FACILITY REENGINEERING

OIP funding was provided for the first year of a two-year effort to

- eliminate the need for ORNL facilities to use the outdated and expensive central liquid and gaseous waste treatment facilities currently operated by DOE's Environmental Management (EM) program,
- assist generators in reengineering the liquid and gaseous waste systems, and
- complete the Facility Process Evaluations initiated under the Facility Environmental Vulnerability Assessment Recommendations Implementation OIP project.

FY 2003 funding was \$575,000; the total investment will be \$1,002,000.

This year's OIP effort resulted in the following outcomes

The *Liquid and Gaseous Waste Treatment System Strategic Plan* (ORNL/TM-2003/197) was submitted by August 29, 2003, satisfying a Performance Evaluation Plan (PEP) commitment to "Develop a risk-prioritized strategic plan for the liquid and gaseous waste treatment systems and associated infrastructure required to support current and future ORNL missions; prepare Activity Data Sheet requests for operating/capital project funding to implement these systems; and complete preliminary proposal for FY 2004 General Plant Project (GPP) funds."

Support of \$10,000 was provided to ORNL's Metals and Ceramics Division for installation of a chiller at Building 4508 that significantly reduced the amount of once-through cooling water discharged to the process waste system. A total of 476 facilities were evaluated for environmental vulnerabilities.

3.4 DISPOSAL OF SPECIAL NUCLEAR MATERIALS

A three-year OIP project to eliminate the storage of special nuclear materials (SNM) in the Building 3027 vault, received \$382,500 in FY 2003. The total OIP investment to date is \$633,000. When completed, this project will allow closure of a Category 2 nuclear facility, saving about \$2.5 million in operating costs (based on 20 years of operation). Disposition paths have been identified for all materials remaining in the facility. These paths are being worked aggressively by project personnel. Where the disposition options are at risk, alternate paths are being developed and worked. Because comment resolution for the Cell F safety analysis required more than a year, the projected operational date for Cell F is currently early January 2004. Remaining programmatic materials can be transferred to Cell F from Building 3027 at that time.

3.5 SAFETY ANALYSIS DOCUMENTATION FOR BUILDING 3047

An OIP project to fund the upgrading of safety documentation for Building 3047 received \$14,800. The effort produced a document set that is compliant with nuclear hazard Category 3, 10 CFR 830 Subpart B, comprising a Safety Analysis Report (SAR) and the Technical Safety Requirements (TSR) for the facility. This document set was transmitted to DOE for approval on April 7, 2003. DOE formally acknowledged receipt of the transmittal as compliant on May 12, 2003. DOE approval is pending.

The updated Building 3047 SAR/TSR removes some of the imprecision experienced with the current Basis for Interim Operation (BIO)/Operational Safety Requirements (OSR). The new SAR/TSR also streamlines controls and reduces the safety management burden by reducing the facility to Category 3. Until it is approved by DOE, the full benefits of this investment will not be realized. However, ORNL

was able to fully comply with the submission deadline of April 10, 2003, imposed by 10 CFR 830 Subpart B.

3.6 CONSOLIDATION OF FABRICATION ACTIVITIES

With OIP funding of \$537,000, major fabrication shops at ORNL were consolidated into one facility, Building 7012. This is expected to increase efficiency by providing a single focal point for fabrication activities. Because tenants from four other facilities moved into the space vacated by the fabrication shops, this project will also assist in meeting our commitment to space reduction. As a result of the consolidation of fabrication activities and the movement of other Facilities and Operations Directorate personnel into that space, the space charge cost was reduced \$40,000 per month. In addition, the Fabrication Department's burden labor force was reduced by 1 full-time equivalent (FTE) employee. Program maintenance costs were also reduced by the elimination of machines that were not needed due to logistical changes. This project will provide a full return on investment in less than a year.

3.7 REMOVAL OF DEAD PINE TREES

OIP funding of \$69,000 was used to remove dead pine trees that posed a danger to personnel because of their location (on or near parking lots, walkways, roadways, or work areas).

3.8 BASIC ORDER AGREEMENT FOR ANALYTICAL SERVICES

A basic order agreement (BOA) for analytical work to be performed by qualified commercial laboratories was developed using \$40,000 of OIP funds. This BOA provides a comprehensive mechanism for project managers to use laboratories that offer the most efficient cost structures while ensuring generation of quality data, thus reducing ORNL's liability. The new process is expected to deliver a cost savings of \$105,000, creating a return on investment of 2.6:1 in one year.

3.9 PROCUREMENT PROCESS IMPROVEMENT FOR NONREACTOR NUCLEAR FACILITIES DIVISION

This OIP project, begun in August 2003 and funded at \$30,000, was commissioned to develop a coherent set of procurement instructions to be utilized across Nonreactor Nuclear Facilities Division (NNFD) operations to ensure safe and compliant facilities configuration and operation, commensurate with the applicable federal regulations and contractual requirements. The initial focus is the procurement of safety-related materials for ORNL's nuclear facilities. The first products—receipt inspection guidelines and structures, systems, and components (SSC) procurement classification tools—are to be available in first draft form in early October. Follow-on analysis will be conducted early in FY 2004.

4. LABORATORY RESERVE-FUNDED INITIATIVES

Laboratory Reserve funds are used to finance new opportunities, maintain momentum within existing improvement agenda activities, or deal with uncontrollable events. In comparison to infrastructure improvements and OIP, these reserve-funded activities are subjected to fewer planning requirements and less project rigor to enable flexibility to respond to specific, well-bounded needs in real time. Overall,

they provide outstanding return on investment. During FY 2003, 24 activities, listed in Table III.1, received Laboratory Reserve funds totaling \$7,792,000.

Table III.1. Initiatives receiving Laboratory Reserve funds in FY 2003

Description	Manager	Funding
Furniture procurement	Smith	\$209,000
Microsoft Enterprise Agreement	Zacharia	\$1,056,000
Class action suits	Smith	\$11,000
American Museum of Science and Energy transition: National Environmental Policy Act documentation	Stair	(\$6,000)
CAT VI cable for ORNL facilities	Debban	0
Contamination event response	Smith	\$12,000
Lawsuit settlement	Smith	\$148,000
Construction cost comparison study	Debban	\$50,000
Secure space	Debban	\$30,000
ORNL 60th anniversary	Stair	\$50,000
PBViews software	Beierschmitt	\$169,000
Senior advisors for nuclear operations	Smith	\$734,000
Legal: outside counsel	Porter	\$95,000
Human Resources: Strategic Capabilities Initiative Facilitator	Boykins	\$43,000
Human Resources: Quality of Work Life Focus Group Facilitator	Boykins	\$10,000
Debban Reserve	Debban	\$2,900,000
Demountable walls	Debban	\$1,710,000
Personnel moves	Debban	\$124,000
Laboratory moves	Debban	\$449,000
Facility Revitalization Project (FRP) support cost	Debban	\$980,000
Renovation cost	Debban	\$1,202,000
Other FRP cost	Debban	\$702,000
General Hires Program Reserve	Smith	\$300,000
Reserves (Miscellaneous from FY 2002)	Smith	\$21,000

PART IV OPERATING EXPERIENCE ANALYSIS

1. INTRODUCTION

A review of operating experience information at ORNL in FY 2003 provides several indications that we are making progress toward our goal of having fewer significant abnormal events and no identification by external entities of abnormal conditions that we do not already know about. In addition, both internal audits and external oversight show that we are generally improving our ability to respond to abnormal events and conditions.

In general, external oversight activities conducted in FY 2003 identified no significant or major deficiencies or issues that we had not already identified through our self-assessment activities. Our FY 2003 trends in abnormal events also indicate a continuing positive bias towards reporting. In comparison to FY 2002, fewer abnormal events were reported in FY 2003, and the significance level of the events that were reported continued to decrease. We have discerned that the number of near misses and management concerns that are being reported is higher than ever before based on a multi-year evaluation.

The rigor of our responses to abnormal events likewise shows a positive trend. Thanks to more widely disseminated critique training and a more consistent and disciplined implementation of critique guidance, far more critiques are being conducted. The depth and breadth of investigations, root cause analysis, and corrective actions have substantively improved, resulting in the identification of more issues and actions at the Laboratory or management systems level. This has made the development and implementation of corrective actions more efficient and effective.

While the analysis demonstrates a positive trend, considerable work remains to be done in enhancing our overall effort in reporting, analyzing, and responding to abnormal events. We are continuing to build expertise in the use of the Assessment Tracking System (ATS) to support a more robust analysis of abnormal events and external oversight data. Our goal is to develop a central point of information so that operating experience results and subsequent actions are available in a single database. This information, coupled with the information from our self-assessing activities, will allow us to bring ATS to its full potential as a management system tool. New occurrence reporting requirements will prompt us to revisit our problem identification, analysis, and reporting functions, including our actions on problems that fall below occurrence reporting thresholds. We will also continue the education and training of staff in conducting critiques, investigations, and causal analysis so that additional emphasis will be placed on timeliness of initial categorization of events and on filing of follow-on reports.

2. MANAGEMENT OF SELF-DISCLOSING EVENTS AND CONDITIONS

ORNL has an extensive program to identify, properly evaluate, and report abnormal events and conditions. The goal of our reporting programs is to identify the causes of problems and put in place effective corrective actions that will prevent recurrence. A number of factors indicate that line management and staff have embraced the concept of identifying and reporting problems, concerns, incidents, and associated issues as the first step in finding solutions and implementing systemic

improvements. These factors include the increased use of critiques to more fully discern and alleviate operational barriers.

2.1 ENVIRONMENTAL INCIDENTS

UT-Battelle delivered outstanding environmental performance during FY 2003.

- There were no reportable releases to the environment at ORNL.
- There were no significant findings from inspections conducted by regulators, indicating that UT-Battelle is fully cognizant of and responsive to the expectations of our regulator organizations. Compliance inspections were conducted in seven regulatory areas: the Clean Water Act (CWA), the Clean Air Act (CAA), the Resource Conservation and Recovery Act (RCRA), underground injection control, the Emergency Planning and Community Right-to-Know Act, underground storage tanks, and drinking water. Positive observations were made by the regulators in all compliance areas. ORNL also underwent a multimedia compliance inspection by representatives of Environmental Protection Agency (EPA) Region IV. Ten inspectors were involved in reviewing facilities, evaluating documentation, and interviewing staff over several weeks. No serious findings were reported in this very thorough review, and the audit team was highly complimentary in its comments concerning ORNL's staff and programs.
- There were no National Pollution Discharge Elimination System (NPDES) permit nonconformances attributed to UT-Battelle activities.

This is the first performance period during which all three of these indicators have been held to zero. UT-Battelle has been able to deliver this performance as a result of organizational effectiveness in combination with the maturity of our regulatory compliance and waste management programs.

UT-Battelle sustained its outstanding performance in the area of environmental compliance by operating and research organizations, despite challenges in the form of reduced Environmental Programs and Waste Services (EPWS) oversight of UT-Battelle activities, as well as diversion of key EPWS core resources to the development of the Environmental Management System (EMS) and major legacy material removal initiatives. This sustained level of performance is attributed to the line organizations' increased ownership and use of deployed resources such as Environmental Compliance Representatives (ECRs), Generator Interfaces (GIs), and other technical support personnel. The strengthening of the EMS-related Standards-Based Management System (SBMS) subject areas and procedures also contributed to our performance.

2.2 WORKER SAFETY AND HEALTH

As indicated in Fig. IV.1, ORNL has been increasingly successful in reducing work-related injuries and illnesses over the past five years. The pace of this trend accelerated during FY 2003, resulting in a 36% reduction in the recordable injury/illness (RII) rate and a 47% reduction in lost workday case (LWC) rates. These reductions result, in part, from a continued management focus on accountability, deployment, and implementation of work control processes, and effective injury case management. Much of the credit must also be attributed to the ORNL Facilities and Operations (F&O) Directorate, which reduced injury rates for its staff by more than 45%.

While this success is commendable, we must continue to focus on delivering further improvements if ORNL is to reach its potential as best in class among the national laboratories.

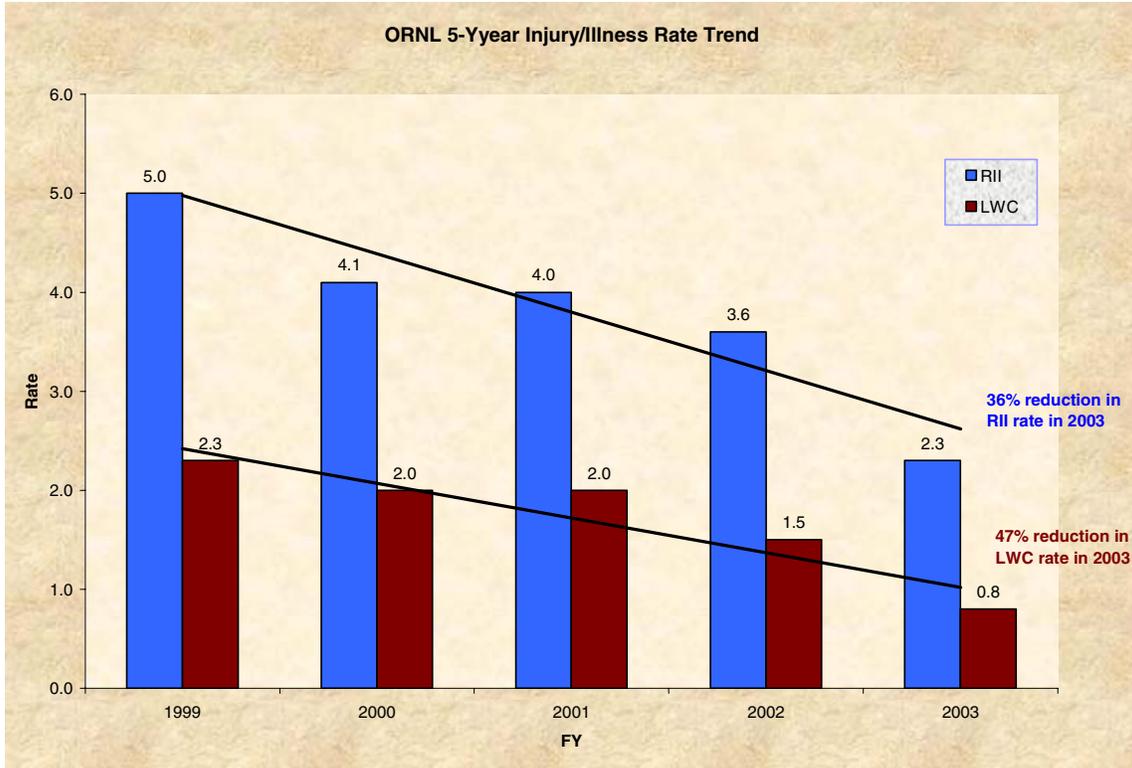


Fig. IV.1. Trends in illnesses and injuries at ORNL for FY 1999–FY 2003, showing significant reductions of 36% in the recordable injury/illness (RII) rate and 47% in the lost workday case (LWC) rate in FY 2003.

2.3 RADIOLOGICAL EVENTS

In FY 2003, 157 Radiological Event Reports (RERs) were filed, 12 more than the 145 RERs filed in FY 2002. As indicated in Table IV.1, increases occurred mainly in contaminations of equipment or material and discovery of contaminated areas. Many of these occurred during our continuing efforts to move personnel from old areas with legacy contamination to newer facilities. There was also a slight increase in radiological procedure violations and poor radiological control practices as the new Nonreactor Nuclear Facilities Division (NNFD) began implementing more rigorous controls in nuclear operations and as the Research Reactors Division (RRD) upgraded and implemented a more thorough performance assessment function.

2.4 OCCURRENCE REPORTING

As indicated in Fig. IV.2, we have seen a shift in the types of occurrences submitted to the DOE Occurrence Reporting and Processing System (ORPS) during FY 2003. While near-miss events/management or potential concerns remained the leading type of reported occurrence, representing 31% of the total of 103 reports through September 30, 2003, reports dealing with facility issues increased to 27% of the total, and reports dealing with environmental issues fell to 3% of the total.

Table IV.1. Radiological events at ORNL

Category	Events in FY 2002	Events in FY 2003
Contamination of equipment/material	68 (47%)	69 (40%)
Contamination of company clothing	12 (8%)	15 (9%)
Contamination of area	25 (17%)	23 (13%)
Violation of radiological procedures		
Radiological control practices		16 (9%)
Radiological protection procedures		15 (9%)
Radiological posting requirements		9 (5%)
Total violation of radiological procedures	10 (7%)	24 (14%)
Radiological work permit (RWP) violation	7 (5%)	4 (2%)
Other		
Airborne contamination		4 (2%)
Skin contamination		6 (3%)
Contamination of personal clothing		2 (1%)
Contamination of vehicle		1 (1%)
Uncontrolled release of radioactive material		1 (1%)
Leaking source		2 (1%)
Uncategorized		5 (3%)
Total other	23 (16%)	21 (12%)

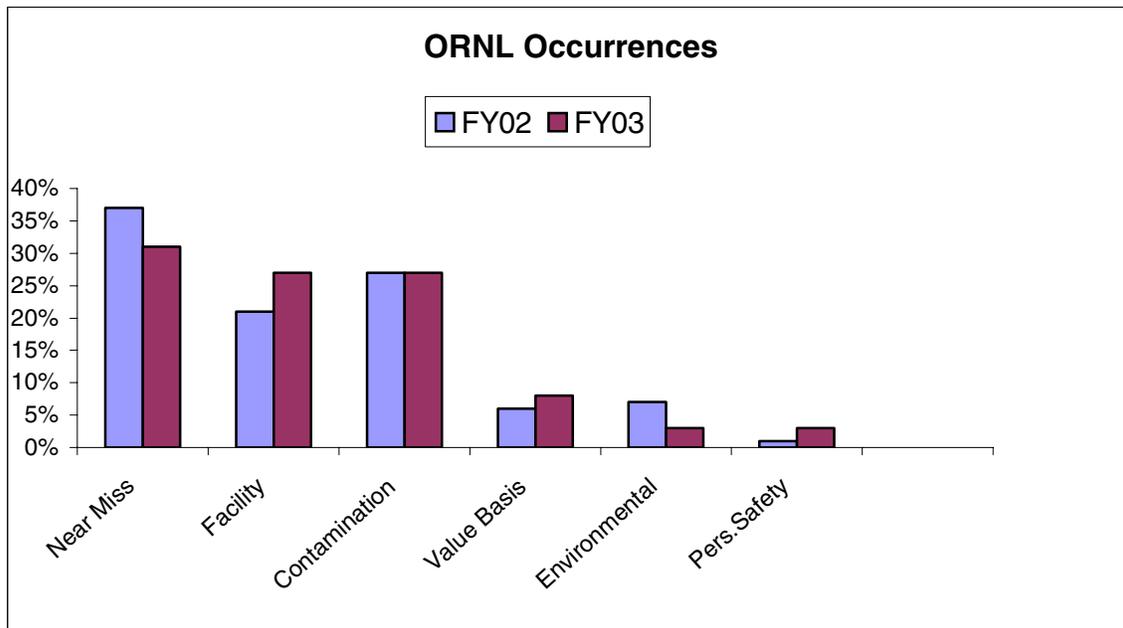


Fig. IV.2. Trends in occurrence reporting.

Other trends can be observed by reviewing occurrence reporting data for the past few years. In FY 2003, 54% of the reported occurrences were identified through self-assessment activities rather than through self-disclosing events. In FY 2002, 46% of the reported occurrences were found during self-assessment activities. This trend appears to indicate that putting more of our resources into self-assessment is providing payback in the prevention, detection, and resolution of problems.

We also saw a decrease in the total number of occurrence reports submitted to ORPS with 129 reports in FY 2002 and 103 for FY 2003. This is in contrast to the upward trend seen in FY 2001 and FY 2002, which is attributed to UT-Battelle management’s emphasis on and advocacy of an open reporting environment. We believe that this decrease may be the result of our nuclear facility consolidation initiative, which has emphasized a more consistent adoption of management expectations for work planning and control and associated problem prevention. Tracking of this metric over multiple years will be needed to determine whether this is, in fact, a significant trend.

In FY 2003, the three organizations that submitted the most occurrence reports were the F&O Directorate, RRD, and the Nuclear Science and Technology Division (NSTD). The F&O Directorate is leading the consolidation of all nonreactor nuclear facilities and has also increased its management focus on reporting and critiques. In RRD, the principal driver for reports in FY 2003 was occurrences related to work control issues and a subsequent emphasis on facility-based assessment activities; in NSTD, it was occurrence reports resulting from facility cleanup activities.

Analysis of the root causes of occurrences showed a marked increase in the percentage of reports attributed to management problems. This category covers such issues as inadequate administration, inadequate procedures, and the inadequacy of work planning activities.

2.5 NONCONFORMANCE REPORTING

ORNL organizations generated a total of 261 Nonconformance Reports (NCRs) in FY 2003, compared to 309 in FY 2002. As shown in Fig. IV.3, a reporting trend from FY 2002 continued this year with most NCRs continuing to originate in the F&O Directorate. This trend reflects the shift in responsibility for facility-based NCRs from the research divisions to the F&O Directorate and shows the effects of our implementation of the facility complex management concept. The sharp increase in the use of NCRs by other ORNL organizations points to a more balanced adoption and use of the NCR tool throughout the Laboratory.

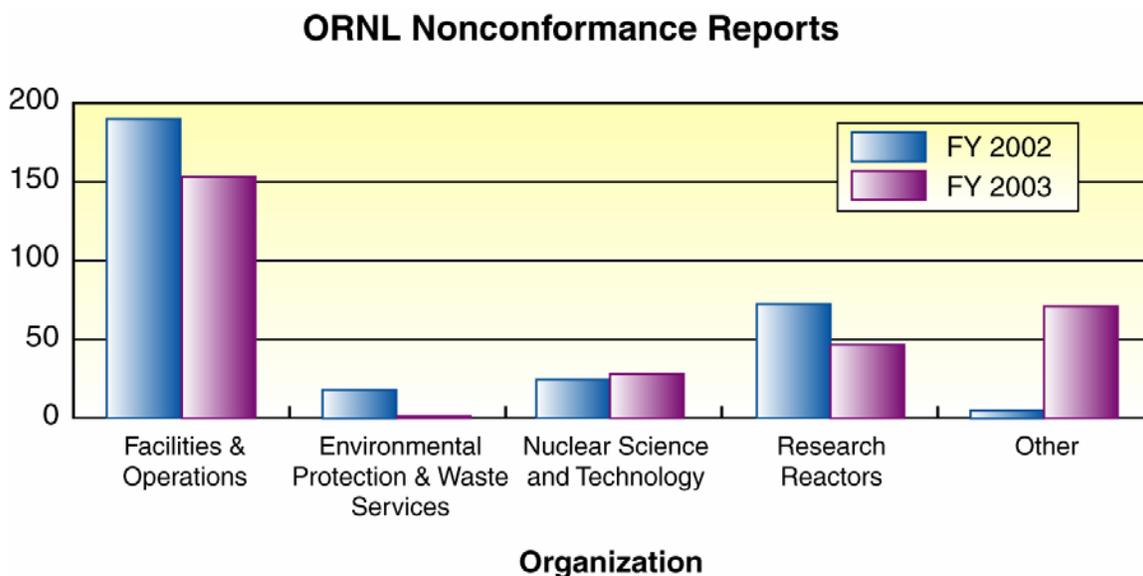


Fig. IV.3. ORNL nonconformance reports by organization.

2.6 PRICE-ANDERSON AMENDMENTS ACT REPORTING

During FY 2003, ORNL filed 20 new reports to meet Price-Anderson Amendments Act (PAAA) requirements, as indicated in Table IV.2.

Table IV.2. New PAAA reports filed in FY 2003

Identification Mechanism	Internal Reports	Non-Compliance Tracking System Reports	Total
Self-Disclosing Events	11	5	16
Assessment Identified	0	4	4
Total	11	9	20

As shown in Fig. IV.4, we also made progress in dispositioning Non-Compliance Tracking System (NTS) reports. The NTS closure process that we jointly pursue with DOE ensures that effective corrective actions have been implemented to address the underlying root cause of the initiating issue.

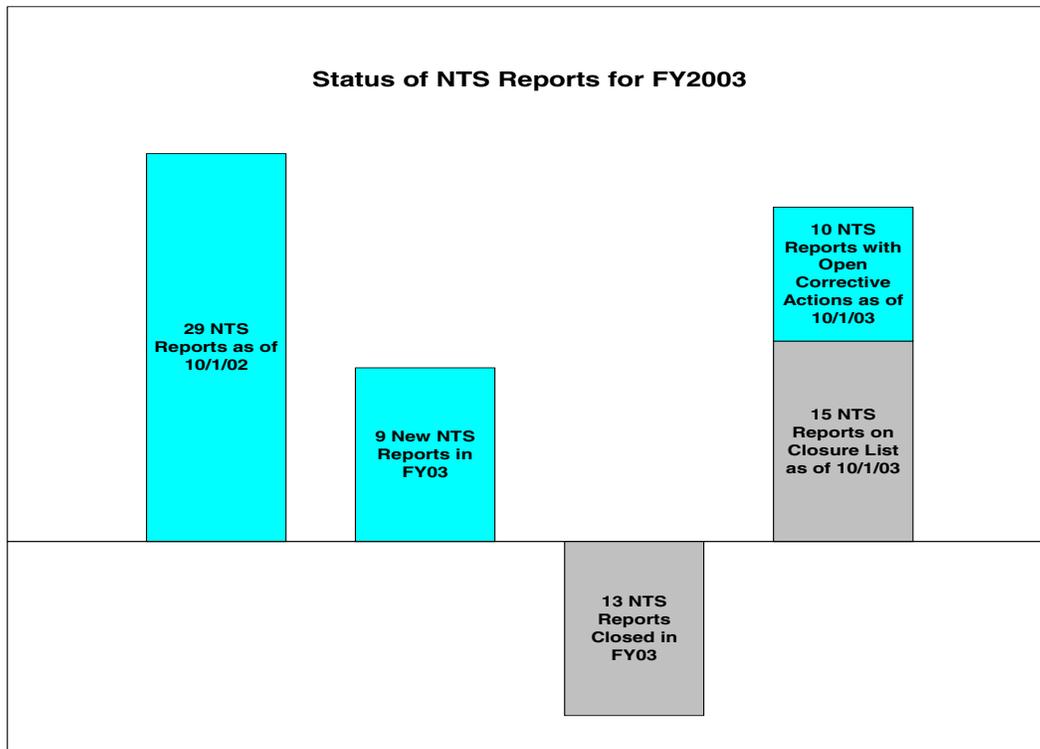


Fig. IV.4. Status of NTS reports for FY 2003.

The data indicate that ORNL continues to consistently identify issues requiring attention, reports them at an appropriate level, and then works to correct the root cause (after which the NTS report can be closed). Our reporting program has matured via the use of “roll-up reports,” which support the reporting of multiple issues that have the same systemic root cause and occur during a limited period of time as a single, programmatic potential noncompliance.

ORNL completed a three-year schedule of internal assessments modeled on PAAA program reviews in FY 2003. These self-assessments were initiated to address a DOE Office of Enforcement (DOE-OE) concern, communicated in FY 2001, that related to observed inconsistencies in screening and reporting thresholds across the Laboratory. The overall results from the three-year campaign of internal PAAA

reviews consistently showed the maturing, as appropriate, of line PAAA program implementation, conduct, and process consistency across the Laboratory.

In February 2003, an unplanned shutdown of ORNL's High Flux Isotope Reactor (HFIR) took place. This event, when aggressively investigated by Laboratory management, revealed numerous instances of breakdowns in work planning and execution. Recognizing that potential PAAA noncompliances appeared to be involved, UT-Battelle proposed a Consent Order to DOE-OE. However, based on "widely divergent views from the various DOE line and oversight organizations," the DOE-OE Director decided to proceed with an enforcement investigation. This DOE investigation was conducted in August 2003, and an enforcement conference was scheduled for October (early FY 2004).

3. SUMMARY OF FY 2003 AUDIT PROJECTS

The mission of the Audit and Management Advisory Services Directorate (AMAS) is to assist the management of UT-Battelle, LLC, in effectively discharging its administrative, legal, and fiscal responsibilities in the management and operation of ORNL. The AMAS serves as an independent, objective assurance and consulting function designed to add value and improvement to the organization's operations. As evidence of the fulfillment of this goal, summaries of audit activities during FY 2003 are provided here.

3.1 ALLOWABILITY OF COST (IA2003-1)

Purpose: Audit of ORNL's transactions for allowability of costs to determine whether costs claimed for reimbursement from DOE during FY 2002 were allowable and in accordance with the terms and conditions of the prime contract.

Results: Identified questionable costs of \$239 for home office and lodging expenses. After management agreement, the amount of \$239 was processed for payment from corporate funds. Subsequently, management implemented enhanced controls over subcontract travel payments and accountability for home office expenses.

3.2 INSTITUTIONAL GENERAL PLANT PROJECTS (IA2003-2)

Purpose: Determine whether the Institutional General Plant Project (IGPP) Program is administered in accordance with DOE-approved criteria for accounting, budget execution, reporting, and cost control functions and whether the program complies with applicable Cost Accounting Standards. In addition, review whether project execution is consistent with the DOE-approved criteria for IGPPs, project management guidelines, and management's objectives.

Results: The IGPP Program is administered in accordance with the DOE-approved criteria for IGPPs and project execution is consistent with the IGPP criteria, management's objectives, and project management guidelines and procedures.

3.3 ADMINISTRATIVE CONTROLS IN METALS AND CERAMICS DIVISION (IA2003-3)

Purpose: Audit administrative controls in the Metals and Ceramics Division (M&C) to determine whether administrative procedures and management controls in M&C are in accordance with UT-Battelle, LLC, policies and procedures.

Results: Most reviewed areas have sufficient administrative procedures and management controls in place to provide reasonable assurance that company goals and objectives are met and assets are properly utilized and safeguarded. Noteworthy practices were identified in the areas of procurement and safety. However, M&C can take additional steps to enhance management controls in the areas of training, sensitive property, proprietary information, and timekeeping. In addition, other Laboratory-wide steps can be taken to enhance management controls in the areas of cost transfers, proprietary information, and export control. Management concurred and agreed to submit action plans to address the recommendations.

3.4 STORES MANAGEMENT (IA2003-4)

Purpose: Audit ORNL's materials management activities to determine whether controls are in place and operating effectively to ensure that ORNL's material inventories maintained in Stores and Expensed Bench Stock (EBS) are being managed in accordance with applicable requirements and in a manner that ensures management's objectives are achieved.

Results: While Stores and EBS functions fulfill a critical need within ORNL to provide materials in real time for support of Laboratory operations, controls could be significantly enhanced. Specifically, management should consider establishing one process owner for the entire materials life cycle to ensure consistency across this process; and consider reviewing the appropriateness of certain EBS items, increasing accountability of EBS items, and monitoring common-use items from both Stores and EBS. Finally, management should ensure that Stores and EBS items with environmental, safety, health, and quality regulatory implications are updated as needed by a designated owner. Management agreed with our suggestions for improvement and has submitted an action plan.

3.5 PRIOR YEAR'S AUDIT ACTIVITIES (IA2003-5)

This project is not an audit but a yearly report to DOE of AMAS's prior-year audit activities.

3.6 PROPERTY MANAGEMENT (IA2003-6)

Purpose: Audit property management at ORNL to determine whether internal controls are in place to provide reasonable assurance that property items are effectively managed and adequately controlled and that management's objectives are achieved.

Results: Controls are generally in place to manage accountable property; however, enhancements should be made in formalizing and enforcing personal property accountability policies, ensuring that accountable property is labeled and recorded in the Property Information System, and enhancing the property disposal process to ensure timely and secure movement of excess property to the Excess Warehouse. We identified a noteworthy practice in which the Network Registration System is used by Property Management

Department to identify untagged computers. Management concurred with our suggestions for improvement and will submit a corrective action plan by October 31, 2003.

3.7 SAP PURCHASE-TO-PAY PROCESS (IA2003-7)

Purpose: Audit of the SAP purchase-to-pay process to review and evaluate all aspects of the process (Purchasing, Receiving, Accounts Payable, and Treasury Services) to determine whether internal controls are in place to provide reasonable assurance that the process is effectively managed and adequately controlled and that management's objectives are achieved. This review primarily focused on the controls and functionality of SAP.

Results: In general, proper controls are in place for the purchase-to-pay process, and management is continuously assessing and implementing enhancements to increase controls and efficiencies in this process. Possible efficiencies could be realized in the vendor payment process, and opportunities were identified for enhancements to internal controls in the areas of SAP security, SAP release strategies, vendor master file maintenance, reconciliation of goods received to invoices received, PAAA procurements, and quality inspections. In addition, we identified two noteworthy practices, which have been implemented to increase controls and efficiencies in the payment process. Management concurred with our suggestions for improvement, completed implementation of one suggestion, and submitted action plans to address the remaining suggestions.

3.8 CONTROLLED SUBSTANCES (IA2003-8A) AND PRECIOUS METALS (IA2003-8B)

Controlled Substances (IA2003-8A)

Purpose: Audit controlled substances maintained at ORNL to determine whether controls are in place and operating effectively to ensure that controlled substances are managed in accordance with requirements and in a manner that meets management's objectives.

Results: We determined that management of controlled substances could be enhanced and risks of noncompliance with applicable regulatory requirements could be reduced by developing Standards-Based Management System (SBMS) procedures to standardize controls over the accountability, procurement, dispensing, and disposal of controlled substances. Management concurred with our recommendations and as a result of our audit initiated steps to (1) issue an SBMS procedure on controlled substances, (2) add controlled substances to Work Smart Standards, (3) identify the controlled substances inventory at ORNL, (4) apply for appropriate registrations and licenses, and (5) conduct training as appropriate.

Precious Metals (IA2003-8B)

Purpose: Audit precious metals maintained at ORNL to assess the precious metals management and accountability process and to determine whether controls are in place and operating effectively to ensure that precious metals inventories are properly managed.

Results: We determined that, in general, precious metals reflect weights consistent with inventory records, precious metal write-offs or loss occurrences for FY 2002 do not appear to be unusual, and surplus precious metals are being evaluated annually for retention justification. We also determined that precious metals are usually secured when not in use; however, the level of security defined by SBMS for the different categories of precious metals is not always followed and may be excessive, and there are potential security risks related to iridium located at Buildings 2525 and 2547.

Management concurred with our observations and initiated steps to (1) review storage requirements for precious metals and make appropriate changes in SBMS and (2) conduct a review of Buildings 2525 and 2547, where iridium processing operations are conducted, to evaluate internal controls, identify potential risks, and establish sufficient security controls for areas. All actions will be completed by February 29, 2004.

3.9 SAP SECURITY/SEGREGATION OF DUTIES (IA2003-9)

Purpose: Audit of SAP security/segregation-of-duties controls to review and evaluate whether internal controls are in place to provide adequate SAP security and segregation of duties and to ensure management's objectives are achieved.

Results: In general, proper SAP security/segregation-of-duties controls are in place within the review areas to provide reasonable assurance that company goals and objectives are met and assets are properly utilized and safeguarded. We determined that a limited number of users may have inappropriate and/or unnecessary access to certain sensitive SAP system administration authorizations, and we identified potential segregation-of-duties conflicts arising from users' access to certain SAP purchase-to-pay transactions. Management is currently evaluating whether user access is appropriate and necessary and whether compensating controls are in place to reduce risks arising from the access. Management is also evaluating the use of a data analysis tool that would provide regularly scheduled monitoring of access to sensitive SAP administration authorizations and identification of potential SAP segregation-of-duties conflicts. Management will complete these actions by June 30, 2004.

3.10 FACILITY USE AGREEMENTS (IA2003-10)

Purpose: Audit ORNL's Facility Use Agreements (FUAs) to determine whether controls are in place and operating effectively to ensure that FUAs are being managed in accordance with applicable requirements and in a manner to ensure management's objectives are achieved.

Results: During the survey phase of our audit, several areas of concern were noted; however, Facilities Management Division (FMD) management was aware of these concerns and is taking corrective action. Therefore, we concluded the audit at the survey stage and suggested that planned revisions to the FUAs be completed as soon as possible. We also suggested that management should (1) support FMD as the organization works to implement the Facility Management Model Implementation Project Plan and (2) ensure the accurate and timely completion of the facility boundary definitions contained in the FUAs and supporting monitoring systems. Management agreed with our suggestions for improvement and will complete corrective actions by September 30, 2004.

3.11 OVERHEAD ALLOCATION AND COSTING FOR THE SPALLATION NEUTRON SOURCE AND THE CENTER FOR NANOPHASE MATERIAL SCIENCES (IA2003-11)

Purpose: Audit overhead allocation and costing for the Spallation Neutron Source (SNS) and the Center for Nanophase Material Sciences (CNMS) construction projects to (1) ensure that the special reduced overhead rates for the SNS and CNMS construction projects are calculated correctly and adequately supported and (2) evaluate the system in place to ensure shared costs are adequately segregated between the SNS and CNMS construction projects.

Results: Management has implemented comprehensive cost accounting and subcontract management systems to appropriately allocate overhead and segregate costs between the SNS and CNMS construction projects. Although we noted a minor discrepancy in the management fee rate for the CNMS project and in the application of taxes to a purchase, these were isolated instances, and management took immediate corrective actions.

3.12 WORKERS' COMPENSATION (IA2003-14)

Audit cancelled and approved by DOE.

3.13 SAP WORKFLOW (IA2003-13)

Purpose: Audit SAP workflow controls to review and evaluate whether internal controls are in place to provide reasonable assurance that SAP workflow processes are effectively managed and adequately controlled, and that management's objectives are achieved.

Results: ORNL's workflow processes configured in SAP are well designed and represent an efficient and effective control within ORNL business processes. We identified a noteworthy practice and determined that management can further strengthen internal controls by completing planned actions to enhance workflow security and pursuing greater utilization of workflow to automate the SAP change control process. Management concurred with our suggestions for improvement and submitted an action plan to address the suggestions by June 30, 2004.

3.14 DIRECTOR'S P-CARD REVIEW (MR2003-4)

Purpose: Based on recent events at Los Alamos National Laboratory, the AMAS conducted a management review of selected small-purchase credit card (P-Card) transactions posted from April 2000 through September 2002.

Results: Since our sample included transactions that were made prior to the implementation of additional management controls, we identified some of the same types of deficiencies that were noted in previous P-Card audits and reviews. However, additional areas should be considered for increased management control, such as procurements of clothing items and items with imprinted logos and sufficient descriptions/justifications of items purchased.

4. SUMMARY OF FY 2003 INDEPENDENT OVERSIGHT ASSESSMENTS

The Independent Oversight (IO) function is the element of PBMS charged with providing additional assurance to UT-Battelle and ORNL leadership and to DOE that the Laboratory's performance assessment and assurance processes are effectively and efficiently providing information to support critical management decisions. This section provides a summary of IO results and feedback gained in FY 2003.

4.1 PERFORMANCE ASSESSMENT EVALUATIONS (IO-2003-01, IO-2003-06, IO-2003-07, IO-2003-08, IO-2003-11, IO-2003-12, IO-2003-14, IO-2003-15, AND IO-2003-16)

IO conducted a series of assessments to satisfy a Performance Evaluation Plan (PEP) commitment for an independent evaluation of the state of maturity of ORNL's performance assessment program. The results of these assessments are described in Part I, Section 2.1.3, and in Part V of this report.

4.2 REVIEW OF MANAGEMENT ACTIONS AND COMMUNICATIONS IN RESPONSE TO MANUAL SCRAM AT THE HFIR (IO-2003-02)

The IO Director was tasked to conduct a multifocused review of events and responses following the identification of significant breakdowns in work control and management oversight at the HFIR in February 2003. The results of this review are controlled as "UT-Battelle Business Personal," because of the discussion of sensitive personnel management issues. In summary, however, the IO review concluded, "Previous corrective actions developed for similar problems at HFIR have clearly been ineffective, and RRD management and ORNL senior management must now directly address the 'cultural' and communication issues that underlie many of these recurring problems."

4.3 EVALUATION OF NUCLEAR AND OPERATIONS SAFETY AT BUILDING 3019 (IO-2003-03)

The IO evaluation of nuclear and operations safety at Building 3019 was conducted to provide an independent assessment of the effectiveness of the nuclear and operations safety processes and to provide a baseline to support future evaluations of operations in this building by NNFD.

Overall, the nuclear and operational safety systems, as implemented in practice, were found to be complete, effective, and rigorously implemented. However, additional actions can be taken to further enhance the nuclear and operational safety programs.

4.4 WASTE CERTIFICATION PROGRAM ASSESSMENT (IO-2003-04)

IO facilitated a UT-Battelle corporate assessment of the ORNL Waste Certification Program. This corporate assessment made use of resources from the Brookhaven National Laboratory, the Battelle Columbus Laboratory Decommissioning Project, and the Pacific Northwest National Laboratory. The assessment independently evaluated the performance of the ORNL Waste Certification Program in meeting applicable requirements related to the effective and efficient removal, processing, and disposal of regulated waste.

In general, the assessment determined that waste management functions performed under the ORNL Waste Certification Program were being conducted in compliance with regulatory requirements and met waste acceptance criteria. Program personnel were knowledgeable of their job functions and executed program functions as currently defined. However, weaknesses were identified in the areas of waste certification process design and implementation, organizational structure, communications and teamwork, and feedback and improvement.

4.5 FUTURE DIRECTION OF THE OPERATIONAL AWARENESS PROGRAM (IO-2003-05)

IO conducted an assessment to gather information, through the interview process, in order to establish a strategy for incorporating Operational Awareness Program (OAP) practices and principles into the line organizations' performance assessment process, as recommended in the "Evaluation of ORNL ISMS/SBMS Program—Final Report, October 15, 2002."

An analysis of the information gathered led to the following conclusions:

- Of those interviewed, 78% did not think that ORNL and/or their division were ready to assume and carry out an OAP-type program at this time.
- An additional 22% of those interviewed thought that specific changes needed to be made in order for them to carry out an OAP-type program.
- DOE participation is highly valued and needs to be an element of any OAP-type program that is developed.
- Any OAP-type program that is developed needs to include the use of subject matter experts independent of the division.

4.6 P-AAA PROGRAM REVIEW (IO-2003-09)

IO completed the third and final set of reviews associated with addressing the FY 2001 DOE-OE PAAA Program Review finding that noted a lack of consistency among the line PAAA programs at ORNL. The divisions reviewed this year were those selected using a risk prioritization approach that resulted in their being scheduled in this third year of the three-year review.

The overall results from the three-year campaign provided evidence of the continuing maturity of the line organizations' PAAA program implementation, conduct, and process consistency across the Laboratory. There are still areas for improvement, particularly in divisions in which PAAA-related issues occur infrequently, so that they have less practice in the screening, evaluation, and reporting process.

4.7 EVALUATION OF NUCLEAR AND OPERATIONS SAFETY SYSTEMS AND PERFORMANCE ASSESSMENT IN THE NONREACTOR NUCLEAR FACILITIES DIVISION (IO-2003-10)

An IO team evaluated both the effectiveness of the nuclear and operational safety programs of three NNFD facilities and the effectiveness of selected elements of the NNFD Performance Assessment Program. This evaluation was conducted to determine whether systems were in place and effectively functioning to address activities that might have an impact on compliance with the approved Safety Basis of the facility.

Overall, the IO evaluation revealed that systems are in place, at both the division and the facility level, to ensure that activities are screened against the limiting conditions embodied by the Safety Basis. These systems are relatively new and are still being evolved to be more efficient. Performance assessments that have been carried out to date are very good, but there is still room for improvement in staff awareness of the program and a documented approach to program planning.

4.8 EVALUATION OF RESEARCH REACTORS DIVISION SELF-ASSESSMENT PROGRAM (IO-2003-13)

A review was conducted to determine the extent to which the results of several previous evaluations were being systematically translated into changes to the overall RRD performance assessment program. This IO review was conducted as part of the formal set of corrective actions developed in response to the identification of breakdowns in work control and feedback processes at HFIR in February 2003.

Overall, the evaluation revealed that RRD had made significant improvements to its feedback and improvement process, and the initial implementation of the revised Performance Assessment Plan was impressive.

5. EXTERNAL ASSESSMENTS

As shown in Fig. IV.5, ORNL undergoes reviews and evaluations by a number of external regulators, including the State of Tennessee, DOE, and other federal government agencies. The results of each assessment are reviewed, analyzed (including the development of corrective actions), and recorded, as appropriate, in the ORNL Assessment Tracking System.

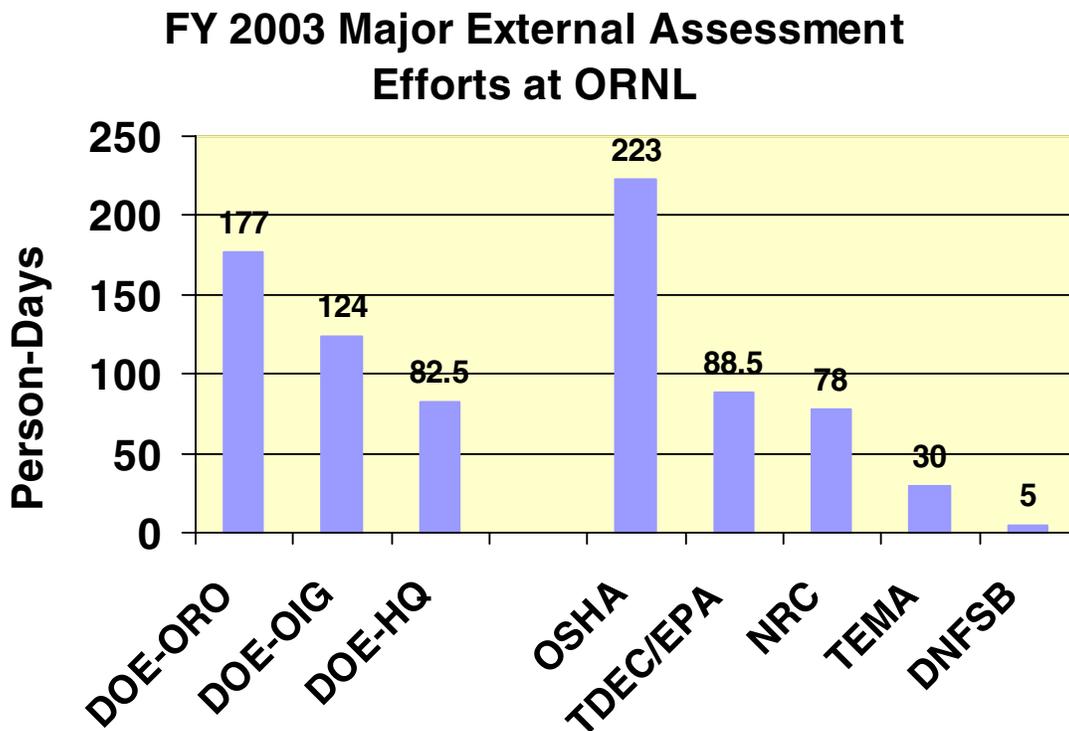


Fig. IV.5. Major external assessments at ORNL in FY 2003. (DOE-ORO: DOE's Oak Ridge Operations Office. DOE-OIG: DOE Office of the Inspector General. DOE-HQ: DOE Headquarters. OSHA: Occupational Safety and Health Administration. TDEC/EPA: Tennessee Department of Environment and Conservation/Environmental Protection Agency. NRC: Nuclear Regulatory Commission. TEMA: Tennessee Emergency Management Administration. DNFSB: Defense Nuclear Facilities Safety Board.)

The number of individual DOE oversight reviews increased from 16 in FY 2002 to 20 in FY 2003, and the number of person-days associated with these reviews increased from 322 to 383.5. We continue to actively partner with DOE in the conduct of Operational Awareness Program assessments and internal independent evaluations of organizational performance assessment (see Part I, Sect. 2.1.3 of this report).

In FY 2003, the Nuclear Regulatory Commission (NRC) and the Occupational Safety and Health Administration (OSHA) conducted extensive assessments at ORNL as part of their pilots to examine the potential for external regulation of DOE's Office of Science contractor facilities.

Overall, none of the external oversight activities conducted at ORNL in FY 2003 identified any significant or major deficiencies or issues that had not already been identified by internal self-assessment and independent assessment activities.

5.1 NON-DOE EXTERNAL OVERSIGHT ACTIVITIES

A joint EPA/Tennessee Department of Environment and Conservation (TDEC) multimedia audit, as well as a variety of external assessments focused on environmental compliance, occurred in 2003. There were no findings of regulatory noncompliance during any of these inspections of ongoing operations conducted by State and Federal regulators, nor were any revealed as a result of internal self-assessments.

ORNL's aging infrastructure continues to present a risk of incident (as demonstrated by last year's release of strontium-90 from a facility managed by Bechtel Jacobs Company), and legacy materials also continue to pose substantial risk.

Pertinent to these risk factors, compliance audits were performed by the Occupational Safety and Health Administration (OSHA) and by the Nuclear Regulatory Commission (NRC) at ORNL during 2003. During these external regulatory reviews, no issues that would preclude the transition of ORNL to external regulation under OSHA or NRC were identified.

The cost estimate for discrepancy resolution of the OSHA findings is \$1.95 million (including a 35% contingency). Approximately 89% (\$1.74 million) of the abatement costs are associated with aging facilities and can be corrected through the modernization of ORNL facilities and infrastructure.

On the basis of the compliance items identified by NRC, the estimated one-time cost for transition of ORNL to NRC regulation would be approximately \$17.1 million (\$10 million for HFIR and \$7.1 million for the balance of ORNL), including a 35% contingency.

5.2 DOE EXTERNAL OVERSIGHT ACTIVITIES

During FY 2003, 2 DOE Facility Representative Surveillance Reports were transmitted to ORNL; these reports included 3 concerns, 13 findings, and 6 observations (including 1 strength). ORNL evaluated each of the concerns and findings and has documented appropriate corrective action to address each of them.

As indicated in Table IV.3, DOE conducted 20 external assessments of ORNL in FY 2003. These activities required 383.5 person-days of on-site effort (in addition to the regular oversight provided by the DOE ORNL Site Office staff assigned to the Laboratory).

Table IV.3. DOE external oversight activities at ORNL in FY 2003

Activity	Month	Person-days of effort
DOE Office of the Inspector General (DOE-IG) Audit: Administration of Financial Instruments by National Laboratories	November 2002	10
DOE Environmental Management Consolidated Audit Program: Audit of the Radioactive Materials Analytical Laboratory (Building 2026)	December 2002	15
DOE-IG: Safeguards for Nuclear and Sensitive Technology in the Technology Transfer Program	January 2003	5
DOE Headquarters: HFIR Oversight of Management Actions and Communication	February 2003	12
DOE Office of Science: Fire Department Baseline Needs Assessment	March 2003	15
DOE-IG: Assessment to Changes to Internal Control Structure	March 2003	2
DOE-IG: Audit Resolution and Follow-up Process	March 2003	2
DOE-IG: Audit of the Management of DOE's Personnel Security and Access Control System	March 2003	3
DOE-IG: FY 2003 Audit of Financial Statement	April 2003	50
DOE-IG: Inspection of Inventory Controls over Select Chemicals at the Y-12 National Security Complex	April 2003	12
DOE Oak Ridge Operations (DOE-ORO): For-Cause Review of Electrical Incidents	April 2003	62
DOE-ORO: 2003 Safeguards and Security Operations Survey	May 2003	109
DOE Office of Nuclear Energy, Science and Technology: Review of the HFIR 10 CFR 830 Compliant Documented Safety Analysis	May 2003	14
DOE-ORO: Property Management Office Property Management Walkthrough	May 2003	3
DOE-ORO Diversity and Employee Concerns Office: ORNL/Oak Ridge Associated Universities Employee Complaint Investigation Process Review	June 2003	3
DOE-IG: Audit of the Procurement Administration at the Department's Major Contractors	June 2003	34
DOE Office of Independent Oversight and Performance Assurance: Department's Management of Suspect/Counterfeit Items	July 2003	20
DOE Office of Enforcement: Investigation into Safety Issues at HFIR	August 2003	6.5
DOE-IG: Audit of Integrated Safety Management Performance Measures	August 2003	5
DOE-IG: Audit of Waste Management at the Oak Ridge Reservation	September 2003	1

PART V

MATURITY OF PERFORMANCE PLANNING AND SELF-ASSESSMENT PROGRAMS

1. PROGRAM SUMMARY

UT-Battelle uses a Performance-Based Management System (PBMS) to guide its approach to business planning and assessment at ORNL. Organizations at all levels use PBMS to measure their performance against the Laboratory Agenda and the goals and commitments that support it. PBMS also provides ORNL staff and management with the results of self-assessment activities conducted at the directorate, division, group, and individual performance levels. The information gained from these self-assessments is crucial in defining our successes, areas for improvement, and future business planning strategies.

PBMS incorporates the “balanced scorecard” approach as an internal self-assessment structure for effectively identifying the most important operating factors for our wide range of business units, sponsors, missions, and goals. This approach provides five overarching categories—customer focus, business/financial performance, organizational effectiveness, staff and leadership, and compliance—for use in developing strategic plans and business plans and in formulating self-assessment plans.

We continued to see progress during FY 2003 in taking performance-based management (PBM) from its initial deployment and implementation stages to a more consistent level of adoption and use among ORNL organizations. We are seeing increasing evidence that self-assessment is evolving into a fundamental management process and is being used as a crucial tool to support the broad goal of effective management planning. The Laboratory used the results of self-assessment activities as inputs to management decisions that altered resource allocation plans when information indicated that increased attention was needed in new focus areas.

In addition to using self-assessment as an organizational planning tool, we developed, deployed, and began the implementation of our maturity evaluation processes and tools to assist management system owners and staff in baselining the effectiveness of the design, application, assessment and feedback, and planning activities associated with our Standards-Based Management System (SBMS). We have learned much about what we need to do to improve our self-assessment function as a component of PBMS, and what we learned sets the stage to advance PBMS to a more mature level at which it can be fully used and integrated with our other business processes.

2. HISTORICAL PERSPECTIVE

At the beginning of FY 2002, PBMS was a mixture of new subject areas and older directives and guidance. The need for describing and implementing a comprehensive, Laboratory-wide approach to assessment was evident to PBMS staff, and a complete revision of the management system was completed in 2002.

The self-assessment requirements of PBMS were revised and redeployed throughout the Laboratory to institute a more rigorous and thorough approach to the business planning and assessment processes. We also implemented the Assessment Tracking System (ATS) to replace the Laboratory Issues Database System and the Nonconformance Tracking System and to provide all organizations with a single tool for planning, tracking, and analyzing the results of assessment activities.

This tool has enhanced our ability to meet management expectations for institutionalizing and optimizing the assessment planning and management process on a site-wide basis. ATS has enabled us to make self-assessment, as a component of PBMS, a key function to ensure that we have full knowledge of our strengths and improvement targets, both for our commitments to the Department of Energy (DOE) and for our individual business units.

3. RESULTS OF ORGANIZATIONAL SELF-ASSESSMENT ACTIVITIES

All directorates developed and implemented self-assessment plans this year. Some directorates also require self-assessment plans at the division level, while others find that the self-assessment function is more useful when planned and implemented at the directorate level. This flexibility is necessary to ensure that each organization has a self-assessment function that best suits its needs.

A Laboratory-level view of the comprehensive effort represented by these plans indicates that literally hundreds of self-assessing activities were performed by ORNL organizations this year. From a systems perspective, positive trends in how we are using our assessment resources can be discerned.

During FY 2003, the ORNL Independent Oversight (IO) organization continued a multiyear series of evaluations to gauge the maturity of ORNL line organizations' implementation of the performance assessment element of the PBMS. Five ORNL divisions (Computer Science and Mathematics, Engineering Science and Technology, Environmental Protection and Waste Management, Facilities Management, and Physics) and four ORNL directorates (Business and Information Services, Energy and Engineering Sciences, Facilities and Operations, and Human Resources) were evaluated. The results provide insights that will assist in continuing the progress of integration of the performance assessment function into the business planning process.

The composite FY 2003 rating of 2.9 (out of a possible 4 points) resulting from the IO reviews is encouraging. This score represents the highest rating attained in the first three years in which these evaluations have been conducted, and it compares favorably with the rating of 2.4 in 2002. The range of scores for this year, 2.6 to 3.2, is much tighter than in FY 2001 or FY 2002 and indicates a more consistent understanding and implementation of PBMS processes and tools.

General strengths of the performance assessment process are the identification of organizational strengths and corrective actions taken to improve weaknesses and the use of performance assessment information in Level 1 and Level 2 decision-making. General areas that need improvement are the development of an overall directorate or division approach (critical outcome tree) to the identification of performance objectives and the lack of documented guidelines for conducting performance assessments based on experiences of the individual organization. The single most notable improvement in the performance assessment process in FY 2003 was the clear ownership of performance objectives and associated actions exhibited by Level 3 managers

The following results identify specific line organization strengths (+) and areas for improvement (–) defined through the IO evaluations in the areas of approach, deployment, and process improvement.

Approach: Strengths and Areas for Improvement

- Self-assessment programs verify that organizational performance objectives are established, formalized, and linked to Laboratory critical outcomes.
- Organizational performance measures and performance indicators are effectively measured.

- Line management’s role in the self-assessment process is essential, obvious, and consistent.
 - Roles, responsibilities, authorities, and accountabilities for conducting self-assessments are not fully assigned, documented, or understood by those performing them.

Deployment: Strengths and Areas for Improvement

- Self-assessment activities and performance measurement are tailored to the function that is being evaluated, are performance-based, and are documented.
- Self-assessment activities produce findings that reflect documented measures of performance and/or corrective actions are identified.
 - Organizational guidelines for conducting self-assessment activities are not always documented, accepted, or well understood.

Process Improvement: Strengths and Areas for Improvement

- The corrective action management process prevents recurrence of similar events.
- An effective method for addressing external assessment results is incorporated into the self-assessment process.
- Management decisions are based, in part, on the results of self-assessment.
 - Self-assessment results, related performance information, and customer feedback are not always used to structure and prioritize future self-assessment activities.
 - Results of the self-assessment process are not always communicated to internal and external organizational elements, as appropriate.

4. MANAGEMENT SYSTEM MATURITY EVALUATION RESULTS

As the “gatekeeper system” for translating laws, orders, and regulatory requirements into Laboratory-wide documents, SBMS functions to ensure that program descriptions, subject areas, and procedures are current, accurate, and relevant to the activities performed by ORNL staff. During FY 2003, a maturity evaluation process was developed and deployed within SBMS as a structured, comprehensive approach to measure the efficiency, effectiveness, and deployment of management systems at ORNL.

Maturity evaluations were conducted on a two-tier basis. All management systems were to conduct an internal evaluation against the criteria established by SBMS in the focus areas of management system design, application, assessment and feedback, and planning and the ability to react to change. In addition to the internal reviews, external peer reviews of six management systems were conducted (as specified in Performance Indicator 2.1.1, Indicator 2 of the Performance Evaluation Plan) using the same criteria. Peer review teams were composed of personnel independent of the management system and representing research and development, operations, and support constituencies.

A defined set of strengths and areas for improvement emerged as a result of the conduct of management system maturity evaluations. As a baselining year, FY 2003 will serve as the foundation for future maturity evaluation efforts.

The following strengths were discerned as maturity evaluation results were compiled:

- With very few exceptions, most components (program descriptions, subject areas, and procedures) are in place, current, and functioning as intended.
- Strong efforts were made by management systems (and ensured by SBMS) to include the widest possible cross section of stakeholders in the development team process.

- Most statements of roles, responsibilities, authorities, and accountabilities (R2A2s) needed to support management systems are in place.
- No management system considered its management system to be complete. A consistent intent to explore opportunities for improvement was evident.

Consistent areas for improvement also emerged among management systems:

- More graphical guidance (e.g., flowcharts, maps) is needed to help users understand the linkage within and among management system components and processes.
- Communication with staff needs continuing attention to ensure a clear understanding of management system processes. An SBMS subscription service is available, but few staff take advantage of it. Communication with staff about individual management systems is highly variable.
- Business planning, resource prioritization and allocation, goal setting, and performance assessment activities based on the management system concept are—in most cases—at an early stage of development.
- With a few exceptions, the management system customer feedback function needs to be strengthened. The formation of development teams provides a basis for further interaction with customers to determine their needs.

ORNL's Deputy Director for Operations has identified two complementary but distinct functions that management system staffs must perform to ensure their effectiveness: to protect and to serve. Management systems are charged with protecting the assets of DOE and the American public, and we do this through effective planning, formulation, and deployment of requirements, followed by assessment of performance against these requirements. However, serving our staff with management systems that promote and foster the pursuit of world-class scientific and technological achievements is equally important. Our initial year of implementation of the maturity evaluation process is the foundation upon which we will build the future success of management systems as work-enhancing Laboratory assets.

5. SUMMARY OF SELF-ASSESSMENT MATURITY INDICATORS

Several positive trends have converged to provide management with key information on our organizations' buy-in and use of the self-assessment function as a business process.

- We see increasing evidence of participation by management personnel in the planning and conduct of assessment activities.
- We see an increasingly clear connection of assessment activities to the Laboratory Agenda and Institutional Plan, the Performance Evaluation Plan, and organizational business/strategic plans.
- There is a continuing trend toward performance-based assessments. Though compliance determination is still important, it is evident that divisions and directorates increasingly view the assessment function as a business-enhancing mechanism.
- Assessments are being planned and scheduled to provide more leading and fewer lagging indicators.

5.1 STRENGTHS

- PBMS provides the basis for consistent flowdown of goals and commitments from the Laboratory Agenda and the Institutional Plan to the Laboratory's annual Performance Evaluation Plan and organizational self-assessment plans. It also has the potential to be used for individual performance assessments and development plans.
- Laboratory organizations are showing increased participation through planning and conduct of self-assessment activities across all directorates and divisions. This increase in participation and the

increasing number of personnel involved in self-assessment activities demonstrates growing management and staff awareness of PBMS processes and tools. There has been tangible buy-in and a resulting trend toward consistency of effort across the Laboratory.

- Strong management endorsement and knowledge of PBMS and self-assessment awareness are evident.

5.2 AREAS FOR IMPROVEMENT

- Division and directorate management and staff, management system owners, points of contact, and other subject matter experts need varying levels of additional training and assistance to effectively use ATS to its full potential, including the effective tracking and closure of corrective actions, compilation and communication of assessment results, and information analysis. We have observed a high variation in the effectiveness with which ATS is used.
- PBMS staff must develop methods for identifying customer needs relative to management system processes and tools as a part of the maturity evaluation feedback and improvement cycle. Specifically, management system staff must survey ORNL constituents to determine desired improvements that will enhance ATS as a useful tool for tracking and trending assessment activities, conditions, actions, and results. The ATS Users Group is a useful base from which to broaden improvement efforts.
- PBMS needs to deliver a demonstrable and consistent peer review process and meaningful measures for assessing science and technology (S&T) activities. This process commenced in FY 2003 with the issuance of the SBMS subject area for S&T programmatic peer review, but much remains to be done to make the S&T assessment function successful
- The overall Laboratory strategic planning and assessment effort must include the integrated planning function as a component of PBMS to ensure that performance assessment is an effective component of business/strategic planning.
- An effective Laboratory-level trending and analysis function for operating experience results (both self-disclosed and self-assessment results) must be developed to give Laboratory management the information needed to stay ahead of trends that can affect our ability to meet our commitments and achieve our goals.

In summary, PBMS continues to build on its strengths. Clear areas for improvement have been identified and will be used in our FY 2004 management systems business planning activities. Continuing progress in the understanding and use of PBMS processes and tools is evident, but more work is needed to reach our goals in helping our customers plan their assessments, document their assessment methods and results, and perform useful information analysis for application to their next business planning cycle. Self-assessment of our management system through the effective conduct of a maturity evaluation has increased our knowledge, based upon management and staff feedback concerning our current efforts. We will continue to make use of the periodic, knowledgeable evaluative function provided by IO to ensure that we are in tune to the current state of PBMS deployment and implementation. The maturity of our management system will continue to grow as the results associated with our processes and tools become increasingly useful to management and staff as high-value inputs to future business planning and informed management decision-making.

PART VI SUMMARY AND CONCLUSIONS

This part of the self-evaluation report summarizes the key strengths and areas for improvement that were identified at Oak Ridge National Laboratory in FY 2003 through the execution of our Performance-Based Management System (PBMS) and reflects a distillation of the analyses contained in this report. UT-Battelle has made a philosophical commitment to a balanced management approach that we believe leads to simultaneous excellence in the areas of science and technology (S&T); laboratory operations and environment, safety, and health (ES&H); and community service. UT-Battelle also takes seriously the idea of continuous improvement. By paying attention to what our customers and stakeholders tell us and what we learn from our own assessments, we identify organizational strengths and areas for improvement that form a basis for driving continuous improvement.

1. KEY LABORATORY STRENGTHS

1.1 SCIENCE AND TECHNOLOGY

This section does not include information from surveys of our principal Department of Energy (DOE) customers for S&T. An addendum will include survey results and analysis information.

1.1.1 Sustained Support for Customer Goals

The Laboratory continues to field highly successful research and development programs in support of our customer base. Our success in program performance and development is evident in our regular dialogues and program reviews with DOE's Office of Science (DOE-SC) and Office of Energy Efficiency and Renewable Energy (DOE-EE), with the National Nuclear Security Administration's Office of Defense Nuclear Nonproliferation, and with other DOE offices. For example, ORNL has the largest market share of DOE-SC research programs and is among the leaders in DOE-EE programs. We continue to use our established points of contact to discern and promote new areas of programmatic opportunity that fit well with our core competencies.

1.1.2 Ownership of the Work Control Process

Our S&T organizations own the portion of the work control subject area in the Standards-Based Management System (SBMS) relating to R&D programs and projects. The expectations and requirements associated with R&D work controls were developed through consensus-building among the scientific and technological constituencies across the Laboratory. As a result, S&T management and staff take an active role in the administration of the Work Project/Planning and Control management system. To facilitate this role, an active users' group periodically considers management system issues and recommendations for improvement. In addition, Web-based tools are available for both R&D and Maintenance, Operations, and Services employees to execute their responsibilities in the area of work control. R&D line ownership of our work control/hazard mitigation has resulted in a more rapid advancement of our goal to institutionalize a strong work planning and control culture based on the principles of Integrated Safety Management (ISM).

1.2 LABORATORY OPERATIONS AND ES&H

1.2.1 Leadership in Innovative Business Practices

The construction and beneficial occupancy of the Research Office Building (ROB) is outstanding evidence of the innovative approach that UT-Battelle has employed in enhancing the infrastructure at ORNL. This approach has linked the public and private sectors in establishing sustainable growth in new facilities and maintaining ORNL as a world-class R&D organization.

ORNL leadership continues to operate with a well-balanced approach to the allocation of resources. In an environment that is fiscally challenging, leadership has aggressively looked for efficiencies, invested \$2 million in operational improvements, and through those improvements has strengthened the operating infrastructure in areas such as chemical stewardship, nuclear facility consolidation, and many other areas. This approach to driving efficiency to maximize the availability of resources and to reduce operating risks directly supports research and has positioned the Laboratory well for the future.

1.2.2 Improvements in Safety Performance

Safety performance at ORNL continues to improve at an impressive rate. This year, all but one of our performance measures were in the “Outstanding” range. This speaks directly to the sustainable improvements that have been made in removing legacy risks from facilities and associated infrastructure, the improvements in our procedure base that drives the implementation of ISM, and the engagement of ORNL staff in an understanding of their involvement and accountability in their personal safety and that of their fellow staff members. Clear examples of this improvement are the 2 million safe hours worked without a lost-time-away injury for the Laboratory and the 2.5 million safe hours worked to date without a lost-time-away injury on the Spallation Neutron Source (SNS) project.

1.2.3 Standards-Based Management System Progress

Full deployment of SBMS was achieved this year. This effort involved the conversion of all site directives and guidance documents, the completion of a customer survey that measured the effectiveness and efficiency of the process, and the continuation of assessments of management systems by the Independent Oversight organization. The effort has positioned the Laboratory with a strong set of guiding policies and procedures for our operations.

1.2.4 Self-Assessment as a Management Tool

The series of IO reviews of ORNL organizations’ self-assessment programs continued for a third year and showed continuing improvement across the Laboratory. Each year the criteria have been elevated from the previous year, and performance has continued to improve. This demonstrates that a culture of continuous improvement is becoming part of the operating philosophy at the Laboratory and is driving improvements in our operations. We are beginning to see organizations use the results of self-assessment activities as input to strategic planning, resource allocation, and goal-setting activities.

1.2.5 Integrated Safeguards and Security Success

The Laboratory made significant strides in the implementation of Integrated Safeguards and Security Management (ISSM) with the full execution of the associated implementation plan. The deployment of this critical plan has been accomplished in a manner that provides appropriate security in support of our post-911 enhancements while still fostering the quality of openness needed to facilitate the continuing growth of a world-class research laboratory.

1.2.6 Nonreactor Nuclear Facility Division Maturity

The Nonreactor Nuclear Facilities Division (NNFD) was created and staffed to provide an innovative approach to efficient and safe operation of our nuclear facilities. This is a significant shift in the previous operating philosophy at ORNL and will provide significant returns in the consolidation of management systems and resources. Although many challenges remain before complete implementation is achieved, the path we are on will lead to safer, more efficient, and more reliable facilities for the support of our research goals.

1.2.7 Environmental Achievements

Tremendous success was achieved in the environmental areas, both in our landlord activities and in the reduction of our legacy risks. This year the Laboratory conducted its operations with no environmental exceedences, no significant findings in any environmental regulatory inspection, and no National Pollutant Discharge Elimination System (NPDES) permit violations. This is a significant achievement that derives from the operational improvements made in the past few years. The effort to reduce legacy waste at ORNL continues to be highly successful. Significant amounts of legacy waste materials from pumps to gas cylinders to newly generated mixed waste were dispositioned and removed. This represents a significant reduction in current risks and future liabilities to ORNL and DOE.

1.3 COMMUNITY SERVICE

1.3.1 Expanding Media Coverage

A plan developed by the Communications and Community Outreach Directorate (CCO) to expand media coverage of ORNL has enjoyed outstanding success. Greatly increased newspaper and television coverage of the Laboratory's scientific agenda has included an expansion into new markets and a significantly larger presence in the national media.

1.3.2 UT-Battelle Cohesion

Efforts to nurture the relationship with the University of Tennessee (UT) are paying dividends. A new Faculty Affiliates program will foster a closer partnership between ORNL and UT research staff. Initiatives with UT public relations staff have resulted in greater coverage of joint UT-ORNL activities. A partnership with the UT Collaborative for Enhancing Education in Math and Sciences (formerly the Academy for Teachers of Science and Math) has pioneered efforts to promote staff development among area science teachers.

1.3.3 Stakeholder Perspective

Stakeholders in Knoxville and Oak Ridge increasingly view UT-Battelle as a valued partner. A growing number of Team UT-Battelle projects, coupled with participation by the UT-Battelle Leadership Team in a variety of civic activities, has made ORNL a more visible and valued neighbor in the region.

1.3.4 Communications as an Arm of R&D

ORNL researchers have increased their use of CCO's communication and graphic design services to support their work. An increase of 12% in FY 2002, followed by 4% growth in FY 2003, indicates that ORNL research staff place are integrating CCO's support services into their business plans.

2. KEY AREAS FOR IMPROVEMENT

2.1 SCIENCE AND TECHNOLOGY

This section does not include feedback survey information from S&T customers. An addendum will include survey results and analysis information.

2.1.1 Integrated Safety Management in the R&D Workplace

While significant progress has been made in furthering our goals for implementing an effective ISM program in the workplace, continuous attention is required to fully mature this program at all levels within the Laboratory.

2.1.2 Measuring Science and Technology Performance

It is a challenge to R&D organizations to measure the performance of programs of science and technology. As other research entities do, we use several forms of programmatic peer review to yield an assessment of how our research is rated on the world scene. ORNL organizations and programs use advisory committees and other independent, knowledge-based evaluative mechanisms to determine how we are doing with respect to our sponsors' technical pursuits.

Programmatic and organizational reviews that are conducted each year by our sponsors provide valuable information on the quality of our R&D from an independent, yet informed perspective. While the Associate Laboratory Directors use the information from these various reviews to shape their self-assessments and future directions, we have not used this diverse range of peer reviews centrally to look for overall strengths or weaknesses of the Laboratory. We would benefit from collecting and analyzing these reviews within programs and divisions, from the standpoint of customer communication and needed changes to Laboratory direction.

In an effort to provide structure to the independent evaluation function, we developed an SBMS subject area formalizing the expectations for the science and technology programmatic peer review process at ORNL. The goal of this subject area is to establish and deploy R&D division/program advisory committees and directorate review committees as the foundation for the effective S&T peer review of Laboratory research programs. From this start, we will continue our efforts to develop measures and associated methods for information analysis that will truly yield results indicative of our R&D productivity.

In addition to external peer review, we need to continue to do a better job of collecting the research accomplishments of the Laboratory as another measure of our scientific and technological productivity. Each research division collects data on publications and invited presentations, but the process for entering these data into the central database has become erratic. This makes it difficult for central Laboratory planners and managers to gauge our performance on the world scene and demonstrate to our customers our productivity as a Laboratory.

2.1.3 Performance Assessment Relevance to R&D

R&D organizations need to continue efforts to make the performance assessment process the engine that drives continuous improvement and S&T program development. For instance, organizations expend significant resources writing proposals, but often do not adequately evaluate the success rate and related factors to discern why proposals are or are not successful. At the same time, the PBMS needs to enhance

efforts to describe, define, and provide expertise concerning appropriate metrics and associated assessment processes that are relevant to R&D strategic planning activities.

2.1.4 Strategic Hiring and Diversity

The Laboratory has not met its diversity goals and needs to place significant emphasis in this area of strategic hiring as well as overall hiring. Recruiting and attracting employees with strategic skills is a challenge, including the desire to broaden the diversity component of the workforce. With 30% of UT-Battelle's workforce becoming eligible for retirement by 2006, a significant "experience drain" could occur within a short period of time. Demographically, the vast majority of staff is in the age range of 40 to 59 years old. As employees elect to retire, we must ensure that we effectively recruit staff to allow for a smooth transfer of knowledge and that we effectively manage staffing levels to maintain a highly skilled and productive workforce. We continued a multiyear program of strategic hiring, to bring to the Laboratory a small number of research leaders important for our future. In addition, attention must be given to the general hiring program, to ensure that we take this opportunity to replenish the Laboratory with the right set of skills for coming decades and to enhance the diversity component in various job classifications.

2.2 LABORATORY OPERATIONS AND ES&H

2.2.1 Procurement System PAAA Compliance Controls

Actions are being implemented to fully integrate ORNL's Acquisition Management System with all affected management systems to ensure compliance with the Price-Anderson Amendments Act (P-AAA) Quality Rule. Several actions were completed in FY 2003 including formalizing accountability for procurement controls for stock materials, developing a new integrated Battelle supplier evaluation process, revising and providing training on relevant SBMS documentation, adding enhancements to the ORNL automated requisition system, and conducting strategic self-assessments to identify additional needed improvements. Actions remaining for FY 2004 and early FY 2005 include deployment of the Supplier Evaluation Process and database, implementation of the quality-significant and inspection-required processes through custom fields added in SAP, addressing the Supply Chain Management Analysis results, establishing a single operation for warehousing quality significant items at ORNL, and revising the SBMS subject areas and procedures to reflect the changes to the acquisition processes.

2.2.2 Integration of Work Planning and Control

In FY 2003, ORNL began implementation of a standard work/project planning and control process for operations, maintenance, and services (OM&S) work at the Laboratory. A self-assessment of implementation status was completed in February 2003 and identified areas where progress had been made, as well as several areas that still require additional attention. Implementation of the OM&S work planning and control process, further evolution of the R&D work planning and control process deployed in FY 2002, and efforts to fully mature the integration of these two processes with each other and with existing and new Facility Use Agreements will continue throughout FY 2004. The OM&S process will be the subject of an internal independent assessment in early FY 2004.

2.2.3 Nonreactor Nuclear Facilities Management

ORNL has implemented an aggressive program to improve nuclear operations at its ten nonreactor nuclear facilities and focus nuclear research capability to meet the projected demand. Funding was obtained in FY 2003 to begin facility improvements, and a new division was established to enhance our

ability to provide continuity and efficiency in improving nuclear facilities and operations. In addition, ORNL completed a comprehensive study of the future demand for nuclear research capability and delivered to DOE a facility consolidation plan that identifies core capabilities and recommends a minimum set of necessary facilities in order to attain a more cost-competitive posture for projected future nuclear research. FY 2004 objectives include (1) initiating nuclear facility consolidation, (2) continuing nuclear facility strategic improvements with DOE funding support, (3) completing implementation of the ORNL Systems Engineer Program, and (4) continuing improvements in conduct of operations within NNFD facilities.

2.2.4 Workforce Productivity

Internal and external assessments and indicators continue to identify issues with ORNL's internal costs in relation to those at other DOE laboratories. To be competitive, the Laboratory must find and implement innovative ways to accomplish more with the same or lower funding. Significant progress was made in FY 2003 in reducing lost-time injuries to Facilities and Operations (F&O) Directorate staff; this area of focus will continue in FY 2004 and beyond, as needed. Beginning in FY 2004, ORNL will need to continue efforts to identify other approaches for optimizing the efficiency of task management, reducing absenteeism, increasing team flexibility, and other workforce productivity enhancements.

2.2.5 Performance Assessment

The need to continue to develop self-assessment as a key business planning mechanism will remain an area for improvement in FY 2004. While our self-assessment approach and deployment efforts have undergone substantial improvement, ensuring the maturity of the feedback and improvement processes within our organizations is evident in the results of our assessment activities. Until organizations make full use of the results of their assessment activities for resource allocation and goal-setting activities, our self-assessment processes will remain a weak link in the business planning chain.

2.3 COMMUNITY SERVICE

2.3.1 Internal Communications

Internal communications can be enhanced. A communications focus group indicated a desire to promote greater two-way communication between ORNL staff and management.

2.3.2 Enhanced Media Coverage in Trade Journals

External communications in trade journals can be expanded. The success enjoyed in enhanced media coverage by newspapers and television should be broadened to include trade journals.

2.3.3 Staff Cross-Training

Library staff can become cross-trained to reduce costs. Staff can perform multiple duties and reduce the number of full-time equivalent (FTE) employees required.

2.3.4 Opportunities for Relationship Building

A number of initiatives, from graphics services to event planning, can include our DOE customer in ways that can establish closer working relationships.

APPENDIX A

DETAILS AND RESULTS OF THE FY 2003 PERFORMANCE EVALUATION PLAN SCORING

Projected FY 2003 End of Year Status

Critical Outcome	Value Points	Adjectival Rating	Objective Weight	Weighted Value Points	Available Fee (\$K)	Percent of Fee Earned	Earned Fee (\$K)
1. Excellence in Science and Technology	3.51	OUTSTANDING	60.00%	2.10	\$4,116	100%	\$4,116.00
2. Excellence in Operations and ES&H	3.57	EXCELLENT*	35.00%	1.25	\$2,401	90%	\$2,160.90
3. Excellence in Community Service	4.00	OUTSTANDING	5.00%	0.20	\$343	100%	\$343.00
			Total Value Points	3.55			\$6,619.90

Overall Laboratory Rating: OUTSTANDING

Adjectival Rating	Value Points	Percent of Fee Earned
Outstanding	>3.5	100%
Excellent	3.5 P>2.6	90%
Good	2.6 P>1.6	50%
Marginal	1.6	0%

*NOTE: In reviewing the PEP measures and indicators established for Excellence in Operations and ES&H, we believe that we have made substantial progress improving the overall operation of the Laboratory and this is reflected in a PEP numerical determination of "Outstanding." However, we are not satisfied with our progress in establishing a culture that embraces an enhanced level of operational discipline that will ensure consistently outstanding results in this area. We consider our FY 2003 performance in operations and ES&H as "Excellent."

ELEMENT	Value Points	Adjectival Rating	Measure Weight	Weighted Score
Critical Outcome 1 We will deliver scientific advances and technological innovations that support DOE missions, apply our expertise and capabilities to the needs of other customers, and sustain and enhance ORNL's distinctive capabilities				
Performance Measures 1.1–1.4 Continued Scientific Excellence, provided by DOE	3.52	OUTSTANDING	66.67%	2.35
Performance Measure 1.5 Deliver SNS	3.80	OUTSTANDING	25.00%	0.95
Performance Measure 1.6 Enhance the Laboratory's ability to attract and maintain employees with critical skills	2.50	GOOD	8.33%	0.21
		Critical Outcome 1 Total		3.51

ELEMENT	Value Points	Adjectival Rating	Indicator Weight	Weighted Score
Performance Measure 1.5 Deliver SNS				
Performance Indicators				
1.5.1 Deliver SNS on Schedule	4.00	OUTSTANDING	30.00%	1.20
1.5.2 Deliver SNS on Budget	4.00	OUTSTANDING	20.00%	0.80
1.5.3 Technical and Managerial Performance for SNS	3.60	OUTSTANDING	50.00%	1.80
		Performance Measure 1.5 Total		3.80

ELEMENT	Value Points	Adjectival Rating	Indicator Weight	Weighted Score
Performance Measure 1.6 Enhance the Laboratory's ability to attract, develop, promote, and retain a diverse staff with the critical skills required to accomplish the Laboratory's varied science missions while maintaining reasonable cost				
Performance Indicators				
1.6.1 UT-Battelle will reduce its underutilizations by 8 percent in the areas of science, technical, and managerial classifications/categories as it has hiring or promotional opportunities in FY 2003	0.00	MARGINAL	30.00%	0.00
1.6.2 Measure deployment success of ORNL's staffing strategy to ensure effective recruiting and hiring of employees with strategic skills	3.00	EXCELLENT	30.00%	0.90
1.6.3 Publish a comprehensive Laboratory Human Resources Five-Year Strategic Plan	4.00	OUTSTANDING	40.00%	1.60
		Performance Measure 1.6 Total		2.50

ELEMENT	Value Points	Adjectival Rating	Measure Weight	Weighted Score
Critical Outcome 2 We will sustain and improve ORNL's ability to serve the needs of DOE and the nation through responsible stewardship				
Performance Measure 2.1 Integrated Management	3.43	EXCELLENT	37.14%	1.27
Performance Measure 2.2 Improve ES&H Performance	3.56	OUTSTANDING	25.71%	0.91
Performance Measure 2.3 Facilities Modernization and Upgrades	3.95	OUTSTANDING	28.57%	1.13
Performance Measure 2.4 Reduce Cost and Maximize Research Effectiveness	3.00	EXCELLENT	8.57%	0.26
	Critical Outcome 2 Total			3.57

ELEMENT	Value Points	Adjectival Rating	Indicator Weight	Weighted Score
Performance Measure 2.1 Integrated Management				
Performance Indicators				
2.1.1 Standards Based Management System (SBMS) Composite	4.00	OUTSTANDING	7.69%	0.31
2.1.2 Integrated Safety Management (ISM) Maturity Evaluation	4.00	OUTSTANDING	15.38%	0.62
2.1.3 Performance Based Management (PBM) Composite rating from an Independent Oversight review	2.90	EXCELLENT	30.77%	0.89
2.1.4 Demonstrate that the DOE Integrated Safeguards and Security Management (ISSM) initiative is formally and effectively implemented within the ORNL workplace	4.00	OUTSTANDING	7.69%	0.31
2.1.5 NNFD operations established through validated processes, assigned staffing, and assumed responsibilities	4.00	OUTSTANDING	7.69%	0.31
2.1.6 Complete facility strategic improvements	4.00	OUTSTANDING	7.69%	0.31
2.1.7 Demonstrate a high standard of operational performance by implementing improvements.	3.00	EXCELLENT	7.69%	0.23
2.1.8 Develop non-reactor nuclear facility consolidation plan	3.00	EXCELLENT	15.38%	0.46
	Performance Goal 2.1 Total			3.43

ELEMENT	Value Points	Adjectival Rating	Indicator Weight	Weighted Score
Performance Measure 2.2 Improve ES&H Performance				
Performance Indicators				
2.2.1 Safety and Health Composite	3.00	EXCELLENT	44.44%	1.33
2.2.2 Environmental Composite	4.00	OUTSTANDING	33.33%	1.33
2.2.3 Reduce Hazardous Material Footprint (Composite)	4.00	OUTSTANDING	11.11%	0.44
2.2.4 SNS Construction Safety Indicator:	4.00	OUTSTANDING	11.11%	0.44
Performance Measure 2.2 Total				3.56

ELEMENT	Value Points	Adjectival Rating	Indicator Weight	Weighted Score
Performance Measure 2.3 Facilities Modernization and Upgrades				
Performance Indicators				
2.3.1 Vacate excess facilities	4.00	OUTSTANDING	15.00%	0.60
2.3.2 Build new facilities to support facilities modernization	4.00	OUTSTANDING	50.00%	2.00
2.3.3 Demonstrate operational improvements by way of the LCAMs measures (PM, OM, and RP).	3.00	EXCELLENT	5.00%	0.15
2.3.4 Personnel and Equipment Move Composite	4.00	OUTSTANDING	20.00%	0.80
2.3.5 Develop a risk prioritized strategic plan for the liquid and gaseous waste treatment systems and associated infrastructure	4.00	OUTSTANDING	10.00%	0.40
Performance Measure 2.3 Total				3.95

ELEMENT	Value Points	Adjectival Rating	Indicator Weight	Weighted Score
Performance Measure 2.4 Reduce Cost and Maximize Research Effectiveness				
Performance Indicators				
2.4.1 Demonstrate responsible cost management performance through improvement in the Core Composite Indirect Rate (CCIR).	3.00	EXCELLENT	83.33%	2.50
2.4.2 ORNL will maintain an effective purchasing system to support its mission and to accomplish the purposes of the DOE's management and operating contract.	3.00	EXCELLENT	16.67%	0.50
Performance Measure 2.4 Total				3.00

ELEMENT	Value Points	Adjectival Rating	Measure Weight	Weighted Score
Critical Outcome 3 ORNL will be viewed by its neighbors as a highly valued partner in the region. We will be active participants in economic development, efforts to strengthen science and math education, and support of the community's civic and cultural activities.				
Performance Measure 3.1 ORNL will be recognized within the region as a good corporate citizen	4.00	OUTSTANDING	40.00%	1.60
Performance Measure 3.2 ORNL will encourage the growth of businesses based on ORNL technology and/or resources to enhance the economy	4.00	OUTSTANDING	60.00%	2.40
Critical Outcome 3 Total				4.00

ELEMENT	Value Points	Adjectival Rating	Indicator Weight	Weighted Score
Performance Measure 3.1 ORNL will be recognized within the region as a good corporate citizen				
Performance Indicators				
3.1.1 UT-Battelle will enhance community relationships through initiatives to improve the teaching of science education in area schools, implementation of a new Faculty Affiliates Program with the University of Tennessee and to strengthen UT-Battelle's value as a partner in the region. (Composite)	4.00	OUTSTANDING	100.00%	4.00
Performance Goal 3.1 Total				4.00

ELEMENT	Value Points	Adjectival Rating	Indicator Weight	Weighted Score
Performance Measure 3.2 ORNL will encourage the growth of businesses based on ORNL technology and/or resources to enhance the economy				
Performance Indicators				
3.2.1 Indicators of Technology Transfer and Economic Development (TTED) performance	4.00	OUTSTANDING	100.00%	4.00
Performance Measure 3.2 Total				4.00

