Pacific Northwest National Laboratory

Operated by Battelle for the
U.S. Department of Energy

FY1998 ANNUAL SELF-EVALUATION REPORT FOR THE PACIFIC NORTHWEST NATIONAL LABORATORY

October 19, 1998

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Pacific Northwest National Laboratory

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U.S. Department of Energy

October 19, 1998

57-98

Mr. John D. Wagoner, Manager
U.S. Department of Energy
Richland Operations Office
P.O. Box 550
Richland, Washington 99352

Dear Mr. Wagoner:

Pacific Northwest National Laboratory's FY1998 Annual Self-Evaluation Report

Attached is a copy of the Pacific Northwest National Laboratory's FY1998 Annual Self-Evaluation Report. This report summarizes our progress toward accomplishment of the Critical Outcomes, objectives and performance indicators as delineated in the FY1998 Performance Evaluation & Fee Agreement. It also summarizes our analysis of the results of the Divisions/Directorates annual self-assessments, and implementation of our key operational improvement initiatives as well as how we have used our Integrated Assessment processes to identify and plan improvements for FY1999.

As you review the report you will find areas of significantly positive progress; you will also note areas where I believe the Laboratory could make improvements. Overall, however, I believe you will be quite pleased with our progress during the past year.

Jeff Smith (375-2970) of my staff is available for questions regarding the attached report.

Very truly yours,

William J. Madia
Director

WJM:JWS:vah

cc: MA Coronado, DOE-RL
RF Christensen, DOE-RL
TL Davis, DOE-RL
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EXECUTIVE SUMMARY

Pacific Northwest National Laboratory (PNNL) is designated as a Principal Laboratory for the Environmental Quality mission in the DOE Strategic Laboratory Mission Plan. In addition, make significant contributions to DOE's missions in basic science, national security, and energy. We intend to be the benchmark standard of excellence for laboratory management, thus providing DOE and the nation with the greatest possible research value while fully meeting our responsibilities for the health and safety of our workers and the public, and for protecting the environment.

The Department's performance evaluation of the Laboratory is based on six Critical Outcomes. These Outcomes represent high-level, tangible results that we deliver to DOE. We believe we met or exceeded performance expectations for each of the Critical Outcomes.

We believe the Laboratory's overall performance for the FY1998 evaluation period has been Excellent. Performance highlights and key issues for each Critical Outcomes are summarized below.

ENVIRONMENTAL TECHNOLOGY

The Laboratory made excellent progress in the development and deployment of innovative technologies that impact environmental cleanup.

Fourteen technologies were successfully demonstrated for a variety of customers at numerous sites including Hanford, Oak Ridge, Savannah River, White Sands Missile Range, Pantex and Bellingham, Washington, for the Washington State Department of Transportation. It is important to note that the Laboratory has been able to sustain our technology demonstration rate over the past three years despite an overall decline in EM-50 budgets. In addition, the Laboratory is meeting expectations with respect to identifying and proposing solutions to address Hanford-related problems.

Thirteen technologies were deployed into use, but all of these are deployed outside Hanford. For example, our technologies enabled United Nations inspectors to remove nuclear materials from a sludge tank in Iraq, improved operations and worker safety at Oak Ridge waste tanks, and provided the technical basis for remediation of a two-mile-long trichloroethene-contaminated plume at INEEL.

It is expected that the Laboratory's role at Hanford will continue to diminish due in part to lack of M&I contractor incentives to apply new technology. Therefore, we will focus more attention on impacting the two critical Hanford programs where the Laboratory has technology leadership responsibility - Privatization and Groundwater/Vadose Zone Integration. Even with reduced funding and declining work at the Hanford site, the Laboratory has aggressively pursued the deployment of over 32 new technologies in the past three years.

Finally, the Laboratory continued to provide notable support in leading the technical aspects of the Tanks Focus Area (TFA), clearly meeting client expectations as determined by a survey of key customers. We do have room for improvement, however, in delivering milestones on time. This year we only provided 81% of key TFA-related deliverables were provided on schedule.

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Based upon our progress toward the performance indicators that provide the evidence of achieving this objective, our rating for FY1998 is **Outstanding**.

SCIENTIFIC EXCELLENCE

The Laboratory is conducting quality scientific work that is providing new insights and solutions to key technical issues facing the nation and the world. External peer reviews of major programs recognized our programs for the development of facilities that are unique in the world, for significant contributions to international programs, for assembling teams of experimentalists and theorists that go beyond that found in any university, and for a superb job in identifying technologies needed to resolve tank waste issues.

The Laboratory received significant external recognition in FY1998 including an impressive seven R&D 100 and three FLC awards. In addition, the quality of our scientific efforts are reflected by a significant list of staff that were recognized for their scientific and engineering excellence in terms of awards, invited talks, and participation on scientific committees. One notable item this year was the William R. Wiley Environmental Molecular Sciences Laboratory receiving special mention in the 1998 Laboratory of the Year Award from R&D Magazine, where it was quoted that, "the Lab has created an infrastructure where science can evolve over time, while assuring that today's science is correct." Over the past four years the Laboratory has experienced a declining trend in the number of publications in peer reviewed journals. This does not meet performance expectations and we need to examine how we can improve in this area.

The value and relevance of the Laboratory's critical projects and work continues to sustain a high level of satisfaction as reflected by feedback obtained through our formal customer survey. Results from the survey will be used to address comments and identify opportunities for improvement. The Laboratory's evaluation of performance on critical projects indicated strong improvement in budget performance; however, schedule performance was below expectations.

Ongoing interaction with our customers, specific comments provided through the survey, and insights gained from internal systems that track performance suggest opportunities for improvement. We are committed to continuously improve our cost effectiveness and project schedule performance.

Based upon our progress toward the performance indicators that provide the evidence of achieving this objective, our rating for FY1998 is **Excellent**.

SCIENTIFIC & TECHNICAL CONTRIBUTIONS

The Laboratory has increased its scientific and technical contributions in support of DOE's mission objectives. Laboratory staff have been engaged in solving the country's national security problems at the highest levels. Furthermore, staff and facilities are key resources in the Department of Energy and U.S. Government's fight against nuclear proliferation and are recognized as world authorities in their fields. The Laboratory delivered the Automated Radioxenon Sampler/Analyzer (ARSA), a fully automated, remotely programmable unit for the ultrasensitive detection and analysis of nuclear detonations. In addition, the Laboratory facilitated the storage of irradiated plutonium fuel for the Democratic Peoples Republic of Korea.

The Laboratory is developing and expanding fundamental research programs. We experienced a 12% growth in the number of Principal Investigator-initiated programs, and fundamental research funding is up in four new program areas. Furthermore, programmatic funding for the Wiley Lab grew to \$18.3M as result of new funding from several sources.

Progress was made in diversifying key science and technology business areas. The Laboratory saw a 27% increase in the number of new environmental clients and nearly a 50% increase in the dollar volume of new environmental-related sales as compared to FY1997. In addition, significant energy-related business growth was experienced in DOE transportation-related work and in the industrial-international area. These achievements, however, were somewhat nullified by a declining business base on the balance of the energy-related portfolio.

Based upon our progress toward the performance indicators that provide the evidence of achieving this objective, our rating for FY1998 is Excellent.

OPERATIONAL EXCELLENCE

The Laboratory is conducting work and operating facilities with distinction and we've done so in a manner that is supportive of the Laboratory's science and technology mission. We have made significant investments over the past four years to integrate sound safety and environmental management practices into daily operations. Staff and managers are taking responsibility for their ES&H related performance: more than 90% of staff are current on their training, and staff are conscious of the work controls that affect their work. In addition, improvements in awareness and attention to ES&H issues have also been reported as a result of increased staff involvement in work planning activities. Further evidence of excellent progress on this outcome is provided by the recent results of the DOE ISM Verification. DOE conducted an intensive two-week review and as a result of their review, approved the PNNL Integrated Safety Management System on October 16, 1998. PNNL is the first DOE Laboratory to receive verification of both Phase I and Phase II of their ISM System.

The Laboratory's performance with respect to occupational safety and health, radiological control, and waste management and environmental protection are all strong. We have made quantitative improvements in several lagging indicators. A comparative analysis of OSHA statistics indicated that PNNL's performance is better than the average for other R&D organizations and is improving at a faster rate. Staff continue to perform very well with respect to skin and personal clothing contamination events, unplanned spills, airborne contamination events, and uncontrolled releases. During the past three fiscal years there have been only 2 instances (both occurring this year and related to a single event in the 306W facility) of workers exceeding the planned administrative control limit, neither of which exceeded 20% of the Legal Dose Limit during the year. The Laboratory's waste management and environmental protection performance is meeting expectations; however, a special study commissioned by senior management identified several opportunities for improvement. Actions have already been initiated and improvements are already apparent.

The Laboratory has demonstrated strong performance relative to the management and use of facilities and assets. Processes used for acquiring, modifying, and utilizing facility assets are effective. We have demonstrated excellent cost control and have reduced cycle time for engineering requests. Space allocations are on par with national benchmarks and 92% of our R&D laboratories are occupied. In addition, we aggressively pursued benchmarking opportunities

in FY1998, using data as the basis to make improvements resulting in more than \$3M in cost reductions. However, the timeliness of the Laboratory's maintenance processes are not where we would like them to be.

The Laboratory is maintaining effective control of vacant facilities and has completed 100% of required inspections. However, our ability to transfer or demolish facilities that are vacant and no longer of any use to the Laboratory is difficult at best. We were able to transfer only 1/3 of the 32 surplus facilities due to complexities associated with transferring facilities to other site contractors. We had a goal of transferring 100% of these facilities this year.

We believe our performance rating on this critical outcome is **Excellent**. The Laboratory continues to assess operational performance and will work to continuously improve in this area.

LEADERSHIP AND MANAGEMENT

The Laboratory is providing leaders, management systems, and an environment that is supportive of innovation needed to accomplish science and technology mission. Two initiatives started in previous years to improving the quality of work life and implementing self-assessment are maturing and making an impact on performance.

The Laboratory focused in FY1998 on improving management's performance in two areas: providing staff performance feedback and strengthening career development. We have made performance feedback an explicit accountability, developed and implemented an enhanced mini-360 feedback assessment tool, and developed succession plans for key staff, including career development plans for succession candidates. These and other actions we've taken led to a dramatic increase in our QWL survey this year.

The Laboratory's Integrated Assessment processes are maturing - we are in the third year of implementation - and progress has exceeded our expectations. Several organizations have aspects of their self-assessment program integrated into their management approach and many of the self-assessment programs have achieved an outstanding level of performance as determined by evaluations performed by the Independent Oversight organization. Through the survey, which examines DOE's involvement in our self-assessment processes, we find opportunities where we can strengthen interactions with DOE staff.

Providing effective and efficient business management systems is an ongoing challenge, not a singular event. Laboratory staff have acknowledged improvement in business management systems via the QWL survey. DOE's perspective on our systems however, will not be known until completion of the up-coming DOE Business Management Oversight Review. The Laboratory fell below FY1998 expectations with respect to research-to-support staff labor ratio and average cost per research FTE. The Laboratory made conscious decisions to increase our investment in program development and capability development, and we were not able to maintain the pace of hiring research staff to achieve the desired balance between program and overhead costs. Overall however, the Laboratory has used cost management tools to hold lab-level overhead rates flat for the past two years.

Based upon our progress toward the performance indicators that provide the evidence of achieving this objective, our rating for FY1998 is **Excellent**.

COMMUNITY RELATIONS

The Laboratory and Battelle are making a difference in the community. We have exceeded our community relations goals for FY1998. We surveyed the local communities and their leaders, and Pacific Northwest regulators about their perceptions of Battelle and the Laboratory as corporate citizens. Results of the surveys of community leaders and residents were very favorable while the results of surveys of the Pacific Northwest regulators were mixed. The results of the surveys were used to develop and implement improvement actions.

We are helping create a diversified economy by putting technology to work in the Tri-Cities region. In FY1998 we launched, or helped launch, 12 new businesses. All (100%) of the businesses we started in FY1997 have been sustained through the difficult first year of business, compared to a national average of approximately 40%. We were instrumental in the development of 74 new jobs among 28 firms in the local region, exceeding our target of 50 new jobs. These jobs resulted from helping in start-up, recruiting, and/or providing technical assistance to companies. In addition, major growth occurred in two PNNL supported deals from prior years. Oremet recently expanded operations to include 65 new jobs, and Integrated Environmental Technologies grew to add 19 jobs. These companies are large job generators and the Lab's assets have been a factor in making both deals happen.

The Laboratory continues to be an extremely strong influence concerning the enhancement of science and mathematics education.

Based upon our progress toward the performance indicators that provide the evidence of achieving this objective, our rating for FY1998 is **Outstanding**.

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INTRODUCTION

The Laboratory's goal for the FY1998 Self-Evaluation is to provide a critical review of our progress toward accomplishing the Critical Outcomes and to evaluate the quality of the management systems the Laboratory uses to drive continuous improvement.

Building upon the framework established in FY1996 and continued in FY1997, this year's document presents a focussed, quantitative and objective approach to determining the performance of the Laboratory. It is based on the Laboratory's performance toward achieving a set of Critical Outcomes, objectives and performance indicators that were developed in partnership with our key customers.

To ensure our long-term ability to provide high-value products and services to our DOE customer, the Laboratory, in partnership with our DOE customer, evaluated both its long-term needs and the current operating environment to develop the six Critical Outcomes. The Laboratory's FY1998 Critical Outcomes serve as a basis for the overall management and measurement of performance within the Laboratory. Each outcome is supported by two or more objectives. Progress toward each objective is measured by progress toward a specific set of performance indicators. The results of progress toward the Critical Outcomes as documented in Part I of this report are also used to provide DOE-RL with a measurement system by which Laboratory performance can be evaluated.

The Laboratory's FY1998 performance evaluation can be determined by evaluating progress against agreed-to individual performance indicators and rolling the results up to the Objective, Critical Outcome, and Laboratory levels.

The Laboratory views self-assessment as the mechanism to determine if organizational and personal objectives are being accomplished and in the manner expected. Self-assessment has always been part of the Laboratory's management approach, however, a continually maturing self-assessment effort is key to sustaining and improving the overall performance of the Laboratory. Each Division and Directorate is required to perform an annual self-assessment and to document the results of that assessment. A summary of the Division's/Directorate's self-assessment report is provided as Part II of this document.

Part III of this report provides a summary of the results of FY1998 Laboratory-level Improvement Initiatives and a discussion of the FY1999 Improvement Initiatives.

Part IV of this report provides a summary of the External Oversight activities that were conducted on the Laboratory during FY1998.

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PART I. SUMMARY OF PERFORMANCE TOWARD THE CRITICAL OUTCOMES

1.0 ENVIRONMENTAL TECHNOLOGY

In support of the Department of Energy's Environmental Quality mission, the Laboratory has taken a strong leadership role in the reduction of the health and environmental risks associated with both legacy production sites and current operations, and the development of innovative environmental technologies that will address both current, and future, waste cleanup problems.

To fulfill the Department's strategic intent and to meet the cleanup expectations of the nation's taxpayers, the environmental remediation program will require intense effort over the next several years and into the 21st Century.

For these reasons, and in partnerships with DOE, the Laboratory has established the following Critical Outcomes, objectives and performance indicators to guide our efforts and to monitor our progress.

The Environmental Technology Critical Outcome Tree, detailing the Critical Outcome and its' supporting Objectives and Performance Indicators, is presented below.

Summary

The Laboratory made excellent progress in the development and deployment of innovative technologies that impact environmental cleanup.

Fourteen technologies were successfully demonstrated for a variety of customers at numerous sites including Hanford, Oak Ridge, Savannah River, White Sands Missile Range, Pantex and Bellingham, Washington, for the Washington State Department of Transportation. It is important to note that the Laboratory has been able to sustain our technology demonstration rate over the past three years despite an overall decline in EM-50 budgets. In addition, the Laboratory is meeting expectations with respect to identifying and proposing solutions to address Hanford-related problems.

Thirteen technologies were deployed into use, but all of these are deployed outside Hanford. For example, our technologies enabled United Nations inspectors to remove nuclear materials from a sludge tank in Iraq, improved operations and worker safety at Oak Ridge waste tanks, and provided the technical basis for remediation of a two-mile-long trichloroethene-contaminated plume at INEEL.

It is expected that the Laboratory's role at Hanford will continue to diminish due in part to lack of M&I contractor incentives to apply new technology. Therefore, we will focus more attention on impacting the two critical Hanford programs where the Laboratory has technology leadership responsibility - Privatization and Groundwater/Vadose Zone Integration. Even with reduced funding and declining work at the Hanford site, the Laboratory has aggressively pursued the deployment of over 32 new technologies in the past three years.

Finally, the Laboratory continued to provide notable support in leading the technical aspects of the Tanks Focus Area (TFA), clearly meeting client expectations as determined by a survey of key customers. We do have room for improvement, however, in delivering milestones on time. This year we only provided 81% of key TFA-related deliverables were provided on schedule.

Based upon our progress toward the performance indicators that provide the evidence of achieving this objective, our rating for FY1998 is **Outstanding**.

Objective 1.1: Develop innovative technologies and approaches

Results

The Laboratory made significant progress in developing new and innovative technologies this year, exceeding expectations related to all of the performance indicators supporting this objective. Fourteen technologies were successfully demonstrated, 25 significant solutions to Hanford-related activities were provided, and 32 new environmental technology concepts were identified. Figure 2.1 shows that the number of demonstrations has kept pace with our baseline level of performance established the last two years despite an overall decline in EM-50 budgets. The Laboratory continues to move to non-Hanford demonstrations as the Hanford market becomes less receptive. This move forces the Laboratory to be creative and aggressive looking for other venues in this very tight market. (Note ORNL participation levels equal to Hanford.)

Based upon the performance indicators that support this objective, our rating for FY1998 is **Outstanding**.

Analysis

Technology Demonstrations: Figure 1.1 shows the Laboratory's consistent progress in successfully demonstrating technologies in FY1998. Each demonstration is described in greater detail below.

Successful Technology Demonstrations:

Concrete Spallation was successfully demonstrated at Hanford in January 1998, when PNNL decontaminated 50 sq ft of concrete wall that had beta/gamma contamination. The spaller was demonstrated with a shield on it to protect the operator. Bechtel Hanford Inc. might further utilize the spaller at C Reactor to decontaminate cracks in concrete.

Automated Medical Isotopes Generator System was successfully demonstrated in January 1998. The collaborative laboratory experiments were performed with samples from ORNL. The highly successful

performance of the new automated Bi-213 generator in experiments to date has led to a proposal for development and deployment of a prototype commercial generator with "user friendly" software suitable for clinical applications.

Salt Splitting Using Membranes was successfully demonstrated at Hanford in February 1998. Two bench-scale tests with actual radioactive Hanford tank waste were completed using a bench-scale electrochemical unit containing an organic cation exchange membrane manufactured by DuPont. Each test was conducted with approximately 2 liters of waste from the Hanford tanks. Two more tests are planned using some relatively new ceramic membranes developed by Ceramatec Inc.

Thermochemical Environmental Energy System (TEES) was successfully demonstrated in February 1998 at a private site in New York. Through the use of TEES on a byproduct stream from Levulinic Acid, a valuable fuel gas was recovered and wastewater cleaned for reuse or disposal.

DC Arc Treatment of Pantex Classified Components was successfully demonstrated in April 1998. The objective was to sanitize and process 200 neutron generators from the Pantex site. All 200 generators were processed, destroying the classified characteristic and immobilizing the hazardous components in the resulting waste forms.

Chemical Breathalyzer was successfully demonstrated at ORNL in April 1998. The Exposure to Risk Monitor (E2RM) is a chemical breath analyzer that measures organic chemicals in exhaled breath directly. PNNL took the E2RM to the TSCA incinerator at the K-25 Area at the Oak Ridge Site to demonstrate that it functions to the level of sensitivity desired, that it is easy for the workers to use, and that it provides real time data that is verified by the lapel dosimeters.

Figure 1. 1

In-Situ Gaseous Reduction System was successfully demonstrated in July 1998 at White Sands Missile Range in New Mexico. This demonstration undertook in situ treatment of the soil at the waste site by injection of a reactive gas mixture, resulting in immobilization, thus preventing further release of chromium to groundwater. The treatment, well field and monitoring systems performed in a satisfactory manner. Soil samples for the post-treatment sampling were collected and analytical results were received from the laboratory in September. The results will be evaluated in FY99.

ANDROS 211-U Plant Demonstration was successfully demonstrated at Hanford in August 1998. The ANDROS Mark VI robot was used to remotely characterize the 221-U Facility (U-Plant) railroad tunnel, which is a high radiation, airborne contaminated facility. PNNL staff completed an initial characterization demonstration in the U-Plant railroad tunnel. Nine smear samples were taken throughout the length of the tunnel and approximately four hours of video coverage was taken from two video links in the tunnel.

Mycoremediation Field Testing was successfully demonstrated at a Bellingham WSDOT site in August 1998. The objective was to demonstrate that mycoremediation treatment can reduce the total petroleum hydrocarbon levels at the WSDOT maintenance yard much quicker than other biotechnology methods.

High Capacity, Selective Solid Sorbents for Cesium and Strontium was successfully demonstrated at Hanford in September 1998. This demonstration provided information on alternative sorbent materials that have a high potential to reduce the cost of the project while exceeding the strontium removal goals of the 100-N Area groundwater remediation.

Cs-137 Breakthrough Monitor was shipped to ORNL in September 1998, constituting completion of PNNL's participation in this demonstration. This real-time technology replaces the baseline technology of sampling and laboratory analysis that requires man-days of effort and significant radiation exposure. It also allows timely decisions to be made regarding column replacement without significant downtime.

SAMMS for Mercury Removal from Wastewater was successfully demonstrated in September 1998. PNNL's scope of the demonstration was completed with shipments of the SAMMS materials to ORNL in February and March 1998. ORNL finished preliminary testing in wastewater on PNNL beads in September, and will continue testing with the SAMMS materials in FY99. SAMMS has the potential to significantly reduce the costs associated with the mercury cleanup by reducing the amount of adsorbent material required, reducing the volume of secondary wastes generated, and serving as a final waste form for the material.

Electrically Switched Ion Exchange (ESIX) was successfully demonstrated at Hanford in September 1998, by removing cesium from simulated KE Basin water. Cesium ion uptake and elution were conducted three times with the ESIX system, showing the viability of the treatment technology. The major benefit of ESIX is the significant reduction in secondary waste generation and disposal costs compared with conventional ion exchange. Parsons Infrastructure and Technology Group, Inc. will market the technology to potential Hanford Site and other users, and will also provide scale-up and engineering services needed to deploy the system.

Flygt Mixers was successfully demonstrated in September 1998. PNNL worked with the Savannah River Site (SRS) to demonstrate the applicability of the commercially-available Flygt Mixers -- propeller-driven systems -- to mobilize the zeolite heel of the SRS sludge tanks. The first two phases of the demonstration at SRS were successfully completed during the first week of September 1998, constituting completion of PNNL's scope of the demonstration. The third phase of the demonstration (in a full-scale tank facility) is scheduled for FY1999.

Significant Solutions Provided to Hanford Problems: Figure 1.2 shows the number of Hanford Solutions points that PNNL earned in FY1998, totaling 71.5 points. One point is awarded for each project completed for Hanford clients that produce a technical product such as a report or other technical deliverable. One point is awarded for each EM-50 task that addresses one or more Hanford needs. For proposals prepared that address Hanford problems and environmental technology needs a ½ point will be awarded for each. The total Solutions number includes a final report (worth 10 points) that will be submitted in October. The steep decline in solution points from FY97 to FY98 is an artifact of changes that were made in the point scoring system and the number of activities that were counted towards contributing to this indicator. This indicator becomes more challenging as the site Management and Integration (M&I) contractor continues to use existing technology in moving more work to its own subcontractors. The Laboratory's role at Hanford continues to dwindle in the absence of strong M&I contractor incentives. We will continue to emphasize this area, however, in FY99 we will focus more attention on developing the two critical Hanford programs in Privatization and Groundwater/Vadose Zone Integration. All 25 significant activities and their point values are listed below.

- Tank Waste Retrieval Technology (1 pt)
- Institution of Physical Chemistry (IPC) Liaison (1 pt)
- Enhanced Sludge Washing (1 pt)
- Waste Loading Improvements in Glasses (1pt)
- Immobilized LAW Glass Studies (1 pt)
- Low Frequency Electromagnetic Ground Penetrating Holographic System (LEMA) (1 pt)

Figure 1.2

- Concrete Property Studies (1 pt)
- Waste Disposal Integration Team (5 pts)
- Robotics Tank Waste Retrieval (1 pt)
- PNNL Support to the Tank Waste Safety Program (2 pts)
- PNNL Support to the ERC Technology Application Function (1 pt)
- W-211 Scientific Analysis of Hanford mixer pump operations (1 pt)
- DOE FRAMES Support (formerly DOE MEPAS Support) (1 pt)
- HTI Arm-Based Sampling & Characterization Support (1 pt)
- K Basin Fuel Elements Subsurface Sludge Examination (1 pt)
- Hanford Life-Cycle Cost Issue Resolution (1 pt)
- Barrel Scanning and Box Assay for Waste Characterization (1 pt)
- Canyons Characterization Needs Statement (1 pt)
- Aviation Safety Point of Contact (1 pt)
- Hanford Groundwater Monitoring Project (5 pts)
- Dissolution Rate Testing of Hanford N Reactor Spent Nuclear Fuel (1 pt)
- EM Science Program Proposal Submissions (12.5 pts)
- EM Science Program Tasks Supporting Hanford Needs (13 pts)
- Waste Management Strategic Planning (1 pt)
- Management and Integration of Hanford Site Groundwater and Vadose Zone Activities (5 pts)

New Environmental Technology Concepts: Figure 1.3 shows the number of new environmental technology concepts identified or disclosed in FY1998. This measure reflects the Laboratory's efforts to develop and capture new technology ideas. Each new concept is listed below. This was the first year for this indicator and efforts were primarily focused on capturing the appropriate data for further analysis. Each new concept, referenced by its invention number, is listed below.

- E-1634, A Real-Time Protein Toxin/Enterotoxin Immunoassay Using Genetically Engineered and Fluorescent (GEF) Antigen-Antibody Displacement Model
- E-1637, Disposal of Carbon Dioxide as Solid Clathrate Hydrate at Moderate Ocean Depths
- E-1638, Conversion of Waste Starch To 1,3-Propanediol Using Genetically Engineered Starch-Utilizing Yeast Strains
- E-1639, Rechargeable Reactive Barriers
- E-1640, On-Line Melt Monitoring System (OMMS) High Temperature Raman Spectroscopy/Statistical Glass Structure-Property Models
- E-1641, Separation Systems Based on Oscillatory Fields
- E-1644, Treated Geotextile Barriers
- E-1645, Reactive Well Soil Flushing
- E-1647, Vadose Ventilation
- E-1648, Construction of Strong Hybrid Promoter Sequences using a Plant Ribosomal Promoter Sequence (rpl34) and Other Specific and Strong Promoter Elements
- E-1650, Genomic Expression of Foreign Proteins in Higher Plants
- B-1425, Improved Process for the Conversion of Lactate Esters to Acrylate Esters
- B-1426, Plant-Based-Carboxylation of Transgenic Proteins
- B-1429, Formation of a Pharmaceutical Aerosol of Fine Particles using Rapid Expansion of Supercritical Fluid Solution (RESS)
- B-1430, Microemulsion Soubilization for the Generation of Fine Particles Using the Rapid Expansion of Supercritical Fluid Solution (RESS) Process
- B-1431, Electrostatic Deposition of Fine Particles Generated Directly from Rapid Expansion of Supercritical Fluid Solution (RESS) Process
- B-1434, Transgenic Protein Expression in Plant "Milk"
- B-1657, Composite Getter for Hydrogen Isotopes
- E-1659, Mycoremediation System
- B-1436, Multifunctional Peptide Fusions for Protein Immobilization, Purification & Modification
- B-1438, Plant Derived Blood Coagulation Factors
- D-0054, SUM3 Software
- E-1678, Field Technique for Automated Dithionite Analysis
- E-1682, Use of Erbium for Neutronic Control in a BWR
- E-1685, BWR In-Channel Burnable Absorbers (ICBAs)
- B-1454, RF Tag/Sensor Interface
- E-1696, Redox Rejuvenating Agent

Figure 1.3

- E-1697, Near Real-Time Measurements of 90Sr in Groundwater via Cerenkov Radiation at Drinking Water Limits
- E-1701, Ultrafiltration Using Compressible Solvents
- E-1702, Enhanced Micellar Ultrafiltration Using Compressible Solvents
- D-0056, RT3D software
- E-1705, Preparation and Application of Controlled-Release Materials Using Supercritical Fluids

Objective 1.2: Ensure deployment of innovative technologies and approaches

Results

The Laboratory made outstanding progress in advancing the deployment of new and innovative environmental technologies this fiscal year. Twelve formal expressions of interest were entered into and 21 technologies were deployed, for a total of 29 deployment points, exceeding both expected levels of performance. Excellent progress was made towards increasing the number of deployments that are either directly linked with a DOE cleanup activity or indirectly by transfer of DOE developed technologies to a private environmental company who intends to deploy them through contracts with DOE, other government agencies and to private industry with environmental problems. For FY1998, the success of this objective was achieved with no innovative technologies deployed at Hanford. For FY1998, this objective was successfully achieved but no new innovative technologies were deployed at Hanford, an issue for the future as previously mentioned. We also have had good success at ORNL due to their receptiveness to new and innovative approaches to solving problems.

Based upon the performance indicators that support this objective, our rating for FY1998 is Outstanding.

Analysis

Formal Expressions of Interest: A key leading-edge, or forecasting indicator of future technology deployments, is the number of formal expressions of interest. Formal expressions of interest, that include license agreements, CRADA's, and memoranda of understanding (MOU) to partner in delivering technology to the market, often lead to the deployment of a technology through a commercial company who is equipped to deliver its services to both government and industrial clients. The Laboratory enters these agreements with companies that intend to commercialize a unique Laboratory capability or technology. Figure 1.4 shows steady improvement in the performance level over the past two years. Progress has been acceptable and no significant issues were identified in this area.

Figure 1.4

Formal Expressions of Interest Entered Into:

Ammonia Recovery Process. BMI and ThermoEnergy finalized a License Agreement in January 1998 for the ammonia recovery process, which is a joint PNNL/BMI technology.

Soil Treatment Technology. BMI and AGSCO signed a Memorandum of Understanding (MOU) in February 1998 to develop and commercialize a soil treatment technology employing a non-thermal plasma for oxidizing refractory organic compounds as an alternative to more conventional thermal treatment.

D&D Technologies. Battelle and Thermo NuTech finalized a Teaming Agreement in April 1998, to decontaminate gloveboxes and tanks contaminated with transuranic waste.

Radiation Protection Services. PNNL and Thermo NuTech finalized an MOU in April 1998 for the radiation protection services.

Electrically Switched Ion Exchange (ESIX). PNNL and Parsons Infrastructure and Technology Group finalized a MOU in May 1998 for the purpose of deploying the ESIX technology for the treatment of radioactive and hazardous wastewaters and aqueous wastes.

Supercritical Cleaning & Coating. A License Agreement with MiCELL Technologies Inc. was finalized on May 11, 1998, for an exclusive license to Battelle's supercritical microemulsion patents for cleaning and coating applications.

Sizing/Slashing. PNNL and MiCell Technologies Inc. finalized a license agreement on May 11, 1998, for the sizing/slashing technology. This is the second of two supercritical fluid technologies licensed to MiCELL. PNNL was awarded funding from the American Textile Partnership (AMTEX) for the engineering development of a non-polluting approach for the application and removal of sizing from textiles; the AMTEX funding will help MiCELL and AMTEX accelerate its commercialization.

STOMP Software. A Software License Agreement was signed with Delft University of Technology, Netherlands, on June 22, 1998, for the STOMP software.

Gas Phase Corona Reactor. PNNL and the Gradient Point Corporation (GPC) finalized an Option Agreement on June 26, 1998, for the Gas Phase Corona Reactor technology.

Thermochemical & Catalytic Hydrogenation for Polyol Production. PNNL and International Polyol Chemical Inc. (IPCI) finalized an MOU for PNNL's Polyol technology in July 1998.

Self-Calibrating Millimeter Wave Furnace Radiometer. PNNL and Integrated Environmental Technologies finalized an exclusive patent license agreement on July 14, 1998, for this technology, which was jointly developed with MIT.

Microtechnology for Methane Conversion to Methanol or Hydrocarbons. PNNL and FMC Corporation finalized an MOU in early August 1998 for this technology.

Successful Technologies Deployed: A point system was developed for measuring progress against the goals of this indicator, which favors deployments at the DOE sites over other government and commercial sites. To encourage technology deployment at Hanford each deployment is weighted at 4 points. Three points are awarded each time an innovative technology is first deployed at other DOE sites. Two points are awarded each time an innovative technology is deployed at separate non-DOE government sites, while a commercial site is credited with 1 point. Multiple deployments are counted up to a total of 5 points for a single technology. Figure 1.5 shows the number of technologies successfully deployed in commercial practice, where Figure 1.6 shows the total deployment points earned. Each deployment is described in greater detail below. The strong performance in this area is largely indicative of the

increased focus and investment, primarily in the form of key staff that are concentrating on the deployment of activities, and of the increased emphasis on the deployments at DOE sites.

Deployed Environmental Technologies:

In-Well Vapor Air Stripping Technology. The In-Well Vapor Air Stripping technology was successfully deployed at Edwards Air Force Base in December 1997. The start up of operations at Edwards constitutes the first government application of this technology outside of DOE. (2 pts)

Extendible Nozzle/Borehole Miner. The Extendible Nozzle/Borehole Miner was successfully deployed at the Oak Ridge Site in June 1998. To date, two of the five horizontal underground tanks at ORNL's Old Hydrofracture Facility have been remediated, and remediation of the third tank is underway. The major benefits to the extendible nozzle are that it allows the operations to be able to get the high-pressure stream up close to the waste, and it allows the user to navigate quite easily inside the tank. The system also is deployed through a single riser which minimizes exposure to the workers and the public. (3 pts)

Pulsair at ORNL Gunite Tank W-9. The Pulsair system was successfully deployed at the Oak Ridge Site in June 1998. Pulsed-air mixing has a number of advantages over other waste mixing approaches (e.g., jet mixer pumps): reduced equipment cost, reduced risk of equipment failure, easier equipment decontamination, very low operating costs, no minimum liquid level required for operation, and minimal heat addition to the waste. (3 pts)

Lasentec Particle Size Analyzer. The Lasentec system was shipped to Oak Ridge in June and was installed at the ORNL GAAT farm in August 1998. ORNL will begin supernate and slurry testing in FY99. The Lasentec system will lower the probability of pipeline blockage by monitoring the number of large particles that enter the slurry transfer system. (3 pts)

Biosolve Design Service. BioSolve (formerly referred to as Bioremediation Design Tool) was deployed at the INEEL TAN Site in December 1997, to evaluate the technical feasibility and clean up time for remediating a two-mile-long trichloroethene (TCE)-contaminated plume. Four remediation options were evaluated and, based on these results, a pilot-scale test of accelerated anaerobic in-situ bioremediation coupled with natural attenuation is now being implemented at the INEEL Site. (3 pts)

Six Phase Soil Heating (SPSH). Deployment of the SPSH technology at the Ft. Richardson site began in the fall and was completed in November 1997. Arrays #1 and #2 cleaned up 2,300 tons of soil each, and Array #3 cleaned up 5,000 tons of soil. The cleanup success rate was greater than 99%. The client has requested additional cleanup services to begin in August of 1998. (2 pts)

RT3D, a bioremediation design code (DoD GMS). RT3D is a bioremediation design tool that can be used for designing in-situ bioremediation systems and for validating natural attenuation. The RT3D computer code was deployed on the DoD's Groundwater Modeling System (GMS) platform (now a commercial groundwater modeling software) in March 1998, when a version of the GMS software was released with the RT3D code. Via the GMS platform, the RT3D code reaches over 1,500 users worldwide. (2 pts)

Figure 1.5

Figure 1.6

RT3D, a bioremediation design code (GW Vistas). The RT3D computer code was included (deployed) in the Groundwater Vistas (GW Vistas) Modeling platform in June 1998. GW Vistas is a commercial software sold by several engineering software distributors and it currently has over 500 users worldwide. (1 pt)

RT3D, a bioremediation design code (NGWA). The RT3D computer code was made available for public use through a short course sponsored by the National Ground Water Association (NGWA). The training course, Computer Modeling of Natural Attenuation and Bioremediation Systems, was held in Baltimore, Maryland in June 1998. Sixty-three (63) participants from different consulting and research institutions, who are currently working on various DOE and DoD sites, were trained on using the Battelle's bioremediation design and analysis computer software RT3D. (1 pt)

Dual-Head Multibeam Sonar for Fish Behavior and Passage Estimates (Lower Granite Dam). Deployment was completed in June 1998 at the Corps of Engineers' Lower Granite Dam site on the Snake River. The Dual-Head Multibeam Sonar technology was used to remotely determine the fine-scale behavior of salmon and steelhead smolts as they approach a prototype bypass facility. The fish species in question have or are in the process of being listed as endangered, and this project is aimed at safe passage of the fish downstream during their annual out-migration to the sea. (2 pts)

Dual-Head Multibeam Sonar for Fish Behavior and Passage Estimates (Bonneville Dam). Deployment was completed in July 1998 at the Corps of Engineers' Bonneville Dam site on the Columbia River. The Dual-Head Multibeam Sonar technology was used to remotely determine the fine-scale behavior of salmon and steelhead smolts as they approach a prototype bypass facility. (2 pts)

3M Empore for Strontium and Cesium. A team led by PNNL and composed of 3M, IBC Advanced Technologies and Texas A&M University developed ligands for effective sorption of Cs, Sr and others ions such as Tc. The project solved the problems necessary to implement this technology in the 3M Empore web system and adapted the ligand for this use. The Empore technology for separation of Cs, Sr and Tc for analytical purposes is currently being marketed commercially as part of the 3M product line, to remove unprocessed and is being used at Savannah River, Argonne National Laboratory and other sites. (3 pts)

Retrieval Equipment for Iraqi Tank Cleanout. The Pulsed Air technology was successfully deployed in July 1998 in Baghdad, Iraq. This technology enabled the UN inspectors to remove nuclear materials from a sludge tank in Iraq. (2 pts)

Objective 1.3: Effectively lead the technical aspects of the national Tanks Focus Area

Results

The Laboratory made excellent progress in leading the technical aspects of the national Tanks Focus Area (TFA) this year. PNNL exceeded expectations related to one performance indicator by attaining a score of 9.28 out of a possible 10 on a survey given to members of the TFA Management Team. However, PNNL performed poorer than anticipated on its second performance indicator tracking project performance in meeting delivery milestones. An initial assessment of the third TFA performance indicator shows that PNNL met expectations by ending the fiscal year with an acceptable level of carryover.

Based upon the performance indicators that support this objective, our rating for FY1998 is **Excellent**.

Analysis

Effectiveness of TFA Technical Team:

TFA Technical Team effectiveness is determined by how well they work with site users, technical advisors, and DOE-HQ users to develop recommendations that are responsive to customer needs. To measure effectiveness, a survey was jointly developed by DOE-RL and PNNL and administered by the DOE-RL TFA Program Manager at the TFA's Technical Task Plan Review Meeting, held in Las Vegas, Nevada, on July 13-15, 1998. Customers responding to the survey included the members of the TFA Management Team representing users from four DOE sites (Hanford, Oak Ridge Reservation, Idaho National Engineering and Environmental Laboratory, and Savannah River Site) and selected DOE program managers. To rate PNNL's leadership in this area, the survey provided respondents a range from 1 to 10 with a "1" being the worst and "10" being the best, or clearly meeting customer expectations. The composite score for all questions was a 9.28, which exceeded expectations. Customers identified two areas where PNNL demonstrates strength in meeting customer expectations:

- In developing and executing a technical program development process.
- In developing an integrated multiyear technical program.

An area where the laboratory can improve is in ensuring the overall team's understanding of the program development process and each member's role in the process. Figure 1.7 shows a composite score of the TFA Technical Team survey results.

Figure 1.7

Figure 1.8

Solving Complex-wide Problems: The Tanks Focus Area established 24 key deliverables in the area of technology delivery. Performance is measured by the ratio of completed deliverables to total number of deliverables. Of these 24, three were dropped based on approved change control leaving a total of 21 key deliverables. Seventeen of these were successfully completed as of September 30, 1998. Four of the key deliverables were not completed as planned and will be completed in early FY1999. Of the 4 missed milestones, 2 were due to circumstances outside of PNNL's control.

Figure 1.9

A path forward to resolve the counting for these 2 milestones is currently being worked with DOE-RL. Of the 4 missed milestones, 2 were due to circumstances outside of PNNL's control. A path forward to resolve the counting for these 2 milestones is currently being worked with DOE-RL. The other two deliverables were missed due to unexpected staffing shortfalls. Figure 1.8 shows the performance of key TFA milestones.

Technical Progress to Baseline: Current FY1998 carryover projection (based on PTS data through July 98) is approximately 8 percent. An analysis of FY1998 carryover was performed during in July and financial plan changes were initiated to affect the September 1998 financial plan. The amount of carryover is an indication of how well the project is managed. The actual, FY1998 carryover numbers are unlikely to be available until November 1998 but the projected number is within the range that suggests the project is managerially in control. Figure 1.9 shows the TFA year-end carryover projection.

Environmental Technology Performance Evaluation

The overall performance rating for this Critical Outcome is determined by comparing the total value in the table below to the rating scale at bottom.

ELEMENT	Performance Level	Effectiveness Score	Value Points	Weight	Weighted Points
1. Environmental Technology					
1.1 Develop innovative technologies and approaches					
1.1.1 Number of innovative technologies and approaches successfully demonstrated	14	90			
1.1.2 Provide significant solutions to Hanford problems/needs	71.5	83			
1.1.3 Number of new environmental technology concepts...	32	42			
	Obj 1.1 Total	215	4.8	40%	1.9
1.2 Ensure innovative technologies and approaches are deployed					
1.2.1 Number of formal expressions of interest entered into	12	95			
1.2.2 Number of innovative technologies and approaches...	29	100			
	Obj 1.2 Total	195	4.9	45%	2.2
1.3 Effectively lead the technical aspects of the national Tanks Focus Area.					
1.3.1 Effective definition of technical solutions across the DOE complex	9.28	73			
1.3.2 Adequate technology delivery to solve complex-wide problems	81%	-27			
1.3.3 Adequate tracking of technical progress to baseline	8	50			
	Obj 1.3 Total	96	3.8	15%	0.6
				Total	4.7

Table 1.1 - Environmental Technology Critical Outcome Performance Rating Development

Total Score	5.0 - 4.5	4.4 - 3.5	3.4 - 2.5	2.4 - 1.5	1.4 - 1.0
Final Rating	Outstanding	Excellent	Good	Marginal	Unsatisfactory

Table 1.2 - Environmental Technology Critical Outcome Final Rating

2.0 SCIENTIFIC EXCELLENCE

The Laboratory intends to be the premier national laboratory as measured by the science and technology we produce, focused around our core environmental science and technology mission, and with significant contributions in our energy, national security, and health work.

In addition, we intend to strengthen the scientific core of our laboratory, improving both the quality and scientific impact of our basic research programs and strengthening their tie to outcomes important to the Department, Congress, and the public.

Finally, we are continuing our emphasis on partnerships for scientific research and education. We are increasing the fraction of our research that is carried out in partnership with the university community and continuing to provide research participation opportunities to visiting students, teachers, and university faculty. We will continue our contributions to systemic reform of scientific and mathematics education in support of DOE's efforts to provide a technically trained, diverse work force.

For these reasons and in partnership with DOE, the Laboratory has established the following Critical Outcome, objectives and performance indicators to guide our efforts and monitor progress.

The Scientific Excellence Critical Outcome Tree, detailing the Critical Outcome and its' supporting Objectives and Performance Indicators, is presented below.

Summary

The Laboratory is conducting quality scientific work that is providing new insights and solutions to key technical issues facing the nation and the world. External peer reviews of major programs recognized our programs for the development of facilities that are unique in the world, for significant contributions to international programs, for assembling teams of experimentalists and theorists that go beyond that found in any university, and for a superb job in identifying technologies needed to resolve tank waste issues.

The Laboratory received significant external recognition in FY1998 including an impressive seven R&D 100 and three FLC awards. In addition, the quality of our scientific efforts are reflected by a significant list of staff that were recognized for their scientific and engineering excellence in terms of awards, invited talks, and participation on scientific committees. One notable item this year was the William R. Wiley Environmental Molecular Sciences Laboratory receiving special mention in the 1998 Laboratory of the Year Award from R&D Magazine, where it was quoted that, "the Lab has created an infrastructure where science can evolve over time, while assuring that today's science is correct." Over the past four years the Laboratory has experienced a declining trend in the number of publications in peer reviewed journals. This does not meet performance expectations and we need to examine how we can improve in this area.

The value and relevance of the Laboratory's critical projects and work continues to sustain a high level of satisfaction as reflected by feedback obtained through our formal customer survey. Results from the survey will be used to address comments and identify opportunities for improvement. The Laboratory's evaluation of performance on critical projects indicated strong improvement in budget performance; however, schedule performance was below expectations.

Ongoing interaction with our customers, specific comments provided through the survey, and insights gained from internal systems that track performance suggest opportunities for improvement. We are committed to continuously improve our cost effectiveness and project schedule performance.

Based upon our progress toward the performance indicators that provide the evidence of achieving this objective, our rating for FY1998 is **Excellent**.

Objective 2.1: Conduct quality scientific efforts that provide new insights

Results

The Laboratory believes the results of several key peer reviews of major research activities including the Chemical Physics and Materials Science Program, EMSL operations, Tanks Focus Area, and the reviews of our major research divisions recognize an outstanding level of quality and contribution. Further evidence of major contributions is found in the recognition offered by the scientific community and the sustained leadership PNNL demonstrated by winning ten major awards this year. However, our performance on peer reviewed publications was substantially lower than expected and we need to examine how we can improve our contributions in this important area.

Based upon the performance indicators that support this objective, our rating for FY1998 is Excellent.

Analysis

Results of Peer Reviews: During FY1998, the Laboratory's external peer review process continued to mature. The following are the primary components of the Laboratory's peer review process:

- *The Laboratory Review Committee (LRC)* is composed of chairs of the Division Review Committees (DRCs). This committee reports to the Laboratory Director.
- *The Division Review Committees (DRCs)* ensure proper peer review of major programs/projects, product lines, core technical capabilities, and technologies. Positions on the DRCs are held on a three-year rotating basis via a process of Laboratory-initiated external peer review
- *External Reviews* are performed on specific PNNL research programs

LRC Review:

- The LRC and the Director agreed to a set of expectations and the means by which they will be achieved. Process improvements were discussed, and the formal commitments made will be implemented during the next fiscal year. The Director reaffirmed the Laboratory's commitment to formally respond to DRC review reports and share the response with the DRC.

DRC Reviews:

- Energy Technology Division - Rated "Excellent"
- National Security Division - Rated "Excellent-Outstanding"
- Environmental and Health Sciences Division - Rated "Excellent-Outstanding"
- Environmental Technologies Division - Rating not available until the end of October 1998

External Peer Reviews:

- OBES - reviews of the Chemical Physics and Materials Science Programs were extraordinarily positive in describing the projects and their principal investigators.
- EMSL Operations - review statements included: "it is a pleasure to review the operations at this magnificent scientific facility" and the "operations are extremely well-managed."
- Tanks Focus Area - very productive, and valuable input was received from the reviewers; this review differed from past reviews and was considered by the TFA to have provided the most valuable information of the reviews to date
- Peer Review of New Proposal Submissions: The results here are mixed. The EMSP and NABIR program results were outstanding, while the outcome of the health effects competition was disappointing. A formal evaluation of this effort has been completed and the results will be used in subsequent responses to calls for proposals.

A number of significant accomplishments emerged from the peer review process this past year:

- The LRC and DRCs for all Divisions were established and operational.
- Each Division, for which DRC reports have been received, has established formal procedures to deal with observations and recommendations.
- The Laboratory's process for selection and submission of proposals in response to major RFPs issued by funding agencies has been very useful and successful.

- All commitments and milestones were completed.
- The descriptors applied to the reviewed work ranged between "excellent" and "outstanding."

Recognition by the Scientific Community: Information was collected on staff recognition as evidenced by their awards, invited talks, and participation on committees involved in setting both national and international science directions. In comparison to FY1997, the Laboratory increased the volume of those areas constituting scientific recognition. The awards covered a broad spectrum with highlights presented below. This is the second year for this indicator. It is important to note in FY1997 the awards category included staff receiving R&D 100 and FLC awards. These awards were not included in FY1998 totals for this indicator; they are presented under a separate indicator, specific to R&D 100 and FLC awards.

	<u>FY1997</u>	<u>FY1998</u>
Awards	24	29
Invited Talks	24	39
Major Committee Service	27	36

Some of the more noteworthy items are listed below:

Awards: 25 PNNL staff members received individual national, state, or regional awards, 3 awards were shared between 2 to 7 staff members. Highlights are included below:

- **Paul Setcavage:** Presented the Commander's Award for Public Service from the Department of the Army.
- **Robert O'Brien:** Received the ENVR Distinguished Achievement Medal Award on August 10, 1998 and ASA meeting in Dallas, TX.
- William R. Wiley Environmental Molecular Sciences Laboratory received Special Mention for the 1998 R&D Laboratory of the Year Award.
- **Gary Spanner:** Received an Outstanding Project of the Year Award in the Business Assistance category from the National Association of Management and Technical Assistance Centers.
- **Russell Jones:** Named an American Society for Metals Fellow in October.
- **Gregory Exarhos:** Named Fellow of the American Ceramic Society in May.

Significant Invited Talks: 38 PNNL staff presented 39 significant invited talks, course talks, and/or organized key research symposium. Noteworthy talks include:

- **Ned Wogman:** Presentation at the Chemical Analysis by Laser Investigation of Proliferation Effluents (CALIOPE) Team meeting in Sandia-Livermore on December 7, 1997.
- **Albert M. Liebetrau:** Four presentations at the VNIIA Statistics Workshop, Obninsk, Russia, January 27-30 and at a workshop on Determination of Mass and Volume for Nuclear Materials Control and Accountability at Chelyabinsk-70, Russia, February 23-27.
- **X. Sunney Xie:** Presentation on September 13 at Gordon Conference on Macromolecular Org. and Cell Function in Oxford, England.
- **Ray Wildung:** Presentation on October 21 at Workshop on Field Technologies for Bioremediation Research in Virginia Beach, VA.
- **Robin McDowell:** Presentation on June 15 at the 53rd Ohio State University International Symposium on Molecular Spectroscopy in Columbus, OH.
- **Karla Thrall:** Presentation on May 4 at the Biomarkers, the Genome and the Individual in Charleston, SC.

- **H. Peter Lu:** Presentation on August 9 at the 12th International Conference Photochemistry Conversion and Storage of Solar Energy in Berlin, Germany.
- **Frank Garner:** Presentation on June 17 at ASTM Symposium on Effects of Radiation on Materials in Seattle, WA.

Significant Committee Service: 28 PNNL research staff are currently serving on 36 science-related committees including:

- **Ned Wogman:** Chairman for the Nuclear Materials Technology Division Review Committee, Los Alamos National Laboratory.
- **Fred Brockman:** Editorial Board of Applied and Environmental Microbiology.
- **Blaine Metting:** Member, Editorial Board of Arid Soil Research and Rehabilitation.
- **Gregory Exarhos:** Elected to Office of Secretary, Board of Directors International Union of Vacuum Science, Technology, and Applications, IUVSTA, Metallurgy (American Vacuum Society).
- **Glendon Gee:** Appointed to National Academy of Science Panel on Fractured Flow and Transport in the Vadose Zone.
- **Joe McDonald:** Elected President of the Health Physics Society Accelerator Section.
- **Steve Weiner:** Elected to the Governing Board of the Council for Chemical Research for a three year term, 1998-2000.

R&D 100/FLC Awards: PNNL won seven of R&D Magazine's Awards for the Top 100

Technologically Significant Processes and Products for 1998. The Laboratory tied Lawrence Livermore National Laboratory for the most R&D 100 Awards won by a national lab this year (7). They are:

- ***In Situ Redox Manipulation (ISRM)*** - John S. Fruchter, Charles R. Cole, Mark D. Williams, Vince R. Vermeul, James E. Amonette, and James E. Szecsody. This groundwater remediation technique safely, permanently and cost-effectively destroys or immobilizes toxic and carcinogenic contaminants within an aquifer. Battelle and Schlumberger Ltd. are teaming to market and develop the technology.
- ***Life-Cycle Advantage™*** - Kenneth K. Humphreys, Devin E. Terry, Susan M. Adams, Marty Adickes, Scott L. Freeman, Mark A. Johnston, Tamara S. Stewart, and Bruce Vigon. For products, processes, and services, this software package characterizes the lifetime energy and environmental implications, including consideration of raw material extraction, processing, transportation, end-use, waste management and recycling impacts. This is a Battelle sponsored commercialization.
- ***Radionuclide Aerosol Sampler/Analyzer (RASA)*** - Harry S. Miley, Charles W. Hubbard, A. David McKinnon, Robert C. Thompson and Richard Perkins. RASA is a completely automated radionuclide monitoring system that detects airborne radioactive particles. PNNL has a license agreement pending with DME Corporation of Orlando, Fla., who manufactures RASA units.
- ***Rapid Microdialyzer*** - Richard D. Smith, Chuanliang Liu, and Quinyuan Wu. The Rapid Microdialyzer removes the salts and cleanses biological and other liquid mixture samples, including microsamples that otherwise might not be usable thus expanding medical, clinical and analytical applications of mass spectrometry. Several companies are seeking to license the Rapid Microdialyzer for commercial production.

- **Self-Assembled Monolayers on Mesoporous Supports (SAMMS)** – Jun Liu, Glen E. Fryxell, Li-Qiong Wang, Meiling Gong, and Xiangdong Feng; joint entry with; Charles T. Kresge, Wieslaw J. Roth, and James C. Vartuli of Mobil Technology Company. SAMMS is a new class of materials that can remove metals and radionuclides from aqueous and organic liquids and gaseous streams.
- **MICLEAN™/MICARE™ Solvent Cleaning Systems** - John L. Fulton, Max R. Phelps. and Richard D. Smith; joint entry with Joseph M. DeSimone, James McClain, Timothy Romack, and Gina Stewart of MiCELL Technologies. This industrial cleaning process uses special detergents created from polymer-based formulations to increase significantly the scrubbing power of liquid carbon dioxide. Through an agreement with Battelle, MiCELL Technologies is commercializing the system.
- **R-TiC Metals Emission Monitor** - David A. Lamar; joint entry with Paul P. Woskov, Paul Thomas, and Kamal Hadidi of the Massachusetts Institute of Technology. The R-TiC Metals Emission Monitor provides continuous monitoring of hazardous metal emissions from incinerators, plasma furnaces and thermal processes used in manufacturing and fossil fuel electric power plants. Table 2.1 below, provides a historical list of R&D 100 award winners by national laboratory.

National Laboratory	FY93	FY94	FY95	FY96	FY97	FY98	Total FY93- FY98	# of FTEs
LBNL	2	2	0	0	1	0	5	2,700
PNNL	2	1	3	5	3	7	21	2,800
BNL	1	0	0	1	1	0	3	3,100
ANL	3	3	1	6	2	3	17	4,400
ORNL	3	2	5	6	9	2	27	4,500
LLNL	3	6	5	0	7	7	34	6,900
INEEL	1	0	1	2	1	3	6	7,000
LANL	4	6	6	6	6	4	28	7,100
SNL					8	3	17	7,500

Table 2.1

FLC Awards

PNNL staff won three of the 1998 FLC Awards for Excellence in Technology Transfer out of the four they submitted. Each Laboratory is limited to a maximum of four nominations. They are:

- **Six-Phase Soil Heating (SPSH)** - Theresa Bergsman, Janet Roberts, Rick Brouns, and Doug McKinley. SPSH was developed for the Department of Energy as a faster, cheaper way to remediate contaminated soils. In May 1997, the team formed a limited liability corporation called Current Environmental Solutions (CES), owned jointly by Battelle and TerraVac Corporation of Irvine, CA.

- **Nuclide Navigator™** - Walt Hensley, David McKinnon, Mark Panisko, Rodney Savard and Phil Pulver. This innovative team developed and transferred Nuclide Navigator™, a PC-based software tool for retrieving, displaying, and managing large quantities of nuclear data, to EG&G ORTEC, Oak Ridge, TN
- **Spatial Paradigm for Information Retrieval and Exploration (SPIRE)** – Renie McVeety, Jim Thomas, Jerry Work, Marv Erickson, Shawn Bohn, Mark Pottier and Kelly Pennock. SPIRE changes the way people retrieve and analyze text information by quickly analyzing large volumes of text and displaying related documents and themes. Following immense interest in the software's capabilities by industry, Battelle partnered with the Smaby Group of Minneapolis, MN, to form a new company, ThemeMedia Inc., Redmond, WA, to market and sell the software. SPIRE also won an R&D 100 Award in 1996.

Table 2.2, below, provides a historical list of FLC award winners, sorted by national laboratory.

Historical FLC Award Winners								
National Laboratory	FY93	FY94	FY95	FY96	FY97	FY98	Total FY93-FY98	# of FTEs
Ames	1	1	0	1	0	0	3	400
NREL					1	0	1	900
LBNL	2	2	0	0	0	0	4	2,700
PNNL	4	3	3	3	4	3	20	2,800
BNL					1	0	1	3,100
ANL	0	0	1	1	2	1	5	4,400
ORNL	1	0	2	3	1	2	9	4,500
LLNL	0	3	1	1	3	2	10	6,900
INEEL	0	0	1	0	0	0	1	7,000
LANL	2	1	0	2	0	0	5	7,100
SNL	1	1	1	1	1	0	5	7,500

Table 2.2

Publications in peer reviewed journals: To understand the Laboratory's impact and contributions to the scientific community, over 10,000 journals were searched in the databases SciSearch, MEDLINE, INSPEC, Ei Compendex, BIOSIS, CA (Chemical Abstracts), EMBASE, and Social SciSearch. The search looked for PNNL and variations as a corporate source limiting results to journal articles published within this fiscal year. A quality check was made to remove duplicates between the files and overlapping citations from FY1997. Finally, the results were manually scanned to remove inappropriate citations or problem records that the search software did not identify.

In the FY1998 search, 401 items were found. Using this controlled process, the FY1997 data was also revised to correct for duplicate detection, corporate source errors, and human error (the corrected number of papers in FY1997 is 467). The number of publications is substantially lower for FY1998 than expected with no single external factor having been identified as the cause. Results for this indicator are under investigation in an effort to determine those factors, which may have contributed to the lower publication rates.

Journal Titles with More Than 5 PNNL Authored Papers in FY1998 and FY1997, sorted by FY1998

Journal Title	FY1997	FY1998
Journal of Chemical Physics	21	21
Journal of Physical Chemistry A (title change 1/97 from J. Phys. Chem.)	8	18
Journal of Physical Chemistry B (title change 1/97 from J. Phys. Chem.)	8	14
Journal of Nuclear Materials	31	13
Journal of the American Chemical Society	12	12
Analytical Chemistry	7	10
Surface Science	10	8
Applied Surface Science	1	7
Chemical Physics Letters	3	7
THEOCHEM—Journal of Molecular Structure	3	7
Journal of Geophysical Research-Atmospheres (Section D)	10	6
Journal of Radioanalytical and Nuclear Chemistry	5	6
Nuclear Instruments and Methods in Physics Research Section B--...	3	6
Physical Review B--Condensed Matter	8	6
Nuclear Instruments and Methods in Physics Research Section A--...	0	5
Physical Review Letters	8	3
Health Physics	8	2
IEEE Transactions on Nuclear Science	5	2
Journal of Applied Meteorology	6	2
Journal of the Electrochemical Society	5	2
Environmental Science and Technology	7	1
Solid State Ionics	6	1
International Journal of Quantum Chemistry	5	0
Journal of Physical Chemistry (title split to A and B 1/97)	12	0

To assist in evaluating PNNL's performance, we also collected the number of publications from Argonne, Brookhaven, Oak Ridge, and Lawrence Berkeley National Laboratories see Table 2.3, below. This was done in a single database, SciSearch, and hence, was not intended to be a comprehensive search of all publications. However, searching in a single database ensures reliable comparison and fewer problems like the database update overlap. Moreover, SciSearch is a multidisciplinary database which uses citation analysis to cover 90% of the world's significant science and technology literature.

The data from the laboratories has not been normalized against other measures such as the base number of researchers, or against funding sources at each organization. However, several facts are shown. Between FY1995 and FY1998, PNNL has shown a decrease in publication of 9%. In addition, the drop of 70 here supports the drop in citations from the broader search focused only on PNNL.

Laboratory Comparison of Articles
in SciSearch Database, FY1995-FY1998

Laboratory	FY1995	FY1996	FY1997	FY1998	% change	% change	%change	%change
					FY1995- FY1996	FY1996- FY1997	FY1997- FY1998	FY1995- FY1998
PNNL	407	399	439	369	-2%	10%	-16%	-9%
ORNL	1116	1022	1158	1133	-8%	13%	-2%	2%
LBL	1139	1085	1179	1273	-5%	9%	8%	12%
BNL	726	660	666	322	-9%	1%	-52%	-56%
ANL	980	801	955	874	-18%	19%	-8%	-11%

Table 2.3

Objective 2.2: Deliver high-value work that is relevant to DOE missions or national needs

Results

Overall, the results indicate a sustained high level of performance on critical DOE Projects from last fiscal year. Our customers rated the Laboratory's performance on the strategic value of the work and project performance as 4.1 and 4.2 respectively, on a 5.0 point scale. As in FY1997, some of our customers still desire improvement relative to our cost effectiveness.

The Laboratory tracks cost and schedule performance for our most critical projects to ensure we meet customer expectations and to drive improved performance. Compared to last fiscal year, our budget performance improved significantly (11 percentage points) but our milestone performance declined (five percentage points) primarily due to poor change control processes.

Despite significant funding reductions, the Laboratory continues to exceed expectations by developing Academic Partnerships through rather creative means. We developed 80 quality partners. They will be critical to maintaining the flow of high quality science and engineering staff into the laboratory in the coming years.

Based upon the performance indicators that support this objective, our rating for FY1998 is **Excellent**.

Analysis

Customer Feedback on Relevance and Performance on Critical Projects: Performance in FY1998 was determined through a survey sent out to our customers representing our most critical projects as jointly defined and agreed to by Battelle and DOE management. A response rate of 58% was obtained on 139 surveys. In order to ensure the Laboratory was able to collect relevant information from the survey for FY1998, a team performed an assessment on the FY1997 survey questions. Consequently, two changes were made to the Survey for FY1998:

- The addition of questions that addressed differentiating factors as to why clients choose PNNL.
- The elimination of two questions in the Strategic Value section that were deemed irrelevant (potential for reducing future ES&H liabilities) and inappropriate (technical challenge associated with the successful completion of this project).

Figure 2.1

Figure 2.1 provides the results for both dimensions of the survey, i.e. strategic value of the work performed, and ability to perform the work.

The project performance and strategic value scores had little change from the prior year, with the overall difference being less than 1/10 of a point. However, with the new question added to the FY1998 survey, analysis of the data has provided some interesting insights.

From the question to our customers regarding "why are you using PNNL?", seven choices were offered. The overwhelming selection by 65 (81%) of the respondents was "Quality of Staff" as noted in Figure 2.2.

Similarly, responses to other questions in the survey about staff, were rated as most important and as strengths by our customers. Two questions

Figure 2.2

in particular sought customer perceptions by rating the Laboratory's ability to:

- *work effectively with the client, be flexible and responsive to their needs and expectations, and*
- *Deploy unique skills and capabilities.*

On each of these questions, the customer rated the Laboratory's overall performance 4.5 and 4.4 respectively on a 5.0 point scale.

The strategic value scores continue to be strong, slightly exceeding expectations. On the questions the customers answered relative to strategic value, two questions carried the most importance from the customer's perspective:

- *The significance of the success or failure of the project to achieving the customer's program objectives, and*
- *The importance of this project to achieving your program objectives*

On each of these questions, the customer rated our overall performance as 4.2 and 4.5 respectively on a 5.0 point scale.

As noted in FY1997, an area of improvement also highlighted by the FY1998 survey relates to delivering cost-effective products. This was clearly the lowest rated question on the survey, having received an overall 3.6 on a 5.0 point scale.

Project Management Discipline: The objective of this indicator is to demonstrate continuous improvement over the results of FY1997 cost and schedule results. In FY1998, 47 projects participated in this assessment. These projects represented:

- Each of the four PNNL research divisions and the Facilities and Operations Directorate
- Nineteen PNNL product lines
- A range of project sizes from small individual research projects to elements of large complex multi-function programs
- Customers included DOE-RL, DOE-HQ, DOD and other federal agencies

Forty-four of the 47 projects (or 94%) were completed (or are being forecasted to be completed) within their respective baseline budget. This is an eleven-percentage point improvement over the FY1997. Of the three projects which finished over budget, one completed 0.5% over their baseline budget, another is less than 2.0% over budget and the last project experienced a significant increase in scope which is causing a projected 25% overrun.

Ninety-three of the 118 milestones (or 79%) finished on or ahead of schedule. This is five percentage points lower than the FY1997 performance. Thirty-six percent (9) of the missed milestones were completed within two weeks of their baseline dates and 64% (16) of the missed milestones were completed within approximately a month of the baseline date. A contributing factor in several cases was the fact that the Laboratory and the client did not have a defined change control process. As a result, milestones were not changed and unfavorable variances were recorded as a result of this study. One-fifth of the missed milestones are attributable to one international project, which involved subcontract deliverables. In this case, the subcontractor informed PNNL in late April 1998 that it was having difficulty resolving technical issues during

initial equipment testing. The subcontractor was able to complete the milestone, but unfortunately it resulted in delays to this project milestones.

Quality Academic Partnerships: Eighty colleges/universities met USEP criteria for institutional partnerships (e.g. informal and formal agreements, appointments, and significant interactions and collaborations) at the end of the fourth quarter. Northwest colleges/universities that represent the thirty-eight in the more substantial (that is, "robust" and "developing") categories of partnership are:

Washington State University	University of Washington
University of Idaho	Oregon State University
Montana State University	Heritage College
University of Montana	University of Oregon
Oregon Graduate Institute	Eastern Washington University
Whitman College	Pacific Lutheran University

There are also continuing interactions with 42 other academic institutions that constitute "emerging" partnerships.

In addition to these academic partnerships are ongoing interactions with 61 other colleges and universities, representing relationships that could develop into partnerships in the next fiscal year. With cumulative partnerships at 80, we considerably exceeded our best possible target of 50. The outstanding performance noted can be ascribed to EMSL and marketing. The new user facility attracted many new users, which increased the extent and quality of our research- and education-related interactions.

The total loss of Congressional funding for DOE education programs led to the immediate collapse of the communication/marketing infrastructure at DOE-HQ. If the laboratories were to have any visibility within academia, it would have to be through their own initiative. Accordingly, the Laboratory launched a series of steps: some traditional (starting regular correspondence with the Vice Presidents or Vice Provosts for Research of about 175 colleges and universities; printing and mailing brochures; and selecting campuses for site visits to meet students/faculty and attend career fairs) and some non-traditional (printing thousands of Post-It notes with appropriate URLs to send to schools; redesigning the University and Science Education homepage for quicker, more direct access; standardizing on-line applications for AWU and ERULF appointments; disseminating through electronic transmissions the draft Master Agreements; and establishing the on-line University Capabilities Database). Collectively, these steps differentiated the Laboratory and led to favorable recognition, which led in turn to more expressions of interest and applications, more interactions and collaborations and, thus, more partnerships.

Scientific Excellence Performance Evaluation

The overall performance rating for this Critical Outcome is determined by comparing the total value in the table below to the rating scale at bottom.

ELEMENT	Performance Level	Effectiveness Score	Value Points	Weight	Weighted Points
2. Scientific Excellence					
2.1 Conduct quality scientific efforts that provide new insights.					
2.1.1 Results of Peer Reviews of Relevance and Excellence, including Divisional reviews	Outstanding	100			
2.1.2 Recognition by the scientific community, including awards, invited talks at major scientific meetings, and service on major committees and scientific bodies	212	75			
2.1.3 Number of R&D 100 and FLC Awards	7.66	60			
2.1.4 Number of publications in peer reviewed journals	401	-100			
	Obj 2.1 Total	135	3.8	50%	1.9
2.2 Deliver high-value work that is relevant to DOE missions or national needs.					
2.2.1 Customer feedback on relevance and excellence of critical projects	4.1, 4.2	200			
2.2.2 Demonstrate project management discipline across all product lines by meeting critical milestones and budget baselines	Milestones: -5% Budget: +11%	-50 40			
2.2.3 Number and quality of academic partnerships	80	40			
	Obj 2.2 Total	230	4.2	50%	2.1
				Total	4.0

Table 2.4 - Scientific Excellence Critical Outcome Performance Rating Development

Total Score	5.0 - 4.5	4.4 - 3.5	3.4 - 2.5	2.4 - 1.5	1.4 - 1.0
Final Rating	Outstanding	Excellent	Good	Marginal	Unsatisfactory

Table 2.5 - Scientific Excellence Critical Outcome Final Rating

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3.0 SCIENTIFIC & TECHNICAL CONTRIBUTIONS

The Laboratory intends to become the Department of Energy's premier national laboratory as measured by the science and technology we produce. To do this, our efforts will be focused around our core environmental science and technology mission, using the Environmental Molecular Sciences Laboratory (EMSL), the Wiley Laboratory, as a platform for exploring fundamental science of the 21st Century, and with significant contributions in our energy and national security work.

In addition, we intend to strengthen the scientific core of our laboratory, improving both the quality and scientific impact of our basic research programs and strengthening their tie to outcomes important to the Department, Congress, and the public.

For these reasons and in partnership with DOE, the Laboratory has established the following critical outcome, objectives and performance indicators to guide our efforts and monitor progress.

The Scientific & Technical Contributions Critical Outcome Tree, detailing the Critical Outcome and its' supporting Objectives and Performance Indicators, is presented below.

Summary

The Laboratory has increased its scientific and technical contributions in support of DOE's mission objectives. Laboratory staff have been engaged in solving the country's national security problems at the highest levels. Furthermore, staff and facilities are key resources in the Department of Energy and U.S. Government's fight against nuclear proliferation and are recognized as world authorities in their fields. The Laboratory delivered the Automated Radioxenon Sampler/Analyzer (ARSA), a fully automated, remotely programmable unit for the ultrasensitive detection and analysis of nuclear detonations. In addition, the Laboratory facilitated the storage of irradiated plutonium fuel for the Democratic Peoples Republic of Korea.

The Laboratory is developing and expanding fundamental research programs. We experienced a 12% growth in the number of Principal Investigator-initiated programs, and fundamental research funding is up in four new program areas. Furthermore, programmatic funding for the Wiley Lab grew to \$18.3M as result of new funding from several sources.

Progress was made in diversifying key science and technology business areas. The Laboratory saw a 27% increase in the number of new environmental clients and nearly a 50% increase in the dollar volume of new environmental-related sales as compared to FY1997. In addition, significant energy-related business growth was experienced in DOE transportation-related work and in the industrial-international area. These achievements, however, were somewhat nullified by a declining business base on the balance of the energy-related portfolio.

Based upon our progress toward the performance indicators that provide the evidence of achieving this objective, our rating for FY1998 is **Excellent**.

Objective 3.1: Develop and apply innovative arms control, nonproliferation, and intelligence technologies that enhance national security and reduce the danger from weapons of mass destruction.

Results

Staff of the Laboratory's National Security Division have been engaged in solving the country's national security problems at the highest levels. We have achieved our target of two significant solutions/contributions to national security problems, the development of an Automated Radioxenon Sampler/Analyzer and facilitates the safe storage of irradiated plutonium fuel for the Democratic Peoples Republic of Korea. In addition, we have brought the significant scientific talents and state-of-the-art equipment of the Wiley Laboratory to bear on pressing national security problems.

Based upon the performance indicators that support this objective, our rating for FY1998 is **Outstanding**.

Analysis

The staff and facilities of the PNNL are key resources in the Department of Energy and U.S. Government's fight against proliferation of weapons of mass destruction. National Security Division staff are recognized as world authorities in their fields and are frequently called on by the

U.S. government and the United Nations to provide credible solutions to national and international problems. Technologies recently developed at the Laboratory are providing cost-effective techniques for the detection and analysis of nuclear detonation fission products.

Number of relevant contributions to national security problem solutions: The Laboratory has achieved its goal of developing relevant solutions to significant National Security problems. The Automated Radioxenon Sampler/Analyzer (ARSA) is a fully automated, remotely programmable unit for the ultra-sensitive detection and analysis of four xenon isotopes in near real-time. This PNNL-developed instrument permits high-sensitivity, remote detection of nuclear detonations. This instrument meets the requirements of the Comprehensive Test Ban Treaty (CTBT). It has been field-tested and was selected by the U.S. Government for use at International Monitoring Sites on U.S. Territory. This technology will be licensed for use worldwide.

The Laboratory also assisted the Democratic Peoples Republic of Korea (DPRK) with the safe storage and ultimate disposition of irradiated nuclear fuels. The safe storage and ultimate disposition of plutonium-containing irradiated fuel is a pivotal provision of an international agreement to end DPRK's plutonium production. Battelle staff served as on-site advisors for the Department of Energy for the now completed, spent fuel canning and storage. Only cleanup of the site remains to be completed.

Wiley Laboratory contributions addressing national security problems: This performance indicator was intended to measure the effectiveness of bringing the considerable scientific talents and start-of-the-art equipment of the Wiley Laboratory to bear on pressing problems of U.S. national security. At year-end, Laboratory staff in eight technical groups are working, or have worked, on 16 National Security Division projects.

Objective 3.2: Diversify the Laboratory science and technology (S&T) Energy Business.

Results

Energy Division staff did extremely well at increasing DOE-OTT/NATT-related work with \$2.5M of incremental sales growth over FY1997. This represents excellent work given the newness of this area and the barriers that had to be overcome to accomplish this task. In addition, the Laboratory experienced a \$1.5M incremental sales growth over FY1997 for the Industrial-International growth area. These significant achievements however, were nullified by a sales shortfall in the "Balance of the Portfolio." The Laboratory agreed to maintain the "balance of portfolio" sales at 97% of FY1997 levels. However, this did not happen. Year-end sales for the "Balance of the Portfolio" was 89.1% of FY1997 levels.

This resulted in the reduction of our "excellent" rating by one full adjective rating to an overall rating for FY1998 of Good.

Analysis

Diversification of the Science and Technology-Based Energy Business: The Energy Division's FY1998 performance indicator was actually composed of three parts; 1) sales in DOE-OTT and with other NATT-related clients, 2) sales in Industrial and International work, and 3) the maintenance of the balance of the portfolio to at least 97% of FY1997 levels. We exceeded sales expectations in total driven primarily by growth experienced in the NATT-related and industrial/International areas. Other areas of the portfolio showed funding transitions or decreases. The largest contributor to missing the target on "Balance of Portfolio" was an FY1997 single sale for \$4.1M for a project titled *Energy Security in the Ukraine* that was included in the FY97 baseline. This was a multi-year effort with decreasing balances each year to completion. With no follow-on funding intended, this alone put us in a very difficult position relative to meeting the target from the onset.

Even though we exceeded total sales projections, growth was focused in the previously mentioned areas and the "balance of the portfolio" reached only 89% of FY1997 levels.

The FY1998 measures provided motivation to build in the NATT and Industrial-International areas, the exact areas where we invested and grew. With limited resources, investing across the board would not have produced the targeted growth results we achieved that have helped build our base for further growth in FY1999. We believe we did motivate and achieve the desired behavior and outcomes, and learned a great deal about setting more appropriate performance goals.

Objective 3.3: Develop and expand fundamental research programs coupled to the mission of DOE and other mission-oriented agencies.

Results

This Objective monitors the number of Principle Investigator-initiated fundamental research grants and the number of non-OER organizations providing fundamental research funds for the Laboratory. At FY1998 year-end, 163 Principle Investigator-initiated projects were being tracked. This represents an 11.6% growth over the FY1997 baseline, with an additional 4.6% of staff acting as Principal Investigators. In addition, fundamental research funding is up in four new program areas. New program growth in the 4th quarter of FY1998 alone represents \$570K.

Based upon the performance indicators that support this objective, our rating for FY1998 is Outstanding.

Analysis

Number of Staff Obtaining PI Status on PI-initiated Fundamental Research Grants: At FY1998 year-end, data collected indicated that PNNL had secured 163 Principle Investigator (PI)-initiated fundamental research grants. This represents an 11.6% growth in PI-initiated fundamental research grants over the FY1997 baseline of 146 grants. In addition, the number of staff acting as Principle Investigators has increased from 81 in FY1997 to 85 in FY1998; a growth of 4.9%. The areas of growth represented by these PIs cover a wide spectrum, from global climactic change to health effects research, and reflects our continued efforts to broaden the base of research within the Fundamental Sciences product line.

Agencies Providing Fundamental Research Funds: Two new program growth areas were added in the 4th quarter of FY1998 to bring the FY1998 total of new program funding (growth) up to 4 new programs. These new programs include: Non-Government Industrial funding for the *Technical Strategy Program*; Department of Defense Environmental funding which is tied to *Environmental Health*; U.S. EPA funding for enhancements to the *Second Generation Model*; and Other Federal Government funding for *Regional Climate Change*. These new programs constitute outstanding growth in the number of agencies providing fundamental research funds.

Objective 3.4: **Develop research programs within the Wiley Laboratory that effectively use its resources supporting both fundamental and applied research needs.**

Results

The Laboratory is making outstanding progress in the development of programs that utilize the capabilities of the Wiley Laboratory. This Objective measures the commitment of research funding gathered by the end of FY1998 to begin work during FY1999. The projected funding required by the end of FY1998, for FY1999 operations, was \$16M. Total sales volume related to Wiley Lab programmatic funding in FY1998 was \$18.3M, qualifying this objective for an **Outstanding** rating.

Analysis

Wiley Laboratory Research Funding for FY1999: During FY1998, the programmatic funding for the Wiley Lab grew to \$18.3M as result of new funding from several sources. New DOE programs included several BER programs (in atmospheric chemistry, in health effects, and in natural and accelerated bioremediation), a BES Geosciences program, a computational program for MICS, and an EMSP program conducted collaboratively with the State of Washington. A BES Materials sciences program and a DOE-NN program, not previously in the programmatic baseline, were included in the sales volume estimates this year.

Figure 3.1

Programmatic funding with other agencies also increased in FY1998. New programs were added for the U.S. Army and the Department of Defense in the use of mass spectrometry for sensing and detection. A National Institutes of Health (NIH) program using Nuclear Magnetic Resonance

(NMR) to examine large biomolecules was extended in FY1998. Overall, \$2.565M in new Wiley Laboratory programmatic funding was obtained during FY1998.

Objective 3.5: Diversify the environmental science and technology base and increase the scientific and technical contributions to clients

Results

During FY1998, Laboratory staff made sales to 82 new science and technology clients. This represents an increase in new environmental clients of 27% over the FY1997 baseline. In addition, the dollar volume of sales increased by nearly 50%. These increases in the dollar volume of sales and the number of new customers, represent **Outstanding** performance for this objective.

Analysis

Number of environmental S&T clients: This indicator tracks the number of new science and technology customers added to the Laboratory's environmental customer base for the purpose of monitoring our success the diversification of the Laboratory's environmental science and technology business base. During FY1998, Laboratory staff made sales to 82 new science and technology clients. This represents an increase in new environmental clients of 27% over the FY1997 baseline, see Figure 3.2

The set of new clients is a diverse set of industrial and government clients, both domestic and international. The growth in numbers and sales is due to significant pressure on the ETD Product Lines to diversify while maintaining current the base. Notable sales include a variety of environmental tasks for an aluminum company, utilization of our vitrification technologies for hazardous waste management by private industry, and significant sales in the Mexican market.

	FY1997 PROJECTS	FY1997 SALES	FY1998 PROJECTS	FY1998 SALES
New Projects	458	\$46,535K	267	\$28,831K
New Clients	65	5,620K	82	48,777K
Total	523	\$52,155K	349	\$77,608K

Figure 3.2. The FY1997 baseline of projects and sales compared to the FY1998 actual number of projects and sales.

Percent Change in the Dollar Volume of Sales: This measure encourages the development of new projects with existing clients. Unfortunately, this indicator suffered somewhat, due to the movement within the Hanford community of projects funded by Fluor Daniel Hanford and the TWRS project away from PNNL and to other providers, consistent with their contract incentives. In spite of this loss of sales however, our overall sales for FY1998 exceeded our expectations.

The development of a new client base is critical given the financial pressures faced today by the current client set. The 27% growth in the number of new environmental clients and the nearly 50% increase in the dollar volume of new client sales are solid indicators that the Laboratory is diversifying its environmental science and technology customer base.

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Scientific & Technical Contributions Performance Evaluation

The overall performance rating for this Critical Outcome is determined by comparing the total value in the table below to the rating scale at bottom.

ELEMENT	Performance Level	Effectiveness Score	Value Points	Weight	Weighted Points
3. Scientific & Technical Contributions					
3.1 Develop and apply innovative arms control, nonproliferation, and intelligence technologies ...					
3.1.1 Number of relevant contributions to national security problems	2	100			
3.1.2 EMSL contributions to national security problems.	8	53			
	Obj 3.1 Total	153	4.7	30%	1.4
3.2 Diversify the Laboratory science and technology (S&T) Energy Business.					
3.2.1 Diversification of the S&T based energy business	Good	0			
	Obj 3.2 Total	0	3.0	30%	0.9
3.3 Develop and expand fundamental research programs coupled to the mission of DOE and other mission...					
3.3.1 Number of staff obtaining Principle Investigator-Initiated fundamental...	11.6%	100			
3.3.2 Number of agencies providing fundamental research funds	4	75			
	Obj 3.3 Total	175	5.0	15%	0.75
3.4 Develop research programs within the Wiley Laboratory that effectively use its resources supporting both...					
3.4.1 Wiley Lab research funding FY1999	\$18.3M	100			
	Obj 3.4 Total	100	5.0	15%	0.75
3.5 Diversify the environmental science and technology business base and increase the scientific and technical contributions...					
3.5.1 Number of environmental S&T clients	Outstanding	100			
	Obj 3.5 Total	100	5.0	10%	0.5
				Total	4.3

Table 3.1 - Scientific & Technical Contributions Critical Outcome Performance Rating Development

Total Score	5.0 - 4.5	4.4 - 3.5	3.4 - 2.5	2.4 - 1.5	1.4 - 1.0
Final Rating	Outstanding	Excellent	Good	Marginal	Unsatisfactory

Table 3.2 - Scientific & Technical Contributions Critical Outcome Final Rating

4.0 OPERATIONAL EXCELLENCE

The Department of Energy's Strategic Plan communicates a strong and very unambiguous commitment to operations to ensure the health and safety of our work force and the public, and the protection of the environment.

The Laboratory recognizes that strong scientific and technical performance can not be accomplished at the expense of ES&H or operational performance. In fact, strong ES&H and operational performance is seen as an enabler to the execution of the Laboratory's mission related work. For these reasons, and in partnership with the DOE, the Laboratory has established the Operational Excellence Critical Outcomes and its supporting Objectives to guide our improvement efforts and performance indicators to monitor our progress toward our goals.

The Operational Excellence Critical Outcome Tree, detailing the Critical Outcome and its' supporting Objectives and Performance Indicators, is presented below.

Summary

The Laboratory is conducting work and operating facilities with distinction and we've done so in a manner that is supportive of the Laboratory's science and technology mission. We have made significant investments over the past four years to integrate sound safety and environmental management practices into daily operations. Staff and managers are taking responsibility for their ES&H related performance: more than 90% of staff are current on their training, and staff are conscious of the work controls that affect their work. In addition, improvements in awareness and attention to ES&H issues have also been reported as a result of increased staff involvement in work planning activities. Further evidence of excellent progress on this outcome is provided by the recent results of the DOE ISM Verification. DOE conducted an intensive two-week review and as a result of their review, approved the PNNL Integrated Safety Management System on October 16, 1998. PNNL is the first DOE Laboratory to receive verification of both Phase I and Phase II of their ISM System.

The Laboratory's performance with respect to occupational safety and health, radiological control, and waste management and environmental protection are all strong. We have made quantitative improvements in several lagging indicators. A comparative analysis of OSHA statistics indicated that PNNL's performance is better than the average for other R&D organizations and is improving at a faster rate. Staff continue to perform very well with respect to skin and personal clothing contamination events, unplanned spills, airborne contamination events, and uncontrolled releases. During the past three fiscal years there have been only 2 instances (both occurring this year and related to a single event in the 306W facility) of workers exceeding the planned administrative control limit, neither of which exceeded 20% of the Legal Dose Limit during the year. The Laboratory's waste management and environmental protection performance is meeting expectations; however, a special study commissioned by senior management identified several opportunities for improvement. Actions have already been initiated and improvements are already apparent.

The Laboratory has demonstrated strong performance relative to the management and use of facilities and assets. Processes used for acquiring, modifying, and utilizing facility assets are effective. We have demonstrated excellent cost control and have reduced cycle time for engineering requests. Space allocations are on par with national benchmarks and 92% of our R&D laboratories are occupied. In addition, we aggressively pursued benchmarking opportunities in FY1998, using data as the basis to make improvements resulting in more than \$3M in cost reductions. However, the timeliness of the Laboratory's maintenance processes are not where we would like them to be.

The Laboratory is maintaining effective control of vacant facilities and has completed 100% of required inspections. However, our ability to transfer or demolish facilities that are vacant and no longer of any use to the Laboratory is difficult at best. We were able to transfer only 1/3 of the 32 surplus facilities due to complexities associated with transferring facilities to other site contractors. We had a goal of transferring 100% of these facilities this year.

We believe our performance rating on this critical outcome is **Excellent**. The Laboratory continues to assess operational performance and will work to continuously improve in this area.

Objective 4.1: Establish full integration of ES&H activities into work practices and management at all Laboratory levels.

Results

This objective drives the changes in the Laboratory's work practices and management approach that resulted in Integrated Safety Management principles being fully integrated into normal business activities. Our FY1998 performance shows substantial improvement over the previous year's baseline, which was evaluated at "Low - Good." Staff and managers are taking responsibility for their ES&H related performance, more than 90% of staff are current on their training, and staff are conscious of the work controls that affect their work. In addition, the Laboratory's Risk and Prep system, which is a key planning tool that ensures ES&H priorities are addressed, is being used, we believe the integration of ES&H activities into the daily work practices has resulted in quantitative improvements in several lagging indicators. However, many subtle improvements in awareness and attention to ES&H issues have also been reported as a result of the improved staff communication facilitated by this objective.

Taken as a whole, the indicators provide verification that perceived increases in safety consciousness, communication, and understanding and implementation of work requirements by staff are real. This improvement was further substantiated by the recent results of the DOE ISM Verification. DOE conducted an intensive two-week review and as a result of their review, approved the PNNL Integrated Safety Management System on October 16, 1998. PNNL is the first DOE Site to receive verification of both Phase I and Phase II of their ISM System.

Based upon the performance indicators that support this objective, our rating for FY1998 is Outstanding.

Analysis

Six indicators, developed around DOE's principles of safety management, form the basis for evaluating and monitoring our progress towards this objective.

Line Managers and Staff Throughout the Laboratory are Clearly Responsible for ES&H Performance: This indicator shows that Line Managers and staff are clearly becoming responsible for their ES&H performance. A standardized evaluation was used by the line organizations to collect the data that indicated that we exceeded our expectations. The results translated into a 3.8 score on a 1 to 5 scale.

ES&H Roles, Responsibilities, Accountabilities, and Authorities are Clearly Established Throughout the Laboratory: This indicator measured the clarity of ES&H Roles, Responsibilities, Authorities and Accountabilities, (R2A2s) for the Laboratory. A survey was used to collect data for this indicator and we recognize that this method produces highly variable data that may or may not be indicative of true performance. We achieved a 4.0 score on a scale of 1 to 5 which is consistent with our performance expectations for this year.

Staff Competence and Level of Knowledge Throughout the Laboratory is Commensurate with Assigned Responsibilities: This indicator attempted to measure staff competence through

training. It addressed two aspects of training; 1) the extent to which staff identified their current environment, safety and health training requirements in a training plan using the Staff Development and Training Plan (SDTP) Tool, and 2) the extent to which staff completed their training requirements. Our FY1998 target was to have 90% of staff develop their training plans using the SDTP and complete required environment, safety and health training by September 30, 1998. With a score of 91.4%, we achieved the target level of performance.

A Proper Balance of Priorities Between the Science and Technology Mission and ES&H Performance is Achieved Throughout the Laboratory: This indicator measured the balance between ES&H and science and technology priorities for the Laboratory by evaluating data from the Prep and Risk database. Timely completion of NEPA documents and appropriately answered ES&H questions were specific aspects tracked. With a final score of 82.2%, we exceeded our target of 80%.

ES&H Standards and Requirements are Clearly Identified: This indicator measured the clarity of ES&H requirements and standards. A survey focused on project staff was used to collect data for this indicator and we recognize that this method produces highly variable data that may or may not be indicative of true performance. Our FY1998 performance of 3.4 (on a scale of 1 to 5) was slightly below our expected level of performance of 3.6. This area will require additional emphasis in FY1999 to ensure that ES&H requirements are clear for all staff.

Work Authorizations and Controls are Tailored to Work Hazards: Standardized evaluations were conducted to assess the tailoring of specific work controls to the known hazards. With a score of 3.8 (on a scale of 1 to 5), our target of 3.2 was dramatically exceeded, indicating that staff are conscious of the controls that affect their work and are implementing them appropriately.

Objective 4.2: Achieve operational excellence in worker safety and health, and environmental protection

Results

This objective drives the continuous improvement of the Laboratory's Occupational Safety and Health Programs, Radiological Control Programs, Waste Management and Environmental Protection Programs.

With respect to Occupational Safety and Health performance, the indicators that support this are all positive and trending positive with the exception of completions of the new-hire Employee Job Task Analysis (EJTA). The low score on the EJTA indicator (85% versus a target of 95%) is believed to be the result of a lack of management attention and does not reflect on the safe work practices of the staff. Lagging indicators such as Lost Work-Day Case Rate (1.0 cases per 200,000 hours) and the Days Away from Work Rate (7.4 days per 200,000 hours) are significantly better than targeted and better than last year's performance. A comparative analysis of OSHA statistics indicated that PNNL's performance is better than the average for other R&D organizations and is improving at a faster rate. This is attributed to increased attention to safe work planning and practices by staff.

Staff continue to perform very well with respect to skin and personal clothing contamination events, unplanned spills, airborne contamination events, and uncontrolled releases. During the past three fiscal years there have been only 2 instances (both occurring this year and related to a

single event in the 306W facility) of workers exceeding the planned administrative control limit, neither of which exceeded 20% of the Legal Dose Limit during the year. In addition, we continue to demonstrate very good performance in the implementation of Radiological Control programmatic functional elements and compliance with 10 CFR 835 and the Hanford Site Radiological Control Manual as evidenced by the results of numerous evaluations and assessments. Self-assessments associated with radiological activities confirm overall compliance, but several opportunities for improvement have been identified and are being addressed.

Based on the agreed to performance indicators the Laboratory's waste management and environmental protection performance is meeting expectations, but there are several opportunities for improvement. No waste packages were rejected due to inaccurate documentation, \$255,000 of life cycle cost savings were captured due to successful pollution prevention/waste minimization efforts, and the Environmental Compliance Field Representatives are provided high quality support. However, several compliance notifications were received early in the year and we fell significantly short of our 10% target related to timely turnaround of waste shipment paperwork. A special study commissioned by senior management identified several weaknesses including lack of clarity in roles and responsibilities, insufficient planning, and inadequate requirements management. Actions have already been initiated and improvements are being demonstrated. This area will require continued management attention next year.

Based upon the performance indicators that support this objective, our rating for FY1998 is **Excellent.**

Analysis

Occupational Safety and Health Composite: This indicator is a composite of five sub-indicators.

Integrated Hazard Analysis: This indicator is a measure of progress toward the development of an integrated hazard analysis process. Our performance target for the year was achieved with a process being defined and piloted in four of the Laboratory's organizations. We anticipate rolling the integrated hazard analysis process out to the other Laboratory organizations in FY1999.

The Days Away From Work Rate is a measure of the effectiveness of the Laboratory's processes for identifying, and eliminating or controlling hazards which can result in occupational injuries or illnesses that are serious enough to result in "Days Away from Work." This rate is calculated by the "(number of days away from work X 200,000)/hours worked." As noted in Figure 4.1, our year-end Days Away From Work Rate of 7.4 days significantly exceeded the target level of 15 days.

Figure 4.1

Employee Job Task Analysis (EJTA): This indicator is a direct measure of the extent to which the EJTA database for Laboratory staff is being kept current to reflect internal transfers and external hiring. This number is calculated as the EJTA's for internal transfers and external hires that are completed within 30 days of the transfer or hire-date, divided by the total number of transfers and external hires, expressed as a percentage. FY1998 performance finished the year

at 85%. This correlates to minimum performance.

Poor performance in the first and second quarters could not be recovered later in the year. However, efforts to address the initially low performance resulted in a better understanding of the process and led to several minor process improvements. These improvements are reflected in the third and fourth quarter performance, which met, or was near, "expected."

This indicator was further impacted by a Hanford site-wide system conversion on August 20, 1998. In addition to typical impacts associated with use of a new system, this conversion resulted in an extended period of system unavailability for most users.

Lost Workday Case Incidence Rate: This indicator is a measure of the effectiveness of the Laboratory's processes for identifying, and eliminating or controlling hazards which can result in occupational injuries or illnesses that are serious enough to result in lost workdays. The LWDC is calculated as the (number of lost workday cases X 200,000)/hours worked. Performance of 1.0 significantly exceeded the target level of performance and represents continued improvement from FY1997 when the LWDC rate was 1.23, as noted in Figure 4.2.

Figure 4.2

Chemical Management System Inventory: This is a measure of the overall accuracy and completeness of the chemical inventory data contained in the Laboratory's Chemical Management System. Performance, as measured during the September assessment, indicated that final performance of 84.3% was slightly higher than was expected (80%). The September assessment also showed marked improvement over the previous assessment.

Radiological Control Composite

This composite indicator (eight sub-indicators) is a measure of the overall effectiveness of the Radiological Control Program.

Unplanned Exposures: This indicator tracks the number of unplanned exposures that result in doses greater than the administrative controls levels. Two unplanned exposures were due to a radiation exposure event in 306W, reported in RL-PNNL-PNNLBOPER-1997-0032. Performance fell short of our FY1998 target of zero unplanned exposures.

Unplanned Depositions: This indicator tracks the number of unplanned depositions of radioactive material. In FY1998, the Laboratory had two internal depositions both stemming from the same event in 306W that impacted the Unplanned Exposure indicator. This was significantly below the target of zero unplanned depositions.

Uncontrolled Release: This indicator tracks the uncontrolled release of liquid or solid radioactive material. There were no (0) uncontrolled releases during FY1998 thus meeting our targeted level of performance.

Satisfactory Responses On Field Evaluations Of Training: This indicator is designed to determine if Laboratory Radiological Workers are retaining radiological worker training information and applying their instruction in daily field work. The FY1998 performance was an overall 92% correct response rate on 200 in-field evaluations of radiological workers. This fell slightly short of our targeted level of 95%. Additional management attention will be given to the sub-indicator in FY1999.

Dose Index: This indicator provides a direct measurement of the accuracy of estimating dose for activities during the radiological work planning process. It is designed to drive enhanced involvement of Radiological Control staff in the planning and performance of radiological work. The dose index is the ratio of the sum of actual doses received on applicable RWPs divided by the sum of the collective dose estimates for those RWPs. Ideally the Laboratory would like to operate with a dose index of 1.0 indicating that our dose estimating is accurate. However, our FY1998 dose index was 0.74 pointing out that roughly 25% more dose was received than anticipated. This score meets expectations but also represents an improvement opportunity.

Unplanned Spills and Airborne Contamination: This indicator tracks the spread of contamination via spills or airborne contamination. There have been no (0) spills or airborne contamination events in FY1998 thus reaching our targeted level of performance.

Loss of Radioactive Sources: This indicator tracks the loss of control and/or accountability of a sealed or unsealed radioactive source. Control was lost on one source as reported in RL-PNNL-PNNLBOPEM-1998-0002. This was better than the FY1997 performance of two lost sealed sources but fell short of our target of "0."

Skin and Personal Clothing Contamination: This indicator tracks radiological contamination of worker skin or personal clothing. There were four events this year, down dramatically from the 11 contaminations recorded in FY1997. This significant improvement was necessary to reach our targeted level of performance.

Waste Management and Environmental Protection Composite:

This performance indicator, a composite of six sub-indicators, is designed to provide an overall evaluation of the Laboratory's Waste Management and Environmental Program relative to the expectations of DOE and Battelle. These sub-indicators are designed to work together as a set and performance on individual sub-indicators can not serve as a discrete measure of the Program's work.

Environmental Compliance: This indicator tracks the notifications received from regulators. Several notifications were received during the first quarter of FY1998 but none since then, exceeding our expected level of performance. The audit report for the EPA Multi-Media audit, conducted earlier this year, will not be received by PNNL until FY1999. The actual content of that report is not finalized but it will not impact indicator.

Pollution Prevention/Waste Minimization: This indicator measures the success of the Laboratory's pollution prevention/waste minimization efforts in life cycle cost savings (dollars). Our "target" level of performance of \$200,000 was exceeded as we finished the year with a total life cycle cost savings of \$255,000.

Seven-Day Turnaround: This indicator measures the accuracy of paperwork, in that it impacts turn-around time of waste shipment paperwork due to inaccurate documentation. With 90% of the paperwork exceeding the seven day turn-around cut-off, performance fell significantly short of our target of 10% and will require significant management attention in FY1999 to turn this performance around.

Correct Waste in Drums: This indicator measures the validity of waste characterization efforts by measuring the percentage of waste packaging rejections. No waste packages were rejected due to inaccuracies during FY1998, exceeding our "target" of 3% rejections.

Alternative Disposal Paths: This indicator was canceled via the Change Control process by mutual agreement of Battelle and DOE.

Environmental Compliance and Field Service Representative Support to Waste Generators: This indicator reflects quality of support provided by field deployed staff by measuring the first review acceptance rate of Chemical Disposal Recycle Requests (CDRRs). The acceptance rate was 96% and exceeded our 95% target.

Waste Indexing: This indicator measures the Laboratory's ability to forecast waste generations. Performance is based on the design, development and implementation of a waste forecasting methodology to predict waste generation rates at the project level. During this first year of implementation, an index of plus or minus 50% is considered outstanding. We finished the year with a minus 10% prediction vs. actual disposal rate. We believe this demonstrates that the methodology is sound and reflects positively on the quality of our staff.

Objective 4.3: Achieve excellence in the management and use of Laboratory facility assets.

Results

The Laboratory has demonstrated strong performance relative to the effectiveness of processes used for acquiring and modifying its facility assets. We will carry-over only 17.5% of the GPP budget compared to almost 50% in FY1997, the Composite Cost Performance Index (CPI) came in at 1.03, and the Cycle Time for Engineering Requests was reduced to only 5.5 days. These performance levels significantly exceeded expectations. Finally, we participated in three significant benchmarking efforts in FY1998, using data collected to make more than \$3M in cost reduction improvements.

We have demonstrated solid performance relative to space utilization. On average, staff are being allocated 133 ft² per person, essentially meeting the national benchmark of 135 ft² and 92% of our R&D laboratories are occupied. Better understanding of our metrics used to measure percent of available offices occupied could lead to the ideal percentage of offices that will need to be vacant to allow for some movement of staff without significant impacts to move schedules and staff productivity.

The effectiveness of the Laboratory's processes for physical asset maintenance relative to planned use is not where we would like it to be as evidenced by mixed performance on the supporting indicators. Although Overtime Ratio of 6.5% and Work Request Backlog of only 27% were near or exceeding performance targets, these are offset by high Work Request Age (57

days) and poor Efficiencies of Scheduling Critical Work performance (only 47% verses a target of 80%). This area will require additional management attention FY1999.

The Laboratory is maintaining good control of vacant facilities and completed 100% of required inspections of vacant facilities. However, our ability to transfer facilities that are vacant and no longer of any use to the Laboratory to other Hanford contractors, or to demolish surplus facilities that are no longer of any future use, is difficult at best. We were able to transfer only 1/3 of the 32 surplus facilities due to the fact that these activities frequently require the cooperation of other Hanford Contractors. We had a goal of transferring 100% of these facilities this year.

Based upon our progress toward the performance indicators that provide the evidence of achieving this objective, our rating for FY1998 is **Excellent**.

Analysis

Physical Asset Acquisitions and Modifications Composite:

This indicator is a composite of five sub-indicators and is designed to provide an overall evaluation of the Laboratory's processes for acquiring and modifying its facility assets relative to the expectations of DOE and Battelle. Overall performance toward this Composite has exceeded expectations and speaks well for the Laboratory's facilities assets acquisition and modifications process. In particular, significant learnings resulting from the Laboratory's strong participation in the national benchmarking groups is the catalyst for improvement of systems and processes throughout the Facilities and Operations Directorate.

Percent of DOE general plant project funding that is carried over beyond the authorized funding year: This Performance Indicator (PI) tracks the annual percentage of DOE GPP funds that are carried over, defined as "service not costed in the Battelle financial system by the end of the fiscal year." Our FY1998 "target" was to carry over less than 30 percent of the total EM and ER GPP funds. At year-end, we carried over only 17.5% of GPP funds.

Composite Cost Performance Index (CPI) : This indicator provides an indication of the overall cost efficiency, from the beginning of a project, with which work has been accomplished. The CPI is calculated as the "budgeted cost of work performed divided by actual cost of work performed" (BCWP/ACWP). The Composite CPI for FY1998 ended the year at 1.03, slightly short of our target of 1.04.

Cycle Time for Engineering Request Action Plans: This sub-indicator seeks to drive improvements in the Laboratory's decision making process for identification and correction of facility deficiencies. It indicator provides incentives to accomplish the rapid implementation of process improvements. The FY1998 goal is to have an average timeframe for the Core Team to reach agreement and closure on an action plan for each Service Request of 15 working days or less. We ended FY1998 with a cycle time of 5.5 days per engineering request.

Results of Benchmarking Opportunities: This indicator looks at the results of benchmarking activities with companies who have similar processes. A benchmarking opportunity is defined as an improvement that results in an actual FY1999 budget submission reduction of greater than \$100K for some combination of overhead budget elements.

More than \$350K reduction in B&U and OJS pools can be specifically tied to benchmarking activities with MK Ferguson/Tectronic, Portland, Oregon. The best practices implemented included development of the criteria for tasks that did not require extensive planning and could be implemented directly by staff within a 3-day timeframe. These tasks are estimated to be about 85% to 90% of our work.

More than \$410K worth of reductions in Facility Management staff (OJS) resulted from a recommendation by a benchmarking consultant. This activity removed a level of managers from the Facility Operations and Maintenance Services organizations.

In addition, we participated in three significant benchmarking efforts in FY1998, using data collected to make approximately \$3M in cost reduction improvements, which will take effect in FY1999. Significant benchmarking participation included the Facility Issues Roundtable, a benchmarking group of some 30 R&D laboratories and two other DOE labs, and a Research Laboratory Facilities Benchmarking Group. This second group is composed of some 30 commercial laboratories and six DOE laboratories.

The Percent of Adequate Space: This indicator is a measurement of total adequate square footage of the Laboratory, with the desired amount being 36% or greater. The classification of adequate is determined and documented using the process that was developed at the Argonne National Laboratory called the Argonne Model. We ended FY1998 with an actual percent of adequate space of 36.5%. This is slightly better than our target of 36%, but fell short of our goal of 38%.

Space Utilization Composite

This performance indicator is a composite of three sub-indicators and is designed to provide an overall evaluation of the Laboratory's processes for space utilization relative to the needs of its science and technology mission and expectations of DOE and Battelle.

Percent of Available Offices Occupied: Current Laboratory office space allocations are comparable to other private research organizations yet the high cost of operating facilities and of new construction provides the motivation to increase utilization. This sub-indicator is designed to increase the Laboratory's knowledge of the actions that can be taken to reduce the amount existing vacant office space (e.g., office space used to store material and equipment instead of actual staff), and to find additional opportunities to consolidate into a smaller set of buildings. We ended FY1998 with 92.4% of all available offices being occupied. This is better than our performance expectation of 90% yet lower than our "target" of 97%. Additional emphasis will be placed on this indicator in FY1999.

The Actual Average Office Space Square Foot Per Person: This sub-indicator is designed to optimize the average total office space per square foot per person. It is intended to help ensure that Battelle staff are housed in the most economical and efficient manner possible given their mission needs and the configuration of the space they occupy. We ended FY1998 with an average total office space allocation of 133.3 square feet per person. This is only 1.7 square feet off our "target" of 135 square feet per person.

Percent of Available Laboratories Occupied: This indicator is designed to collect baseline data to help understand and develop a better model for allocating and occupying Laboratories. We finished FY1998 with 94.8% of our available laboratories occupied compared to our target of 95%.

Maintenance Requirements and Work Performance Composite

Implicit in achieving operational excellence is the expectation that maintenance work will be completed in a timely fashion without allowing a backlog to buildup or to utilize excessive overtime to minimize the time to complete or minimize the backlog. This performance indicator is a composite of four sub-indicators and is designed to provide an overall evaluation of the Laboratory's processes for physical asset maintenance relative to planned use needs of the Laboratory and the expectations of DOE.

Maintenance Work Request Age: This sub-indicator measures the age of work requests; the length of time (days) from the day the work request is funded and entered into the planning and scheduling system, to the day it is completed and removed from the planning and scheduling system. We ended FY1998 with an average Work Request Age of 57 days, falling short of our "target" of 48 days.

Maintenance Work Request Backlog: This sub-indicator tracks the accumulated maintenance work requests that are incomplete, providing a trend of facility status, readiness for occupant use, and responsiveness of the maintenance function. We ended FY1998 with a Work Request Backlog of only 27% exceeding our "target" of 35%.

Maintenance Overtime Ratio: Overtime used on a regular basis increases Laboratory cost, lowers efficiency, and increase the potential for negative ES&H events. Consequently, there is and will continue to be, strong emphasis on planning and scheduling work such that overtime becomes an exception rather than a routine practice. This sub-indicator measures the ration of overtime worked to the total regular time worked. The Facilities organizations included in this measure ended FY1998 with an Overtime Ratio of 6.5% compared to our target of 6%.

Efficiencies of Scheduling Critical Work: This sub-indicator provides a monthly measurement of the percentage completion of the top 10% of jobs, based on the Building Managers priority listing for a given Core Team. The intent of this sub-indicator is to achieve excellence in the management and use of Laboratory facilities and assets is the requirement that the right work is selected prioritized, planned and executed based on sound organizational selection criteria. The Laboratory ended FY1998 with a 47% efficiency in the scheduling of critical work, compared to our "target" of 80%.

Surplus Physical Assets Composite

This performance indicator is a composite of two sub-indicators and is designed to provide an overall evaluation of the Laboratory's processes for management and disposition of surplus physical assets.

Percent of Material Condition Inspections Performed: This indicator tracks the percent of material condition inspections performed in DOE facilities vacant for more than 180 days. Fully 100% of the required material conditions inspections were performed in FY1998.

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The Percent Surplus Facilities Transferred indicator tracks the percent of 32 identified surplus facilities that have been transferred or removed from the Laboratory's inactive facility inventory. Our FY1998 year-end performance is 31.3%. This is better than our expected performance level of 10% but short of our "target" of 100%.

Operational Excellence Performance Evaluation

The overall performance rating for this Critical Outcome is determined by comparing the total value in the table below to the rating scale at bottom.

ELEMENT	Value Points Tables 4.1-4.7	Weight	Performance Level	Effectiveness Score	Value Points	Obj. Weight	Weighted Points
4. Operational Excellence							
4.1 Establish full integration of ES&H activities into work practices...							
4.1.1 Line managers and staff throughout the Laboratory are clearly...			3.8	100			
4.1.2 ES&H roles, responsibilities, accountabilities and authorities...			4.1	5			
4.1.3 Staff competence and level of knowledge is commensurate...			91.9%	75			
4.1.4 A proper balance of priorities between the science and ...			82.2%	50			
4.1.5 ES&H standards and requirements are clearly identified			3.6	5			
4.1.6 Work authorizations and controls are tailored to work hazards			3.8	95			
			Obj 4.1 Total	330	4.9	34%	1.7
4.2 Achieve operational excellence in worker safety and health,...							
4.2.1 Occupational Safety & Health Composite	3.7	33%			1.2		
4.2.2 Radiological Control Composite	3.3	34%			1.1		
4.2.3 Waste Management and Environmental Protection Composite	4.3	33%			1.4		
			Obj 4.2 Total		3.8	33%	1.3
4.3 Achieve excellence in the management and use of ...							
4.3.1 Physical asset acquisitions and ...	4.7	25%			1.2		
4.3.2 Utilization of space is commensurate with science...	4.4	35%			1.5		
4.3.3 Maintenance requirements and work performance ensures physical asset availability for planned use	3.5	25%			0.9		
4.3.4 Surplus physical assets are managed to reduce cost and risk	4.3	15%			0.6		
			Obj 4.3 Total		4.2	33%	1.4
						Total	4.4

Table 4.1 Operational Excellence Critical Outcome Performance Rating Development

Total Score	5.0 - 4.5	4.4 - 3.5	3.4 - 2.5	2.4 - 1.5	1.4 - 1.0
Final Rating	Outstanding	Excellent	Good	Marginal	Unsatisfactory

Table 4.2 - Operational Excellence Critical Outcome Final Rating

Indicators	Performance Level	Effectiveness Points	Value Points
4.2.1 Occupational Safety & Health Composite			
4.2.1.1 Integrated Hazard Analysis	Piloted	100	
4.2.1.2 Days Away From Work Rate	7.4	20	
4.2.1.3 Employee Job Task Analysis	85%	-70	
4.2.1.4 Lost Workday Case Rate	1.0	20	
4.2.1.5 Chemical Management System Inventory	84.3%	40	
	Composite Total	110	3.7

Table 4.3 Occupational Safety & Health Composite Performance Rating Development

Indicators	Performance Level	Effectiveness Points	Value Points
4.2.2 Radiological Control Composite			
4.2.2.1 Unplanned Exposures	2	0	
4.2.2.2 Unplanned Depositions	2	-90	
4.2.2.3 Uncontrolled Release	0	65	
4.2.2.4 Satisfactory Responses Field Evaluations of Training	92.1%	35	
4.2.2.5 Dose Index	0.74	0	
4.2.2.6 Unplanned Spills and Airborne Contamination's	0	5	
4.2.2.7 Loss of Radioactive Sources	1	20	
4.2.2.8 Skin and Personal Clothing Contamination's	4	40	
	Composite Total	75	3.3

Table 4.4 Radiological Control Composite Performance Rating Development

Indicators	Performance Level	Effectiveness Points	Value Points
4.2.3 Waste Management and Environmental Protection Composite			
4.2.3.1 Environmental Compliance	32	27	
4.2.3.2 Pollution Prevention/Waste Minimization	\$255K	65	
4.2.3.3 Seven-day Turnaround	90%	-55	
4.2.3.4 Correct Waste in Drum	0%	100	
4.2.3.5 Alternative Disposal Paths	Cancelled	NA	
4.2.3.6 Environmental Compliance and Field Svc. Representative Support to Waste Generators	96%	80	
4.2.3.7 Waste Indexing	-10%	95	
	Composite Total	312	4.3

Table 4.5 Waste Management and Environmental Protection Composite Performance Rating Development

Indicators	Performance Level	Effectiveness Points	Value Points
4.3.1 Physical asset acquisition and modifications follow an integrated and systematic process			
4.3.1.1 Percent of DOE general plant project funding that is carried beyond the authorized funding year	17.5%	95	
4.3.1.2 Composite Cost Performance Index	1.03	75	
4.3.1.3 Cycle time for Engineering Requests action plans	5.5	65	
4.3.1.4 Results of Benchmarking opportunities	2	30	
4.3.1.5 The Percent of adequate space	36.5	0	
	Composite Total	265	4.7

Table 4.6 Physical asset acquisition and modifications follow an integrated and systematic process Performance Rating Development

Indicators	Performance Level	Effectiveness Points	Value Points
4.3.2 Utilization of space is commensurate with science and technology mission needs			
4.3.2.1 Percent of available offices occupied	92.4	35	
4.3.2.2 The actual average office space square foot per person	133.3 (delta is 1.7)	65	
4.3.2.3 Percent of available laboratories occupied	94.8	97	
	Composite Total	197	4.4

Table 4.7 Utilization of space is commensurate with science and technology mission needs Performance Rating Development

Indicators	Performance Level	Effectiveness Points	Value Points
4.3.3 Maintenance requirements and work performance ensures physical asset availability for planned use			
4.3.3.1 Maintenance Work Request Age	57 days	-15	
4.3.3.2 Maintenance Work Request Backlog	27%	90	
4.3.3.3 Maintenance Overtime Usage	6.5%	35	
4.3.3.4 Efficiencies of Scheduling Critical Work	47%	-30	
	Composite Total	80	3.5

Table 4.8. Maintenance requirements and work performance ensures physical asset availability for planned use Performance Rating Development

Indicators	Performance Level	Effectiveness Points	Value Points
4.3.4 Surplus physical assets are managed to reduce cost and risk			
4.3.4.1 Percent of material condition inspections performed	100%	20	
4.3.4.2 Percent of surplus facilities transferred	31.3%	60	
	Composite Total	80	4.3

Table 4.9: Surplus physical assets are managed to reduce cost and risk Performance Rating Development

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5.0 LEADERSHIP AND MANAGEMENT

The Department of Energy's Strategic Plan establishes four primary critical success factors. Two of these critical success factors are Communication and Trust, and Human Resources. We recognize that the heart of the Laboratory is made up, not of facilities and equipment, but of our research and support staff. Managing the Laboratory in the complex world of today requires effective and involved leaders. The recognition that effective leadership and management are critical to our success, both at the personal level and at the institutional level, is especially important in light of the long-term implications of the programmatic and staff reductions the Laboratory experienced in 1995.

For these reasons and in partnership with DOE, the Laboratory established the following Critical Outcome, objectives, and performance indicators to guide our efforts and monitor our progress.

The Leadership and Management Critical Outcome Tree, detailing the Critical Outcome and its supporting Objectives and Performance Indicators, is presented below.

Summary

The Laboratory is providing leaders, management systems, and an environment that is supportive of innovation needed to accomplish science and technology mission. Two initiatives started in previous years to improving the quality of work life and implementing self-assessment are maturing and making an impact on performance.

The Laboratory focused in FY1998 on improving management's performance in two areas: providing staff performance feedback and strengthening career development. We have made performance feedback an explicit accountability, developed and implemented an enhanced mini-360 feedback assessment tool, and developed succession plans for key staff, including career development plans for succession candidates. These and other actions we've taken led to a dramatic increase in our QWL survey this year.

The Laboratory's Integrated Assessment processes are maturing - we are in the third year of implementation - and progress has exceeded our expectations. Several organizations have aspects of their self-assessment program integrated into their management approach and many of the self-assessment programs have achieved an outstanding level of performance as determined by evaluations performed by the Independent Oversight organization. Through the survey, which examines DOE's involvement in our self-assessment processes, we find opportunities where we can strengthen interactions with DOE staff.

Providing effective and efficient business management systems is an ongoing challenge, not a singular event. Laboratory staff have acknowledged improvement in business management systems via the QWL survey. DOE's perspective on our systems however, will not be known until completion of the up-coming DOE Business Management Oversight Review. The Laboratory fell below FY1998 expectations with respect to research-to-support staff labor ratio and average cost per research FTE. The Laboratory made conscious decisions to increase our investment in program development and capability development, and we were not able to maintain the pace of hiring research staff to achieve the desired balance between program and overhead costs. Overall however, the Laboratory has used cost management tools to hold lab-level overhead rates flat for the past two years.

Based upon our progress toward the performance indicators that provide the evidence of achieving this objective, our rating for FY1998 is **Excellent**.

Objective 5.1: The Contractor's leaders/managers create a work environment that is supportive of innovation

Results

The Quality of Work Life (QWL) survey was distributed to all staff in FY1998 and 63% of the staff responded, up from the FY1997 rate of 53%. Three major areas, or composites, of the survey were selected from the FY 1997 QWL survey results for management attention and formed the basis of this performance indicator. These areas were:

- **Performance Feedback** – a composite of questions to measure staff perception on whether managers regularly provide information on their performance, whether they receive

performance feedback from customers; and if their organization rewards and recognizes good performance.

- Customer Service Model Implementation – a composite of questions to measure how well staff members understand strategy, the business model, and their role within it,
- Management Alignment, Associate Laboratory Directors/Division Directors – a composite of questions to measure staff perception of their Level 1s efforts in leading and communicating direction and in creating a supportive work environment.

Historically, the amount of change that occurred from FY1996 to FY1997 was minimal. The Laboratory was concerned about the slow rate of change but changing a culture is tough issue. However, from FY1997 scores to FY1998, the amount of change reported via the survey was a 14% improvement in Performance Feedback and a 15% improvement in both Customer Service Model Implementation and Management Alignment. Significant management attention was focused on these three areas throughout the year. While attention does not necessarily change staff perception, much of the shift to the positive perception came from those who rated these areas as “neither agree or disagree” in FY1997. The Laboratory as surprised and pleased by the amount of change.

Based upon the performance indicators that support this objective, our rating for FY1998 is **Outstanding**.

Analysis

Each of the three composites is discussed below.

Performance Feedback: This composite is comprised of 5 questions that touch on staff perception of their manager's ability to provide meaningful information regarding their strengths and weaknesses, recognize good performance, and provide information on career development. Other questions address recognition and rewards for good performance and feedback from customers on staff performance.

Figure 5.1 shows significant change in this area. A number of activities were initiated during the year to affect this improvement including:

- Making performance feedback an explicit part of the organization's strategy.
- Development and implementation of an enhanced mini-360 feedback assessment tool.
- Development of succession plans for key staff, including career development plans for succession candidates.

Customer Service Model Implementation: This composite is comprised of 10 questions that touch on staff perception of the Laboratory's implementation of the Customer Service Model (CSM) – which is the mechanism the Laboratory uses to translate customer needs into products and services. Questions relate to an understanding of goals, staff member responsibilities, and their support of the model.

Figure 5.1

Figure 5.2 shows a dramatic improvement in staff understanding of the Customer Service Model.

At the beginning of FY1998 Divisions and Directorates put plans in place to communicate the CSM and demonstrate each staff member's role within the CSM. The Laboratory Standards Based Management System also defined the roles, responsibilities, accountabilities, and authorities (R2A2s) for all major functions of the CSM framework and made this information available. Further refinement of the functions (R2A2s) of support organizations and staff were also included.

Figure 5. 2

Management Alignment: Associate Laboratory Director (ALD) Performance: This composite was comprised of 9 questions that touch on staff perception of ALD or Division management's; communication with staff, providing effective leadership, understanding staff issues, ability to create a supportive work environment, and ability to create a work environment that supports innovation.

Figure 5.3 shows substantial change in management alignment performance relative to last year.

This area was identified as a key improvement area in FY1998 and beyond. As such, each Division and Directorate developed a strategy to improve this issue and typically included this item within management's Staff Development Review (SDR). There was also a concerted effort on the part of each ALD to increase the amount of communication to staff through the use of all-hands meetings, brown-bag sessions, etc.

Figure 5. 3

Broader Analysis of QWL Data: Comparative data provided by International Survey Research Corporation (ISR) shows that the Laboratory continues to perform above the national norms in many areas. The Laboratory has also asked ISR to provide an opinion regarding the improvements noted in the FY1998 results, i.e. how significant and/or common are improvements of this magnitude. This information is forthcoming and will be shared with DOE when it becomes available. Changes to this most recent survey regarding delivery method (electronic vs. paper), size of the survey (21 areas focusing on the critical issues within the Laboratory vs. the broad 88 areas), and the fact that a work package was provided to staff to complete the survey may have impacted the response rate and the resulting outcome. The performance evaluation approach used in the future will continue to be directed at our most critical performance issues with analysis based on the Laboratory's performance relative to comparative data.

Objective 5.2: Battelle Leadership effectively uses self-assessment to monitor performance and to drive needed improvements enabling DOE to optimize oversight activities.

Results

The Laboratory is making strong progress regarding implementation of Integrated Assessment (IA). Several organizations have matured beyond basic implementation and are using the self-assessment process to continuously improve products and processes and to aid in determining overall organizational health. This is especially true for those organizations that have an extra year of experience with the program due to their participation in the FY1996 pilot. For FY1998, the IA implementation and deployment rating, as determined by the Laboratory's Independent Oversight Organization reviews, was 3.7 on a 5.0 point scale, which met our targeted level of performance. This is a 32% improvement over the FY1997 rating of 2.8 which was based upon the same evaluation criteria.

The overall level of satisfaction of DOE staff with their involvement in the Laboratory's self-assessment activities has steadily improved, however, 35% of DOE's points of contacts with the Laboratory's various organizations are still not satisfied. Finally, the number of specific DOE oversight activities have declined compared to prior years, however, increased partnership with DOE in self-assessment activities will be necessary in order to build increased confidence and trust in the overall program.

Based upon the performance indicators that support this objective, our rating for FY1998 is **Excellent.**

Analysis

Annual Rating of the Divisions/Directorates Self-Assessment Program Performance:

Independent Oversight evaluated each of the Division/Directorate's self-assessment activities and observed differing levels of maturity of planning, deployment, and use of results. Compared to FY1997, because of more senior management involvement and better planning, the Laboratory improved by 32%, achieving our target (see Figure 5.4).

Figure 5.4

The key attributes of those organizations having strong self-assessment programs in FY1998 are:

- Formality of approach, integrated with the Business Planning Process
- Fundamental understanding of program concepts and value
- Clear linkage with business and strategic goals (often through the Staff Development Review process)
- Assessments occurring as planned with results shared with staff
- High level of senior management involvement and commitment
- Partnering with DOE-RL in self-assessment planning, execution, and reporting
- Use of comparative data to strengthen analysis
- Customer feedback being a key element of success
- Assessments systematically analyzed where results are used to drive improvement

The least mature programs are typically Directorates and not the large Divisions. Typical attributes include:

- Lack of formal self-assessment planning and linkage to strategy
- Minimal management involvement and staff awareness
- Confusion regarding assigned roles and responsibilities
- No routine self-assessment progress reporting
- General misunderstanding of program requirements

The majority of the organizations are now demonstrating a systematic approach and deployment to their programs. However, the Independent Oversight organizations identified several opportunities for improvements for IA. Examples include: improving integration between business

planning and self-assessment activities, updating IA SBMS guidance to address management systems and the CSM, and enhancing the customer value metrics being used. All of the organizations have received a report identifying their strengths and weaknesses. Many of the organizations have already initiated improvements in their self-assessment programs.

DOE's Satisfaction With their Level of Involvement: DOE-RL conducted a survey in September 1998 for the purpose of determining satisfaction with their level of involvement in IA processes. The survey had a response rate of 43% out of a total population of 51. DOE is currently investigating the appropriateness of this large population due to several staff who stated they were not able to comment on this survey.

Figure 5. 5

The percent of the respondents that rated the overall satisfaction level to be 3 (Satisfied) or greater on a 5-point scale was 65%, compared to 58% in FY1997. The targeted level of performance for this indicator was 90% as noted in Figure 5.5.

Further analysis of those who provided a rating of "1" (Not Satisfied) or "2" (Slightly Satisfied) generally rated their understanding of IA processes as "Do not understand" to "Understand somewhat". Conversely, the DOE-RL respondents who rated their overall satisfaction as a "3" (Satisfied) or greater, generally have "Adequate understanding" to "Could teach it to someone else" levels of understanding of IA processes.

Perhaps the most interesting commentary provided by the survey is in the question that asked DOE-RL "How satisfied are you with the contractors effort in using the results of self-assessment to effect improvement". This question addresses the effectiveness of IA to drive improvement. The response of those "satisfied" or greater is 76%.

Objective 5.3: Provide effective and efficient business management that enables accomplishment of objectives.

Results

The Laboratory performance on our productivity metrics was disappointing in FY1998. The Research/Support staff labor dollar ratio never reached expectations. The Laboratory made significant investments to support growth in the development of new research programs but were slow in the hiring of scientific and technical staff to execute this new work. The actual ratio for FY1998 was 2.51 against a target of 2.63.

The Laboratory also missed our average cost per research FTE target of \$116K for generally the same reasons as outlined above. Our FY1997 cost was \$123k per research FTE.

The Laboratory's evaluation also includes input from DOE that will not be generated until they complete their annual 2-week review that assesses the Laboratory's Business Management processes. For the purposes of preparing this report, the Laboratory will assume the receipt of an overall *Excellent* rating based upon FY1997 results. Any other rating will result in a preparation of an addendum to this report.

As part of the QWL Survey submitted to Laboratory staff in August of 1998, a select set of questions related to staff perception of "Internal products, services and systems provided by Laboratory service groups". Specifically, staff were asked to rate their overall satisfaction with these service groups and their products. The Survey response showed a nine-percentage point improvement over the FY1997 baseline of 60%.

Based upon the performance indicators that support this objective, our rating for FY1998 is Good.

Analysis

The Research to Support Staff Labor

Ratio: This indicator provides insight to how the Laboratory is deploying its staff. It is expressed as a ratio of staff dollars expended on research activities relative to staff dollars expended on support activities. Our FY1998 performance of 2.51:1 is short of our targeted value of 2.63:1. The actual FY1998 performance was impacted by:

- 1) A significant reduction in the utilization of graduate and post doc students from prior years.
 - 2) Delays in the hiring of research staff. Hiring did improve toward the end of FY1998 with 80 new staff hired of which over 75% were scientists and engineers.
- Figure 5.6 shows the historical performance of this indicator.

Figure 5. 6

Average Cost Per Research FTE: Figure 5.7 shows the Laboratory's average cost per research FTE. This indicator provides a measure of the 1830 contract operating cost of the laboratory (less capital and subcontracts) expressed as an annual cost per full-time staff member deployed on research activities.

The FY1998 year-end data shows the cost per research FTE to be higher than expected. The shortfall in Research FTE's relative to the size of the Laboratory's infrastructure continues to be an area of concern. Cost management techniques have been implemented in an attempt to balance the overhead cost of the Laboratory with the size of the programmatic base. Laboratory overhead budgets were downsized 5% during FY98 as the shortfall in Research FTE's was identified. The significant decline was students however impacts the results of this metric but was not a factor in the downsizing of Laboratory overheads since they are not in the overhead recovery base.

Figure 5.7

Internal Customer Satisfaction: This indicator is based on a composite of 12 questions presented to Laboratory staff with the QWL Survey. These questions can be categorized into three areas:

1. Characteristics of the Laboratory Service Groups – 7 questions related to skills, service, working relationships, and development of creative solutions.
2. Products, Services, and Systems Provided by Laboratory Service Groups – 4 questions related to cost, quality, and delivery.
3. Overall Level of Satisfaction – A single question addressing personal satisfaction of products, services, and systems provided by Laboratory Service Groups.

Figure 5.8 demonstrates the strong shift of staff satisfied with Internal Products, Services, and Systems (the Laboratory's management systems) as compared to FY1997. Most of the shift occurred in those who, in FY 1997, characterized their satisfaction as "neither satisfied nor dissatisfied". The overall average for FY1998 is a 3.7 on a 5.0 point scale, which meets the target value. Areas that are clearly the strengths of the Laboratory Service Groups are the competency of staff ("have skills and capabilities that meet my needs" – 80% favorable response) and the products, services, and systems ("meet or exceed

Figure 5.8

my needs/requirements" and "are of high quality and add value to my work" – both 70% favorable response). An area continuing to require improvement is the cost of those products, services, and systems ("are provided at a reasonable cost" – 50% favorable response).

The most significant improvements from the FY1997 QWL Survey are in the areas of improved "training and documentation of the procedures and requirements" staff members must satisfy (+17 percentage points), "seek to understand my business needs and requirements" (+14 percentage points), and products and services "delivered in a timely way" (+12 percentage points).

Leadership Performance Evaluation

The overall performance rating for this Critical Outcome is determined by comparing the total value in the table to the rating scale at bottom.

ELEMENT	Performance Level	Effectiveness Score	Value Points	Weight	Weighted Points
5. Leadership and Management					
5.1 Battelle's leaders/managers create a work environment that is supportive of innovation.					
5.1.1 Composite evaluation of the Leadership and Management focus areas determined by QWL staff survey	Prf Fdbk 58% CSM 61% Mgmt 60%	70 80 100			
	Obj 5.1 Total	250	5.0	30%	1.5
5.2 Battelle Leadership effectively uses the Integrated Assessment Program to monitor performance and to drive...					
5.2.1 Contractors' Internal Oversight annual averaged rating of the Divisions/Directorates self-assessment program performance	3.7	100			
5.2.2 DOE's satisfaction with the implementation of the Contractors self-assessment processes	65%	34			
	Obj 5.2 Total	134	4.4	40%	1.8
5.3 Provide effective and efficient business management that enable accomplishment of objectives.					
5.3.1 Research/Support staff labor ratio	2.51	-40			
5.3.2 Average cost per research FTE	\$123	-25			
5.3.3 DOE's evaluation of the overall Contractor performance in the business management...	4.0	23			
5.3.4 Internal customer satisfaction with the quality and effectiveness of business management...	3.7	100			
	Obj 5.3 Total	40	3.3	30%	1.0
				Total	4.3

Table 5.1 - Leadership and Management Critical Outcome Performance Rating Development

Total Score	5.0 - 4.5	4.4 - 3.5	3.4 - 2.5	2.4 - 1.5	1.4 - 1.0
Final Rating	Outstanding	Excellent	Good	Marginal	Unsatisfactory

Table 5.2 - Leadership and Management Critical Outcome Final Rating

6.0 COMMUNITY RELATIONS

As an adjunct to the Department of Energy's core missions, the DOE Strategic Plan establishes goals to help Industry make the transition from a nuclear research and production capability to one of pollution prevention and waste minimization. The DOE has made a strong commitment to help local economies transition to a post-cleanup world in which thousands of DOE-supported jobs will disappear and must be replaced by private-sector activities.

Just as the PNNL's business mission underlines its role of advancing technology, Battelle's commitment to the local communities drives its efforts to serve the neighborhoods in which the staff live and work, the local multi-county region and the PNNL through economic development, open communication and science, mathematics and technology education reform.

For these reasons, and in partnership with the DOE, the Laboratory has established the Community Relations Critical Outcome, and its supporting objectives and performance indicators, to guide our efforts and to monitor our progress toward our goals.

The Community Relations Critical Outcome Tree, detailing the Critical Outcome and its' supporting Objectives and Performance Indicators, is presented below.

Summary

The Laboratory and Battelle are making a difference in the community. We have exceeded our community relations goals for FY1998. We surveyed the local communities and their leaders, and Pacific Northwest regulators about their perceptions of Battelle and the Laboratory as corporate citizens. Results of the surveys of community leaders and residents were very favorable while the results of surveys of the Pacific Northwest regulators were mixed. The results of the surveys were used to develop and implement improvement actions.

We are helping create a diversified economy by putting technology to work in the Tri-Cities region. In FY1998 we launched, or helped launch, 12 new businesses. All (100%) of the businesses we started in FY1997 have been sustained through the difficult first year of business, compared to a national average of approximately 40%. We were instrumental in the development of 74 new jobs among 28 firms in the local region, exceeding our target of 50 new jobs. These jobs resulted from helping in start-up, recruiting, and/or providing technical assistance to companies. In addition, major growth occurred in two PNNL supported deals from prior years. Oremet recently expanded operations to include 65 new jobs, and Integrated Environmental Technologies grew to add 19 jobs. These companies are large job generators and the Lab's assets have been a factor in making both deals happen.

The Laboratory continues to be an extremely strong influence concerning the enhancement of science and mathematics education.

Based upon our progress toward the performance indicators that provide the evidence of achieving this objective, our rating for FY1998 is **Outstanding**.

Objective 6.1: Battelle will serve the communities to further enhance the Laboratory's status as a valued corporate citizen of the Northwest Region.

Results

During FY1998 Battelle conducted surveys of the local community, its leaders and the Pacific Northwest regulators. The surveys were conducted to collect feedback on PNNL's/Battelle's impact in the local community and region. Results of the surveys of community leaders and residents were very favorable. Twenty-seven percent of community residents surveyed perceived the Laboratory to be an excellent employer, while 48% perceived the Laboratory to be a "good" employer. Figure 6.1 provides a breakdown of the surveyed resident's perceptions of the Laboratory as an employer. Twenty-eight percent of community residents surveyed gave the Laboratory an "A" for being an environmental citizen, while 39% of residents surveyed gave us a "B" and 11% gave us a "C". Figure 6.2 provides a breakdown of surveyed resident's perceptions of the Laboratory as an environmental citizen. Additionally, slightly more than 50% of the residents surveyed rated Battelle/PNNL as being "better" at providing contributions to local organizations and events, compared to other local corporate citizens. Figure 6.3 provides this data.

Figure 6.1 – The Laboratory as an Employer

The results of surveys of the Pacific Northwest regulators were mixed. The results of the regulator surveys were not negative, but were decidedly more neutral to slightly positive (when compare to then survey of the community). The community survey data was evaluated and actions were developed to take advantage of opportunities for improvement. Many of the actions have already been implemented while many are designed for implementation within FY1999.

Based upon the performance indicators that support this objective, our rating for FY1998 is **Outstanding**.

Figure 6.2 - Percent of Surveyed Population by Letter Grades

Figure 6.3 – Laboratory Contributions vs. Others

Analysis

Feedback from the Local Communities Regarding Their Involvement in, and Understanding of, the Laboratory's Missions and Programs: Several planning sessions between PNNL, Department of Energy, and Opinion Strategies Inc., the firm conducting the survey, were conducted to determine the various components of the survey. The surveys, consisting of one-on-one interviews, telephone surveys and focus group discussions, were specifically designed to independently measure the factors indicating progress in achieving community outreach goals.

Feedback from the local communities regarding their involvement in, and understanding of, the Laboratory's missions and programs. Three common themes emerged from both community leaders and citizens: (1) The top community concern is diversification of the local economy; (2) PNNL/Battelle is a highly valued and respected employer, and is a community asset; (3) Hanford is viewed as a significant asset, but is also seen as a fragile element of the economy.

As a result of the following feedback from the community surveys, several actions have been taken or are planned for FY1999:

1. **Feedback:** *Economic development is a top-of-mind concern with community leaders and citizens.* **Action:** PNNL consolidated two directorates and a portion of a third to strengthen PNNL's impact in the community and region. The new organization merges staff dedicated to cultivating new economic growth and communicating key information to targeted audiences.
2. **Feedback:** *People really don't understand the work performed at PNNL.* **Actions:** A print advertising campaign was launched in April to inform the local community on the significant scientific research and technology development being conducted at PNNL, and to distinguish PNNL's image from the Hanford image. The *Tri-City Herald* was selected as the medium in

which to place the ads because survey respondents (55 percent) cited the *Tri-City Herald* as their top source of information. To further educate the local community's regarding PNNL science and research activities, a speakers bureau was launched in November 1997. The response to date has been good, with 17 talks delivered so far to local civic, business, and community organizations.

3. **Feedback:** *Battelle/PNNL's linkages with diversity efforts and the minority community are extremely weak.* **Actions:** To improve minority hiring, PNNL Human Resources has implemented the Recruiting Referral Program. Through this program, staff members can receive financial awards for referring a qualified woman and/or minority who is hired in certain job categories. **Other actions taken in FY1998** to counter low minority staffing levels include: the creation of the Staffing Programs Department in April 1998; the hiring of an EEO/AA specialist to monitor and assure progress in the area of Affirmative Action; and conducting a Minority and Woman Career Fair at PNNL.
4. **Feedback:** *Volunteerism by Battelle employees in the community is not readily evident.* **Actions:** Efforts were initiated and are ongoing to pursue implementing a volunteer program at PNNL, which has been in place at Battelle Columbus for more than six years. The program, *Team Battelle*, is designed to positively impact the quality of life in the communities in which Battelle staff live and work by supporting programs that meet community needs, capitalize on staff's interests and are consistent with Battelle's corporate citizenship priorities.

Feedback from Northwest regulators regarding their involvement in, and understanding of, the Laboratory's missions and programs: Regulators with periodic, or greater, interaction and/or knowledge of Battelle/PNNL responded that Battelle was a good environmental citizen. Most regulators showed reluctance to participate in the survey, and none of the tribal leaders responded. Only a few interviews were done in person, with most preferring to participate by phone. Frequently, responses to questions were dealt with in a neutral tone and answer. The sense is that regulators prefer to keep distance between them and the organizations in which they regulate. This is important feedback that has been noted and will be incorporated into decisions involving any future surveys with regulators.

Objective 6.2: Battelle will put technology to work in the Tri-Cities and region to create and sustain a diversified and strong economy.

Results

We have had an outstanding year of putting technology to work in the Tri-Cities region in FY1998. We launched, or helped launch, 12 new businesses. All (100%) of the businesses we started in FY1997 have been sustained through the difficult first year of business, compared to a national average of approximately 40%. And we were instrumental in the development of more than 74 new jobs in the local region.

Based upon the performance indicators that support this objective, our rating for FY1998 is **Outstanding**.

Analysis

The number of new businesses started in the area:

We achieved 12 new business starts during FY1998.

This was against a goal of 10. That we achieved 12 is a function of two factors. The first of these was taking control of the situation. Knowing we faced a shortfall, we implemented a process to formally manage our deal flow as a team on a weekly basis. This meant we stayed focused on all prospects, ranked them by probability of success so we knew where to direct our attention and asked every week what we could do to push a deal along. The second factor can be attributed to momentum. At mid-year, the deal flow pipeline looked empty. But below the surface was far more activity than we honestly recognized. By becoming more proactive, and "beating the bushes," we engaged in more deals than we might normally have seen because we asserted ourselves. This not only helped EDO meet/exceed its goal, but we believe it also helped enhance the quality of these deals.

Figure 6.4

PNNL-Assisted New Business Starts for FY1998:

1. **MesoSystems Technology:** Builds micro scale pathogen collection devices for commercial and public use.
2. **Livingston Rebuild Center:** Rebuilds diesel locomotive engines and recently announced the creation of Livingston Research & Development Division.
3. **Hammerstrom Energy Applications and Technologies,** builds meters to measure accurate electric power flows and power quality monitors for computer protection and utilities.
4. **Bioguard Technologies, Inc.,** a new company located in Richland, Washington, will conduct research and development on new products for customers interested in the controlled release of insecticides, herbicides, related biocides, and biocontrol agents.
5. **U.S. Teleservices:** Created prepaid phone "affinity" cards to benefit charitable organizations.
6. **Advanced Concepts and Design:** Developed a device for sampling 55 gallon drums.
7. **Berkeley Instruments:** Food processing quality control instrumentation.
8. **AGIS:** Developed an advanced precision sensor data collection and analysis system for agricultural use.
9. **Knight Sports:** Fabricates night time (glow in the dark) bocci balls.
10. **Farwest Technology:** Developed tissue-equivalent radiation detection instrumentation.
11. **Mesoscopic Devices:** Developed oxygen generation systems (space, home) and heat sinks for electronics uses.
12. **IsoRay:** Develops medical isotopes for ("seed") implants in tumors.

The proportion of businesses started in FY1997 that are sustained through the subsequent fiscal year. All 10 businesses (100%) started in FY1997 were still in business at the end of FY1998. The goal was 50%. The mid-year projection was 100%. Again, two factors come into play here. The first is statistical. Since this objective was designed to be a cumulative measure over time, it was anticipated (through our benchmarking analyses), that the first year survival rate might be high, with more business failures occurring in the following 2 to 3 year time frame. So part of the success is a function of timing. The second factor, however, comes from our direct attempts to influence the viability of these businesses. It is a fact that we have intervened on behalf of several of these startups to help them through a variety of startup issues. This intervention, which is sometimes an ombudsman role and sometimes a technical assistance role, has been significant and can to some degree be considered a factor in their early survival.

Figure 6.5

Number of technology-based jobs created or sustained: During FY1998 we created 74 new jobs among 28 firms in the local region, exceeding our target of 50 new jobs, see Figure 6.6. These jobs resulted from helping in start-up, recruiting, and/or providing technical assistance to companies. Part of the reason for these jobs is realizing some growth from earlier deals, being able to achieve 12 new business starts this year, and emphasizing more support to the community in their recruitment activities.

In addition, major growth occurred in two PNNL supported deals from prior years. Oremet recently expanded operations to include 65 new jobs and Integrated Environmental Technologies grew, adding 19 jobs. These companies are large job generators and the Lab's assets have been a factor in making both deals happen. Further, the Lab is continuing relationships with both firms that should continue to strengthen their local presence while adding business volume to the Lab. If added to our tally, Battelle would have been involved in the creation of 158 jobs in FY1998.

Figure 6.6

The Laboratory has adjusted to the challenge of economic diversity by adding to our "spin-off/startup agenda" support to the community's "business attraction agenda" for those cases where the Lab brings something to the table and from which we hope we can realize some return (a win-win deal). We believe we have proven that a distinct synergy exists between creating and helping

create new businesses and sustaining those businesses, that results in the addition of new jobs to the local workforce.

In addition, two awards were received by the Economic Development and Communications Directorate from the National Association of Management and Technical Assistance Centers' 1998 Project of the Year Award. Marv Clement's program, Creating a Successful Company Through Entrepreneurial Leave was selected as Outstanding in the Business Assistance category. The Laboratory has a contractual obligation to 1) make federally developed technology available to U.S. firms, and 2) to contribute to the industrialization of the local community; e.g., creation of new firms and jobs. To accomplish these goals on a limited budget, we created the Entrepreneurial Leave Program. This highly successful program allows staff to gain access to Laboratory technology – usually technology they developed, or helped develop, work part-time for the Laboratory, retain some of their benefits, and access the resources of the Laboratory and the community. This program has resulted in a number of small business spin-offs from the Laboratory and has created additional jobs in the local community.

Gary Spanner's Electronic Alerting Service for Small Business Innovative Research Program was also selected as Outstanding in the Special Assistance category of the competition. This program consists of an innovative e-mail/fax service that notifies small businesses and others of current information on available federal research and development funds. The free service provides subscribers an easy, efficient way to be kept informed about available research and development funding solicitations from 11 federal agencies through the Small Business Innovative Research (SBIR) program. The service supports the SBIR program, but was created and implemented by PNNL with funding from DOE.

Based upon our progress toward the performance indicators that provide the evidence of achieving this objective, our rating for FY1998 is Outstanding.

Objective 6.3: Battelle will continue/establish partnerships with local and regional organizations to enhance science, mathematics, and technology education reform efforts in schools.

Results

Battelle continues to have a significant impact on science, mathematics and technology education reform in the region. At the conclusion of FY1998, a total of 25 academic partnerships with local and regional organizations are in place that enhance science, mathematics, and technology education reform efforts in schools. This exceeded our target of 24 – and in a year when budgets were non-existent at the onset of the fiscal year. In addition, we had 74 student and teacher (K – 14) appointments (of two weeks or more) from local and partner organizations. This is double what we thought we would have and represents significant growth and external recognition for this program.

Based upon our progress toward the performance indicators that provide the evidence of achieving this objective, our rating for FY1998 is Outstanding.

Analysis

Number of partnerships between Battelle and school districts and other academic support organizations in support of science, mathematics, and technology education reform: The linkages we have formed, and continue to form, with local educational organizations remain strong and continue to grow. The number of student and teacher appointees from local and regional academic organizations also continues to grow, in spite of reduced funding.

Number of teacher and student (K-14) appointees from local/regional academic organizations who participate in research/education appointments at PNNL: Thirty-four (34) of the appointments we were able to make in FY1998 were solely funded by outside organizations (22 by The Nature Conservancy and 12 by the Migrant Council). University Science and Education Programs resources (overhead and carryover) funded the remaining 40. An analysis shows that our original stretch goal of 35 was certainly reasonable given the amount of resources within our organization as we began FY1998, but we were impressed to learn that The Nature Conservancy and the Migrant Council thought highly enough of our programs to commit their financial resources for student and teacher appointments.

Pacific Northwest National Laboratory
FY1998 Annual Self-Evaluation Report, 10/19/98

Community Relations Performance Evaluation

The overall performance rating for this Critical Outcome is determined by comparing the total value in the table below to the rating scale at bottom.

ELEMENT	Performance Level	Effectiveness Score	Value Points	Weight	Weighted Points
6. Community Relations					
6.1 Battelle will serve the communities to further enhance the Laboratory's status as a valued corporate citizen . .					
6.1.1 Community Service through staff volunteerism	Outstanding	100			
6.1.2 Community Service through participation on boards and commissions	Outstanding	50			
	Obj 6.1 Total	150	5.0	35%	1.8
6.2 Battelle will put technology to work in the Tri-Cities and region. . .					
6.2.1 Number of new technology-based business starts	12	100			
6.2.2 Number of businesses started in the previous year that are sustained through the subsequent year	100%	60			
6.2.3 Number of technology-based jobs created or sustained	50+	40			
	Obj 6.2 Total	200	5.0	40%	2.0
6.3 Battelle will continue/establish partnerships with local and regional organizations to enhance. . .					
6.3.1 The number of partnerships between Battelle/ PNNL and school districts and other academic. . .	25	100			
6.3.2 The number of student and teacher (K-14) appointees from local and regional partner org's at PNNL	74	50			
	Obj 6.3 Total	150	5.0	25%	1.3
				Total	5.0

Table 6.1 - Community Relations Critical Outcome Performance Rating Development

Total Score	5.0 - 4.5	4.4 - 3.5	3.4 - 2.5	2.4 - 1.5	1.4 - 1.0
Final Rating	Outstanding	Excellent	Good	Marginal	Unsatisfactory

Table 6.2 - Community Relations Critical Outcome Final Rating

Determining the Laboratory's FY1998 Performance Rating

Critical Outcome	Adjectival Rating	Score	Weight	Weighted Score
Environmental Technology	Outstanding	4.7	20%	0.9
Scientific Excellence	Excellent	4.0	25%	1.0
Scientific and Technical Contributions	Excellent	4.3	15%	0.7
Operational Excellence	Excellent	4.4	20%	0.9
Leadership & Management	Excellent	4.3	15%	0.6
Community Relations	Outstanding	5.0	5%	0.3
			Total	4.4

Table A. FY1998 Contractor Evaluation Score Calculation

Total Score	5.0 - 4.5	4.4 - 3.5	3.4 - 2.5	2.4 - 1.5	<1.5
Final Rating	Outstanding	Excellent	Good	Marginal	Unsatisfactory

Table B. Overall Contractor Adjectival Rating Scale

PART II: SUMMARY OF RESULTS OF ANNUAL ORGANIZATIONAL SELF-ASSESSMENTS

1.0 BACKGROUND

Integrated Assessment provides information for organizations to help them understand where they need to improve their performance, and to help them determine overall organizational health. FY1998 represents the second full year of Laboratory-wide implementation of PNNL's Integrated Assessment Program (IAP). As part of the self-evaluation cycle each technical division and support directorate prepares and submits an annual self-evaluation report that summarizes their organizational strengths, areas for improvement, and proposed improvements for the coming year.

2.0 OVERALL SUMMARY OF SELF-EVALUATION RESULTS

All division/directorate self-evaluation reports were analyzed to identify key strengths and improvement themes common to multiple organizations. As a next step, these common themes were compared to the annual Independent Oversight (IO) report results. These comparisons revealed that the Laboratory is making progress in using assessment results to improve its performance and overall organizational health.

Table 2.1, below, shows the correlation of key strengths and improvement themes identified by the divisions/directorates and the IO assessment program evaluators. A shaded cell indicates positive identification. These topics are generic in nature. Further information on these strengths and improvement themes is listed in Table 2.2.

STRENGTHS IDENTIFIED	Div/Dir	I/O	IMPROVEMENT THEMES	Div/Dir	I/O
Integration - Assessment and Business Planning			Program Deployment		
Communication			Communication		
Performance Metrics			Reporting Results		
Records and Documentation			Documentation Management		
Leadership/Management/Involvement			Leadership		
Using Assessment Results			Analysis of Results		
Human Resources and Development			Human Resources and Development		
Customer Focus			Customer Focus		
Compliance			Compliance		
DOE-RL Involvement			DOE-RL Involvement		
TOTALS	9	7	TOTALS	8	5

Table 2.2 provides a rolled-up summary description of the key performance strengths and improvement themes identified in the FY1998 division/directorate self-evaluation reports, and by the Independent Oversight Department as part of their FY1998 evaluations of division/directorate self-assessment programs. A more detailed description of these performance strengths and improvement themes taken directly from the Division/Directorate self-evaluation reports may be found in Appendix B.

Table 2.2 – Further Description and Summary Comparison of Strengths and Improvement Themes

KEY PERFORMANCE STRENGTHS AND IMPROVEMENT THEMES IDENTIFIED THROUGH SELF-EVALUATION	KEY PERFORMANCE STRENGTHS AND IMPROVEMENT THEMES IDENTIFIED BY INDEPENDENT OVERSIGHT
<p style="text-align: center;"><u>Strengths</u></p> <p><i>Key strengths self-identified in division/directorate performance reports include:</i></p>	<p style="text-align: center;"><u>Strengths</u></p> <p><i>Key strengths identified in Independent Oversight evaluation reports include:</i></p>
<p>Integration of Assessment and Business Planning</p>	<p>Integration of Assessment and Business Planning</p>
<ul style="list-style-type: none"> Integration of the self-assessment process with the business planning process is increasing. 	<ul style="list-style-type: none"> Improvement in planning was noted among all organizations. Assessment plans rated as Outstanding integrated business, Market Sector, financial goals, operations, and compliance that collectively indicated the overall health of the organization
<p>Communication</p>	<p>Communication</p>
<ul style="list-style-type: none"> Communication of business drivers, key performance objectives and indicators, and management expectations is improving. Use of web sites is a key factor. 	<ul style="list-style-type: none"> Posting of self-assessment documents on organizational web sites is increasingly used as an efficient and effective records management and communication process. Approximately 50% of all organizations use their web sites to present self-assessment plans and key goals. The more mature organizations also post results of assessment activity.
<p>Performance Metrics</p>	<p>Performance Metrics</p>
<ul style="list-style-type: none"> Performance metrics are undergoing refinement. 	<ul style="list-style-type: none"> This year there is significant emphasis on refining performance metrics, reexamining previously developed measures and questioning their value as the best indicators of performance. Some organizations have gone a step farther and developed acceptance criteria for indicator selection.
<p>Records and Documentation</p>	<p>Records and Documentation</p>
<ul style="list-style-type: none"> Substantive improvements in documenting business and operational results have been made. 	<ul style="list-style-type: none"> An attribute of a self-assessment program rated as "Outstanding" is their use of records as a resource for analysis of performance results and fact-based decision-making. If a record is necessary for these purposes, it is kept; if not, it may be discarded or maintained unofficially.

Table 2.2 Cont.

<p>Leadership/Management Involvement</p> <ul style="list-style-type: none"> • Management involvement at all levels is increasingly apparent, personal and meaningful to self-assessment and achievement of performance objectives. Commitment to using the self-assessment process as a management tool is increasing and becoming a part of the Laboratory's business planning culture. There is a strong and consistent focus on values, performance expectations, and priorities by the Level 1 Manager and leadership team. <p>Using Assessment Results</p> <ul style="list-style-type: none"> • Organizations have implemented a number of significant process improvements based on assessment results; business analysis processes continue to become more efficient through the use of new computer tools and financial models. <p>Human Resources and Development</p> <ul style="list-style-type: none"> • Resources necessary for the career and professional development of staff are provided; staff training plans are under development/ Resources necessary for the career and professional development of staff are provided; staff training plans are under development; alignment of individual staff goals and organizational objectives is improving. • Rewards and Recognition Programs are being strengthened, and Quality of Work Life (QWL) improvement efforts are increasing. <p>Customer Focus</p> <ul style="list-style-type: none"> • The Laboratory actively seeks input and feedback from both internal and external customers through an annual Laboratory-level customer survey, organizational-level customer surveys, and focus groups held with customers. <p>Compliance</p> <ul style="list-style-type: none"> • There have been no repeat findings in Inspector General, GAO, DCAA, or DOE audits or reviews. • Usage of the Laboratory's Standards Based Management System (SBMS) is increasing. 	<p>Leadership/Management Involvement</p> <ul style="list-style-type: none"> • Senior management commitment remains strong, and there continues to be a strong correlation between a Level 1 Manager's presence and involvement in an organization's self-assessment program and the program's level of deployment and maturity. Visible program involvement, understanding, and clear communication of IAP objectives and goals by senior management is a set of attributes common to Outstanding self-assessment programs. <p>Using Assessment Results</p> <ul style="list-style-type: none"> • There is an improving trend in evaluating and using assessment results, from approximately 30% of the organizations demonstrating processes to analyze and use results in FY1997 to 70% in FY1998. <p>DOE-RL Involvement</p> <ul style="list-style-type: none"> • Involving DOE RL in the self-assessment process has improved since FY1997. In FY1997, it was noted that with the exception of Critical Outcomes development, there was very little partnering between Laboratory organizations and their RL counterparts, as a general rule. This year, a greater number of organizations actively involved their RL counterparts up front with self-assessment planning and shared assessment results on a more routine basis.
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Table 2.2 Cont.

<p><u>Improvement Themes</u> <i>Areas that warrant attention and improvement include:</i></p>	<p><u>Improvement Themes</u> <i>Areas that warrant attention and improvement include:</i></p>
<p>Program Deployment</p> <ul style="list-style-type: none"> • Junior staff are noticeably absent in assessment planning activities. 	<p>Program Deployment</p> <ul style="list-style-type: none"> • Although the level of program deployment has increased since FY1997, the factors for inadequate deployment remain the same: lack of program understanding, lack of technical support, and weak management principles applied to the self-assessment process. Increasing staff knowledge and involvement below the management level continue to be areas for improvement.
<p>Customer Focus</p> <ul style="list-style-type: none"> • Customer metrics do not include complaint management and behavioral elements that measure customer loyalty and return business potential. 	<p>Customer Focus</p> <ul style="list-style-type: none"> • While considerable effort goes into measuring customer satisfaction, customer value metrics are opinion-based only, and the only systematic data collection in this area is the annual Laboratory-level customer survey. Customer complaint management as a source of valuable customer input is not in evidence. Behavioral aspects of customer satisfaction (referrals, repeat dollars, etc.) are not used as predictors of future business.
<p>Compliance</p> <ul style="list-style-type: none"> • Although use of subject matter experts on a dedicated basis continues to provide a cost-effective way of ensuring compliance while providing value added to technical staff, the R&D organizations do not collectively evaluate their implementation of all aspects of the ES&H programs in a consistent manner. • The scope of assessments planned and performed does not always fully address the implementation of and compliance with external requirements. • There is no systematic process for gathering self-assessment information and then analyzing it relative to implementation of QA Rule related procedures. 	<p>Compliance</p> <ul style="list-style-type: none"> • Corrective actions that are self-identified continue to be tracked by organizations using a system of their own making. Because these individualized systems are not linked, the Laboratory does not have an efficient method to use data from self-assessments for determining trends and issues at the Laboratory level.

Table 2.2 Cont.

<p>Reporting Results</p> <ul style="list-style-type: none"> • Performance results reporting is improving but still cumbersome in some cases. <p>Human Resources and Development</p> <ul style="list-style-type: none"> • Some staff remain dissatisfied with their opportunities for growth. • Human resource requirements are not linked to long-term planning, and less than adequate attention is being given to the development of human resources consistent with long-term needs. • There is insufficient clarity in alignment of the organization's goals with staff functions. <p>Leadership</p> <ul style="list-style-type: none"> • Although some organizations are involving staff in the Leadership process, there is still insufficient involvement of staff at the more junior levels with self-assessment and the achievement of key objectives. <p>DOE-RL Involvement</p> <ul style="list-style-type: none"> • Although improvements in the Laboratory's working relationship with DOE-RL have been noted, in some organization engagement with RL staff in self-assessment activities is not occurring at a significant level. <p>Communication</p> <ul style="list-style-type: none"> • Communication with staff still needs improvement within some organizations and long-range goals/plans are not well articulated. 	<p>Documentation Management</p> <ul style="list-style-type: none"> • Although documentation and assessment reporting have improved in FY1998, the adequacy of documentation and program record management remains an area of contention due to lack of clarity in the management system description. <p>Analysis of Results</p> <ul style="list-style-type: none"> • Analysis of management system performance, however, is not as robust as it might be. Few organizations have used assessment data to determine management system performance or effectiveness.
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3.0 KEY IMPROVEMENT ACTIONS

The following sections represent improvement actions identified by the Laboratory's Divisions and Directorates (as part of their year-end evaluation process) that they either intend to implement within their own organization (Section 3.1) or are offering as a suggestion for Laboratory-level implementation and improvement (Section 3.2). Additional Laboratory-level improvements are discussed in Part III of this report, *Summary of Laboratory-Level Improvement Initiatives for FY1999*. Section 3.1 is arranged in terms of the *Assessment Planning and Evaluation Framework Criteria* in order to show the comprehensiveness of the improvement actions in terms of the various aspects of performance.

3.1 PROPOSED DIVISION/DIRECTORATE LEVEL IMPROVEMENTS

Business and Operational Results

- Align the Division's Business Performance Measures with the expected structural and emphasize changes that will be made to the Division and Public Energy sub-sector.
- Focus all quadrants (in the Balanced Scorecard) on leading indicators to facilitate management action throughout the year.
- Improve alignment and integration among FY1999 Self-Assessment Plans objectives, Business Plan objectives, and Management Systems.
- Focus on Strategic Intent that drives investments and self-assessments, including the following key areas: providing Scientific Leadership, advancing knowledge, and operating our user facilities for national, high impact initiatives in environmental, energy, national security and health mission areas; and investing and growing molecular biology, computational science, and materials while maintaining global change and environmental molecular science.

Leadership

- Close on the recommendations made for revision of indicators and targets for the Resource and Leadership quadrant. Carefully consider the number of performance objectives and indicators selected for a given year.
- Build back-up capability for the members of the self-assessment team.
- Develop and communicate to staff a more explicit long-range plan for the organization.
- Define, describe, and implement the components of the organization's leadership system.

Human Resources and Development

- Increase direct staff participation in the development of self-assessment plans.
- Increase opportunities for professional growth.
- Rethink human resource alignment and development approach to ensure that developmental activities are aligned with long range needs.

Customer Focus and Satisfaction

- Rework the Customer Satisfaction quadrant objectives, indicators, and targets to better produce the input we need to manage our business and align with the Critical Outcome commitment of the Division.
- Continue to work with BMI to develop a better working relationship and understanding of the "rules of engagement" under the Customer Service Model.
- Evaluate customers/markets and describe future products and services.
- Improve customer relationship management processes: define mechanisms for identifying new products and services; develop a more explicit plan to engage new customers.

Process Management

- Integrate our Peer Review, Customer Feedback, Critical Outcome, and Self-Assessment efforts into a single, coherent, integrated assessment program for the Division.
- Enhance the reporting process to allow easy understanding and access to overall assessment progress and performance results.
- Develop more systematic internal management processes: inventory key processes; design/modify as needed; document and communicate.

3.2 RECOMMENDED LABORATORY-LEVEL IMPROVEMENTS

In their self-evaluation reports, Divisions and Directorates identified the following areas that they recommend for Lab-level improvement. This input will be addressed through the Laboratory Improvement Agenda process.

- *Identification of Active Projects* - Establish an improved method for easily determining the set of "active" project. Current practices tend to correlate data from the EPR and Finance databases to designate a project as active. Experience shows the data to be less than reliable when used for this purpose.
- *Project Management Selection and Skill Set* - Develop and institutionalize an improved method for identifying staff assigned as project managers; establish a minimum skill set for this position; enhance the existing computer-based project management training by incorporating ES&H, quality, records, and operation compliance requirements; and improve the process of identifying changes in project manager assignments.
- *IESHMS* - Enhance the robustness and efficiency of the Laboratory's Integrated ES&H Management System; improve our materials management performance (laboratory chemicals and waste); and drive towards producing the data that will be required by the annual self-verification of the Laboratory's ES&H program performance.
- *Requirements for Foreign Nationals* - Place all requirements for Foreign Nationals under one management system. The volume of Foreign Nationals visiting or becoming PNNL employees has increased dramatically over the last several years. Responsibility for the myriad of requirements related to visiting or employed Foreign Nationals spans several organizations, and the legal and security requirements and concerns are becoming increasingly complex.
- *Calibration System Improvements* - Develop and implement a Corrective Action Plan (to address identified deficiencies) and a Calibration Program Improvement Plan to ensure that all equipment calibrations performed within the Laboratory meet required criteria. (Note: this effort is currently underway.)

4.0 BEST PRACTICES/PROGRAMS/PROCESSES

The following section represents best practices, programs and processes as identified by the Laboratory's Divisions and Directorates as examples of significant performance. This section is arranged in terms of the *Assessment Planning and Evaluation Framework Criteria* in order to show the comprehensiveness of the improvement actions in terms of the various aspects of performance. Many of these items are seen by the authoring organization as adding value to their operations and the way they do business; they may be useful to other organizations within the Laboratory. Other items reflect significant customer recognition for a job well done.

Business and Operational Results

- **Cost Savings** - The *Facilities and Operations Directorate's* Operations Improvement Initiative reduced Building and Utility costs for FY1999 by 6% (i.e., \$3 million).
- **Unbilled/Unpaid Invoices** - The number of unbilled/unpaid invoices was dramatically reduced and business results were positively affected through a series of team efforts initiated by the *Environmental Technology Division* and with the support and input of Contracts, Finance, product line administration, and the product line manager.
- **Partnering With RL Counterparts** - The degree of involvement by DOE RL in the *Finance Directorate's* self-assessment process was cited in the FY1998 Independent Review as excellent.

Leadership

- **Staff Involvement In Leadership Positions** - The *Environmental Health and Sciences Division* is working with DOE to assist them in the development of the Strategic Simulation Initiative. This represents a model that should be considered across the Laboratory.
- **Laboratory and University Teaming** - The *Environmental Health and Sciences Division* is involved in the formation of the Joint Catalysis Institute. The institute represents a model for Laboratory and University consortia to address key DOE problems.
- **Systematic Self-Evaluation** - The *Quality Directorate* developed and performed a year-end self-evaluation process for their organization consisting of an extensive questionnaire and a follow-on half-day workshop. The management team chose to use this process to provide them with information for analysis and decision-making based on quantitative and qualitative data.
- **Increased Senior Management Engagement** - The *Strategic Planning Directorate* increased senior management engagement (e.g., Strategy Council reviews, designated Level 1 oversight, etc.) of Directorate initiatives to ensure that they are supporting our Laboratory and Division business strategies, and are properly coordinated across the Laboratory and BMI.
- **Internal Senior Management Survey** - The *Economic Development Office* (EDO) Director performed a one-on-one survey with other Level 1 Managers in the Laboratory to identify those areas within EDO that would benefit from change and those areas that should be sustained in order to provide the best possible support to the Laboratory.
- **Performance As A Corporate Citizen** - The *Communications Directorate* contracted with a formal survey organization in order to evaluate the Laboratory's performance as a corporate citizen, and their level of name recognition in the local community, in comparison with national standards. This was a new performance area for the Laboratory and the national laboratory arena in general.

Human Resources and Development

- **Career Development** - Career development has been enhanced through the *National Security Division's* development and use of a Career Development Plan. This process includes the establishment of a career goal, a gap analysis to determine strengths and weaknesses, and developmental assignments in preparation for greater job responsibilities.
- **Professional Development Through Mentoring** - The *National Security Division* has developed and implemented a Mentoring Program in support of the Laboratory's efforts to actively engage staff in a nurturing and broadening relationship as a means to professional development.

Customer Focus and Satisfaction

- **Proactive Use of Customer Requirements** - The *Human Resources Directorate* performed a "mock" Office of Federal Contract Compliance Programs (OFCCP) audit, using the OFCCP auditor's official materials. This effort resulted in HR's ability to proactively set important performance objectives to improve their compliance performance.
- **Alignment With CSM Through Reorganization** - The *Facilities and Operations Directorate* has initiated a major reorganization to support the Battelle Customer Service Model (CSM). Evaluation of the effectiveness of the new infrastructure will be a significant element of their FY1999 self-assessment activities.
- **Advanced International Studies Unit (AISU)** - AISU continued to increase its business base with increased diversification to several new customers. Kudos received from AISU staff indicate a high level of satisfaction with performance.

Process Management

- **Reporting Performance Results** - The *Energy Technology Division* deploys a multi-level communication strategy for disseminating performance results to its various Division constituencies, at the right level of detail and frequency of reporting, while making all of the detailed performance data available on the web for anyone who is interested in seeing it.
- **Tracking Improvements** - The *Environmental Technology Division* has implemented a Division Improvement Matrix to systematically track improvement suggestions, decisions made, and actions taken, on the basis of input from Independent Oversight, DOE RL, and the Division's annual self-evaluation process.
- **Major Process Improvement** - The *Legal Department's* management of Outside Counsel Litigation Costs has been recognized by RL as the site benchmark; oversight has been reduced, thereby reducing administrative workload and expediting the payment process.
- **Funds Authorization Process** - The *Finance Directorate* along with Argonne National Laboratories was identified as having the most "best practices" among the DOE Contractors for the Funds Authorization process. Electronic notification of funds to Project Investigators is one example of a "best practice" implemented at PNNL this fiscal year.
- **Project Significance Process** - The *Environmental Technology Division* is underway in the development of a process to enhance the product line manager's ability to determine the significance of a project within the product line and identify strategic challenges (e.g. client interfaces, technical challenges) associated with the project.
- **Efficient ES&H Walkthrough Assessments** - The *Environmental Technology Division* has developed and implemented an efficient walk-through assessment process that results in less paperwork for the accountable managers, and a more efficient and consistent flow of information which allows for performance trending in the area of ES&H performance.

Compliance

- **Tracking Operational/Compliance-Based Assessments** - The *Energy Technology Division* tracks the status of all ES&H/Operations related actions resulting from walk-through inspections, audits, Corrective Action Tracking System (CATS) actions, or other assessment methods. Staff and management affected by an assessment are informed of assessment results and associated actions.
- **Pollution Prevention** - In 1998, the Laboratory's Pollution Prevention Program managed by the *ES&H Directorate* received several national awards recognizing the Laboratory's efforts to minimize the generation of waste, and to integrate pollution prevention concepts and techniques into the daily activities of staff and management. Awards included the 1998 Environmental Protection Agency WasteWi\$e Program Champion Award; 1998 US Department of Energy National Award for Pollution Prevention -Affirmative Procurement; 1998 US Office of Federal Executive Closing the Circle Honorable Mention Award (18 winners and 12 honorable mentions out of 315 nominations nationwide); and the 1998 Washington Department of Ecology Certificate of Appreciation for Waste Reduction and Recycling.
- **Assessment Integration** - The *Energy Technology Division's* integration of compliance-based assessments is efficient. The Division's Operational Assessment Tracking List and ES&H/Operations Action Item Log are valuable tools for the management and resolution of compliance and operational activities.

5.0 CUSTOMER SATISFACTION WITH SELF-ASSESSMENT

An indicator of how well self-assessment is working the Laboratory is the level of customer satisfaction with the self-assessment process. Customer satisfaction data were collected from

two customer groups – the internal Division/Directorate customers and the external customers at DOE-RL. This section summarizes the overall results.

5.1 Division/Directorate Feedback

The Divisions/Directorates were surveyed by the Independent Oversight Department. Data was collected at the close of each self-assessment program evaluation to determine level of Division or Directorate satisfaction with the evaluation process and the perceived value received from the evaluation. Although data has been collected for only 2 years, the results below indicate that satisfaction levels are increasing. The Divisions and Directorates are clearly gaining greater understanding of self-assessment and they are using the evaluation feedback to improve their self-assessment programs.

Attribute	FY1997 Results	FY1998 Results
Evaluation purpose was clear	6.7	8.3
Increase in understanding IAP concepts/requirements.	4.4	6.4
Learned something to improve SA program.	5.6	6.3
OVERALL IMPROVEMENT LEVEL	5.6	7.0

Scoring Key:

To a very large extent	9 or 10	To a fairly large extent	7 or 8	To a moderate extent	5 or 6
To a slight extent	3 or 4	To a very slight extent	1 or 2	Not at all	0

5.2 DOE-RL Feedback

The customers at DOE-RL were surveyed by the Laboratory Performance Measurement Department to determine DOE-RL's satisfaction with the level of involvement in PNNL's self-assessment activities. With 45% of the targeted survey population responding, results show that 65% of RL staff are "satisfied" or better. The data suggests a high correlation between respondents who are "satisfied with their involvement" and those who have an "adequate understanding of IAP processes". A further analysis of the data indicates that 88% of the satisfied RL staff characterize their understanding of IAP to be "better than adequate" or "could teach it to someone else." In comparison, 86% of RL staff who are only "slightly satisfied" or "not satisfied" with their overall involvement in the IAP process have characterized their understanding of the program as "understand somewhat" or "do not understand well at all." A plausible conclusion is that higher levels of understanding of the self-assessment program lead to greater satisfaction with the level of involvement. A comparison between FY1997 and FY1998 levels of satisfaction with involvement is shown in the following graph.

PART III. SUMMARY OF LABORATORY-LEVEL IMPROVEMENT INITIATIVES

1. Results of FY1998 Operations Improvement Initiatives

The Laboratory continues to mature in its approach toward continuous improvement. The set of FY1998 operational improvement initiatives was developed as an integral part of the planning process using information generated through the Integrated Assessment Program. The initiatives, briefly summarized below, were selected and approved by the Laboratory Leadership Team based on their potential impact on the Laboratory objectives and performance. Each of the initiatives had a Level-1 sponsor and a project manager. In FY1998 the Laboratory invested over a Million dollars in operational improvement initiatives.

FY1998 highlights included:

- Reducing facilities cost by more than \$3M per year
- Exporting EMSL / Integrated Operations (IOPS) to 325 and 331 facilities
- Completing 5 pollution prevention projects (4 in progress) saving \$147,000 and reducing hazardous waste by 840kgm annually
- Replacing 322 "obsolete" workstations with new, reduced-cost, Y2K compliant machines (\$96K savings)
- Upgrading our HR information system and integrating it with BMI
- Procuring a new travel system to be installed and integrated with BMI's system
- Completing Y2K assessments within all PNNL organizations and successfully addressing/responding to all DOE-HQ (and other external) inquiries regarding Lab Y2K status
- And creating an approved program design for leadership development.

Additional detail on each of the FY1998 initiatives is provided below.

Improve Leadership Training and Development

The objective of this initiative was to develop and pilot an integrated leadership training and development program consisting of formal training, skills development, and appropriate assignments and activities that support the customer service model and succession planning efforts. The outcomes and benefits included;

- More effective leadership in all roles
- Better prepared and skilled leaders
- Succession readiness for key assignments
- Improved business performance
- Improved performance management for all staff

Major FY1998 Accomplishments:

- Completed internal and external data collection and used as the basis for program framework
- Conducted interviews with level 1 managers and conducted focus groups with all levels of PNNL managers to gather feedback and guidance on appropriate programs.
- Developed structure, design and outcomes of the Leader/Manager program which is a multi year program and gained approval from the Lab Leadership Team
- Incorporated the staff development program into the initiative
- Developed the draft outline of programs and activities for FY1999
- Purchased materials to support FY1999 programs and activities

Address Y2K Issue Initiative

- Many computers and software programs (both commercial and PNNL created) cannot handle dates beginning in the year 2000. This could severely impact efficiency and effectiveness. This initiative provided lab-level support and coordination regarding PNNL efforts to minimize the impact and potential liability of Year 2000 issues for the Lab and BMI. The initiative has reduced DOE and external audit interface with field personnel and helped improve DOE's, BMI's, and others' confidence in PNNL's progress toward addressing Y2K issues. FY1998 activities included:
- Sharing Y2K Information with PNNL directorates and divisions, other DOE Laboratories, DOE HQ, local clubs and associations to improve Y2K understanding. This included presentations, training sessions, storyboards, Y2K Web, and the publication of PNNL Y2K assessment process in Y2K Journal.
- Training PNNL division and directorate Y2K POCs, and key staff about Y2K awareness and assessment. Developing assessment and management tools to expedite Y2K assessment efforts. This helped identify the PNNL systems that were at risk or mission essential to DOE and/or PNNL and facilitated testing, remediation, and documentation activities directed toward ensuring that these systems are Y2K-ready.
- Reporting PNNL's Y2K status to DOE RL, DOE – HQ and other government agencies as requested.
- Serving as the primary Y2K point of contact for Y2K issues and working directly with external and internal audit teams to reduce impact time to the field. This included external audit agencies (DOE-HQ-ER, DOE-HQ-HR, OIG and DNFSB) as well as internal auditors (PNNL auditors and the BCO review team).
- Working with key Contract and Prep and Risk personnel to modify business process for subcontracts, contracts, procurement and P-cards along with Prep and Risk to address Y2K issues.
- Implementing a PC program, as a part of PNNL Managed Hardware Program, that providing the lab with a software tool to test all PC workstations for being Y2K ready along with an incentive procurement program retired 322 obsolete workstations.

This initiative will continue in FY1999.

Upgrade travel system

- The goal of this Initiative is to partner with BCO to implement a new commercial off the shelf software (COTS) system that utilizes current web base technology to support the functional travel management needs of BCO and PNNL into the next millennium.
- Benefits to PNNL include:
- Reducing operating costs by \$25K per year in FY1999 with an estimated \$75K in future years along with an undetermined soft dollar savings throughout the Lab because of the reduced time spent completing travel expense reports and routing them for signatures.
- Reducing other operating costs by direct payment to American Express, reduce receipt requirement base on credit card feed, and electronic routing for approvals

- Improving accuracy and reducing cycle time with on-line entry, routing, and submission of travel expense reports
- Providing on-line status of travel report and cost information
- Replacing old travel systems at PNNL and BCO that were not Y2K-compliant with COTS Y2K-compliant system

Accomplishments in FY1998 included:

- Procuring new software system and server
- Standardizing travel policies and procedures at PNNL and BCO
- Determining travel policy file requirements
- Initial design work

This initiative is part of the BMI OD Strategy Project and will continue into FY1999.

Exporting EMSL Operations Concept and Tools into the Radiochemical Processing Laboratory (RPL) and the Life Sciences Laboratory (331 Building)

The objective of this operations improvement initiative was to export the EMSL Operations concept and tools to the Radiochemical Processing Laboratory (RPL - 325 Building) and the Life Sciences Laboratory (331 Building). Specific deliverables in FY1998 will included:

- Implementing the Cognizant Space Manager (CSM) concept in the RPL and 331 facilities including training on roles, responsibilities, authorities, and accountabilities.
- Developing and implementing 17 existing EMSL Operations work practices and approximately 10 new work practice documents addressing radiological work controls tailored to meet the needs of the RPL and 331 facilities.
- Developing a web-based operations application tailored after the existing EMSL application capable of handling RPL and 331 facilities users and their respective operational needs.
- Developing Laboratory Handbooks for each space in the RPL and 331 facilities.
- Completing self-assessments of each laboratory space to address necessary permitting, hazards awareness and identification, and safe operating processes and procedures.
- Delivering a guide that provides instructions regarding the implementation of the EMSL Operations model at other facilities.
- Completing a self-assessment on the costs and benefits of the new operating system.

The results from this initiative played a major role in the recent validation of the laboratory's Integrated Safety Management Program. This initiative will be continued in FY1999 by exporting to several other facilities.

HR Database Upgrade and Integration

HR data for BMI has been managed in two systems with no connection between the two. This project upgraded the current PeopleSoft application that manages the PNNL HR data to the latest version (7.5) and brings the HR data across BMI into the same database. This allows easier transfers and more effective use of skills across the BMI getting the needed skills to the project easier or without hiring from the outside. This is the first step of many to allow this better integration.

Pollution Prevention (P2)

This initiative was started in FY1997 and is aimed at fully integrating pollution prevention into lab activities, thus reducing waste, increasing business, and helping the Laboratory become

the "premier environmental laboratory." This will be accomplished by instituting personal and financial responsibility for waste generation, tapping into staff for P2 ideas, and supporting those ideas with resources. In FY1998, 5 pollution prevention projects were completed (with 4 currently in progress) resulting in an annual cost avoidance of \$147K and waste generation avoidance of 840kgm of hazardous waste, 62 kgm of mixed, low-level waste, and 40 kgm of low-level waste. In FY1999, similar pollution prevention projects will be funded via a "Pollution Prevention Investment Fee chargeback system" that was developed and tested in FY1998 as part of this initiative. Projects will be charged 5% of the waste management chargeback rate for the amount of waste they generate and submit for removal. This fee will be collected into a pool that will fund new pollution prevention implementation projects. The total expected revenue from the Pollution Prevention Investment Fee is between \$70 - \$120K for FY1999.

Facility & Operations B&U Operational Improvement Initiative

This initiative reduced PNNL's B&U related service costs by \$3 million resulting in an FY1999 space rate reduction of approximately 6.2% to all organizations across the Laboratory.

Initiative accomplishments included:

- Reducing the Laboratory G&A pool cost by \$2.5M
- Establishing an improved work process for completing routine maintenance work in 3 days or less
- Establishing a long range improvement agenda for additional out year enhancements leading to additional cost savings
- Investing in additional work planning and control systems to achieve enhanced performance and customer satisfaction
- Providing a basis for realigning organizational structure and management systems to reflect customer service model and achieve greater insight to work related costs

Savings: The total hard dollar savings achieved from the noted improvements were \$3.0M in the B&U related service costs with \$2.5M in the G&A cost pool. Most of the savings will carry forward to future years and will be reflected in space rate reductions across the Laboratory. Additionally, the 3-day work concept will improve service to F&O customers. It is anticipated that additional cost savings (beyond those mentioned above) will result from these improvements but these have not been quantified.

Improve Approach to Technology Deployment / Commercialization and Intellectual Property Systems

The ultimate goal for this project is to implement an Intellectual Property (IP) Management / Technology Commercialization process at PNNL will result in the more effective deployment and commercialization of PNNL technology. Efforts in FY1998 were focused on recommending a new IP Information System to be implemented BMI wide that will allow users to have access to information on their desktops that enables them to effectively manage BMI's and DOE's intellectual property.

An extensive benchmarking effort identified several potential commercial-off-the-shelf (COTS) products, which were then evaluated against a prioritized list of requirements developed through focus groups of PNNL/BMI users. This eliminated all but two COTS products from consideration. Usability testing is planned for early October with a final recommendation scheduled for 10/22/98.

This initiative is part of the BMI OD Strategy Project and will continue into FY1999.

Customer Service Model Implementation

This BMI OD Strategy initiative was started in FY1997 and will continue for the next several years. It is aimed at fully implementing the new customer service model. This includes aligning PNNL's organizational structures, policies, management systems and associated information systems such that they are fully supportive of the model. Additionally, components, will need to be more fully defined and the (R2A2's) and appropriate performance metrics established to address current confusion and uncertainty among staff and management.

2. Summary of PNNL FY1999 Operations Improvement Initiatives

FY1999 Operations Improvement Initiatives

The Laboratory continues to mature in its approach toward continuous improvement. The set of FY1999 operational improvement initiatives was developed as an integral part of the planning process using information generated through the Integrated Assessment Program. The initiatives, briefly described below, were selected and approved by the Laboratory Leadership Team based on their potential impact on the Laboratory objectives and performance. Each of the initiatives has a Level-1 sponsor and a project manager. The project manager develops a project plan, implements the plan, and reports progress on a monthly basis. The initiative sponsor provides guidance and leadership to the project manager and project team and reports status to the Leadership team at least once during the year.

Improve Leadership Training and Development

The ultimate objective of the Leadership Initiative is to develop and implement an integrated leadership training and development program that will benefit both management and staff members. This program will consist of formal training, skill development, succession planning for key positions and developmental experiences through rotations, assignments and action learning forums. This is an ongoing initiative. FY1998 efforts were focused in four main areas; Data Collection, Validation and Benchmarking, Program Design and Program Implementation. The data collection, validation and benchmarking and program framework were completed and a presentation to the Leadership team was given on May 26th. The Leadership team was supportive of the work to date and gave the approval to continue to develop the program. FY1999 effort will concentrate on the following three areas:

- a leader/manager development program
- a staff development program
- an electronic gateway that will provide information for both staff and managers.

Address Y2K Issue

Many computers and software programs (both commercial and PNNL created) cannot handle dates beginning in the year 2000. This could severely impact efficiency and effectiveness. This initiative will continue to provide lab-level support and coordination regarding PNNL efforts to minimize the impact and potential liability of Year 2000 issues for the Lab and BMI. Key activities include:

- Additional validation, verification of Year 2000 business application impacts.
- Meeting the continually changing and more demanding PNNL, OMB, DOE and BMI reporting mandates.
- Continuing to maintain a central point of contact to respond to Year 2000 issues from government agencies, vendors, clients and BMI.
- Coordinating centralized documentation of Year 2000 assessment and additional system/project assessments to be performed.
- Continuing to monitor and support the remediation activities for DOE and PNNL mission-essential systems. DOE remediation completed by 3/31/1999. PNNL's remediation completed by 10/1/1999
- Coordinating information sharing with other DOE Laboratory's, DOE/RL, FOE HQ, OMB, BMI, other Hanford contractors and industry related to DOE Year 2000 demands.

Upgrade travel system

This initiative is part of the BMI OD Strategy Project. The goal of this Initiative is to partner with BCO to implement a new commercial off the shelf software (COTS) system that utilizes current web base technology to support the functional travel management needs of BCO and PNNL into the next millennium. Planned completion is June 1999.

Benefits to PNNL include:

- Reducing operating costs by an estimated \$75K/year
- Reducing other operating costs by direct payment to American Express, audit on exceptions only, reduce receipt requirement base on credit card feed, and electronic routing for approvals
- Improving accuracy and reducing cycle time with on-line entry, routing, and submission of travel expense reports
- Providing on-line status of travel report and cost information
- Replacing old travel systems at PNNL and BCO that were not Y2K compliant with COTS Y2K compliant system

Export integrated operations "IOPS" to other facilities within the lab

This initiative will be a continuation of the FY1998 project that exported EMSL Operations (now referred to as "IOPS") concept and tools to the Radiochemical Processing Laboratory (RPL - 325 Building) and the Life Sciences Laboratory (331 Building). The FY1998 initiative was quite successful and IOPS played a major role in the recent validation of the laboratory's Integrated Safety Management Program. In FY1999, as a second step in implementation of this program throughout the lab, several Divisions will partner with ES&H to enhance IOPS and export it to multi-organizational laboratory intensive buildings (PSL and RTL).

More specifically this initiative will integrate the Room Assignment Tracking System, Radiological Inventory Tracking System, and Chemical Inventory Tracking System into the IOPS tool. It will also accomplish the following in the two new facilities:

- Implement the Cognizant Space Manager (CSM) concept.
- Revise existing work practices and self-assessment checklists to make them fit the needs of additional facilities.
- Establish a building specific safety committee for each building.
- Modify the IOPS electronic application for the addition of users from each building.

- Produce a hard copy or electronic Lab Handbook for each space each building, including information resulting from CSM activities and self-assessments.
- Conduct a self-assessment of IOPS to gather data on costs and benefits of the new system in this type of building.
- Provide project management and administrative oversight to the project.

Replace the Financial Processing System (FPS)

The PHMC contractors are migrating off of the Hanford Enterprise Server (ES). The costs to run PNNL's FPS application on the ES are going to quadruple in the next two years to over \$450K per year and the service level will be reduced. This initiative will replace the general ledger, project accounting, service center, and cost closing processes which currently run on the Hanford Enterprise Server managed by Lockheed/Martin. The new processes will be developed and managed in PNNL's computing infrastructure. All feeder systems will be redirected through an enhanced accounting transaction edit system to the new FPS. Reporting and data transfers to other systems will be accomplished via PNNL's data warehouse infrastructure. In addition to avoiding the more than \$300K per year cost increase, this initiative will also provide project managers and business model stewards with more timely and accurate cost information. The new system should be operational by 6/1/99 and the old FPS system will be retired on 9/30/99.

Electronic Records and Information Capture Architecture (ERICA)

This initiative will implement a new records and scientific and technical information (STI) system. This new system (ERICA) will integrate and link critical STI and Records databases and repositories that exist at the workstation level in organizations throughout the Laboratory. ERICA will help fill in the gaps where vital information is not readily accessible. ERICA will allow PNNL organizations to have more control over the disposition of their records and documents. ERICA can reduce redundant data entry in the field and, in some cases, eliminate work in information review and release, document transmittal, preparation of Records Inventory Disposition forms, and preparation of Records Transfer and Data Input forms. Implementing ERICA can also reduce future project labor and other costs associated with records storage by reducing the volume of printed records. ERICA is also a critical toward complying with current Federal and client records requirements streamlining work processes, positioning PNNL to comply with DOE's plan to deliver published STI electronically, and strengthening Battelle's business decision-making processes. The ERICA system will integrate the STI and records databases and repositories currently being created and managed at the individual workstation and laboratory level by staff in Communications, Quality, Contracts, and the R&D organizations. ERICA will support PNNL and client requirements to:

- capture scientific and technical information for easy sharing and reuse internally and enable appropriate client and public access externally.
- enhance records management tools; archive electronic records electronically
- streamline the information release process
- provide electronic publishing and document management capabilities that meet DOE requirements
- upload metadata fields to DOE to serve as required announcement reports
- provide metadata and full-text search capabilities for staff against the Lab's repository of electronic records and STI (not funded for FY1999)
- automate and integrate scientific and technical information peer review (routing and signature) processes (not funded for FY1999)

Integrate the Electronic Prep and Risk (EPR) and the Contract and Proposal (PCIS) systems

Currently the EPR and PCIS systems are not integrated, resulting in conflicting information being given to management. Integrating the two systems will reduce the overall costs by eliminating the duplicate entry and results in consistent information enabling PNNL to better manage the risk. This initiative will help:

- Insure that a Prep & Risk is completed prior to a project incurring cost.
- Take work out of the process by eliminating the manual data entry required to get data from EPR into PCIS.
- Insure the data in EPR is consistent with the data in PCIS.
- Facilitate additional product line reports by providing the means to split a project among two or more product lines.

Integrate databases/software to support business development / marketing

Several business development / marketing systems are currently in various stages of development within Battelle (e.g., BMI's capabilities website, LabCap, EMSL's document storage system and the Environmental Technology's CapMap). This initiative will charter a cross-cutting team to document the laboratory needs with regard to business development tools. This team will then conduct an independent review of the various systems to ensure that duplication of effort is not occurring and to recommend the most cost-effective and efficient way to integrate, consolidate, and enhance these systems to better support the needs of the lab.

The goal is to recommend and eventually implement on a lab-wide basis a system that will enable staff to spend more time on the creative part of marketing and business development and less time trying to find data. In particular, the system will provide staff with quick access to:

- Staff capabilities, experience, abilities, and administrative data
- Project data, summaries, proposal information, text, and templates for new proposals
- Client data
- Standard Form (SF) 254 and 255s for DOD work.
- Initiative deliverables include:
 - Determination of lab needs for business development
 - An assessment of all the existing systems, including their utility and user-friendliness
 - A technical recommendation for how to combine, integrate, and configure the systems to meet the lab's needs
- Estimated costs/schedule to implement recommendation

Implement Battelle-wide payroll system at PNNL

This initiative is part of the BMI OD Strategy Project. The goal of this Initiative is to implement a BMI-wide payroll and benefits administration system, which enables transparent transfer and management of employees across all Battelle components. This will help project managers better utilize staff.

Offset impact of removing travel from the "Value-Added Base"

The Leadership Team agreed in August of 1998 that it was desirable to eliminate the overhead burdens currently assigned to travel costs. Finance is currently trying to gain DOE agreement to allow this accounting change to take effect in FY2000. In order to avoid the

impact of eliminating the overhead burdens from travel costs in FY1999 (i.e. G&A would have to increase from 40.5% to 43% and labor costs would be escalated by approximately 1.3%), the Leadership Team requested that we execute an improvement initiative in FY1999 that would identify savings to be captured in FY2000 and thus would offset the travel cost accounting changes. In total, this means that overhead costs would have to be reduced by roughly \$5M assuming all other factors (such as business volume) stay constant. This improvement initiative would be managed in the same manner as our previous ACE improvement initiative. The project team would first conduct a diagnostic to establish cost improvement targets, these targets would be approved by the Leadership Team, breakthrough teams would be commissioned to address each cost improvement target, and final implementation actions would be approved for FY2000. If successful, the cost improvements will be sufficient to provide for the elimination of the travel overhead burdens (currently approximately 50% of travel costs) without a corresponding increase in other overhead burdens such as the G&A rate or labor overhead adders.

PART IV: SUMMARY OF FY1998 EXTERNAL OVERSIGHT ACTIVITIES

The Independent Oversight (IO) Program and Department were established within the Environment, Safety and Health (ES&H) Directorate during FY1996 to support PNNL's newly established Integrated Assessment Program. The IO Program's primary charter is to determine the efficiency, effectiveness, and adequacy of the Laboratory's Self-Assessment Program. The IO Program fulfills this charter by performing formal assessments of the division and directorate self-assessment programs. Additionally, IO conducts various special studies requested and approved by management. The IO Department has an additional responsibility to review and analyze external oversight reports (e.g., U.S. Department of Energy [DOE], Headquarters; DOE, Richland Operations Office [RL]; State of Washington, Department of Ecology; Defense Nuclear Facilities Safety Board; Battelle Columbus Operations) to identify PNNL-wide issues and trends and issues that may require reporting under the Price-Anderson Amendments Act.

This report summarizes the results of the IO FY1998 review of external oversight data. It contains:

- A summary of external oversight reports,
- An overall analysis of these reports, and
- A summary of candidate PNNL-wide improvements.

Twenty-five reports were reviewed and analyzed. The general tenor of external oversight reports for FY1998 indicates that PNNL continues to improve in almost all aspects of PNNL's operations. Progress has been noted by almost all external assessment activities, and the overall performance of PNNL is generally excellent. While overall performance is excellent, there are still areas where improvements are needed. These areas are articulated below.

SAFEGUARDS AND SECURITY

While the overall Safeguards and Security Program is satisfactory, there are a number of administrative functions and access control issues that could be significantly improved.

INTEGRATED ES&H MANAGEMENT

- The hazards and risks associated with off-site (other than PNNL's facilities) work are not always adequately identified, analyzed, controlled, or evaluated.
- Information management systems, supporting the Integrated ES&H Management System as a stand-alone system, could be improved substantially by a careful integration of their complementary features. There is no organized ES&H-oriented stakeholder outreach or involvement program.
- Line organizations should take a more active role in the management of the overall Integrated ES&H Management System, and ES&H objectives should be written into the mission excellence functions.

PERFORMANCE MEASUREMENT/SELF-ASSESSMENT

- Pre-operational assessments/operational readiness reviews/readiness assessments are not routinely performed before work has begun.

- PNNL's Occurrence Reporting System could be improved by enhancing the Lessons Learned Program and the critique process.
- The IO Department does not independently validate self-assessment results.
- Worker participation in the self-assessment process should be strengthened.

OCCUPATIONAL SAFETY AND HEALTH

- The accuracy of Chemical Management System inventories remains suspect.
- PNNL should improve the timeliness with which recordable injuries/illnesses are logged.
- The level of technical rigor and formality of operations in the Occupational Safety and Health Department is not consistent with the level of rigor in the Radiological Controls Program and does not meet the high standards of excellence expected of this organization.
- The Unreviewed Safety Question Determination process may not be in full compliance with DOE Order 5480.21, and it may not be rigorous enough to adequately evaluate changes in systems, structures, components, procedures, training, etc.
- Questions have been raised by RL and Battelle management concerning the adequacy of the Safety Analysis Report for the 325 Building, due to its perceived lack of analysis of hazards and risks to workers and the lack of a rigorous human factors analysis.

ENVIRONMENTAL MANAGEMENT

- An Environmental Protection Agency/State of Washington, Department of Ecology/State of Washington, Department of Health Multimedia Inspection verbally identified (formal report not yet issued) a number of Resource Conservation and Recovery Act discrepancies, which indicated a general lack of conduct of operations, discipline, and formality in operations.
- The Hazardous Materials Response Program requires re-assessment.

REQUIREMENTS MANAGEMENT

- The Chemical Management System and radioactive material inventory are not sufficiently linked to the Facility Use Agreements to ensure operations in facilities remain within their inventory limits.
- Adherence to procedures has improved this year; however, sporadic areas of non-adherence tend to indicate that the issue should continue to receive management attention.

HUMAN RESOURCES/HUMAN FACTORS/STAFF COMPETENCE

- PNNL failed to establish a quality of work life that is conducive to optimum research.
- There is an under-representation of minorities and women within the management and professional ranks.
- There is a continued need for a professional leadership development program that is fully aligned with the new Customer Business Model.
- There is a lack of a formalized career development process within PNNL.
- There is a lack of formal or structured Integrated ES&H Management System training that adequately focuses on key staff positions that provide leadership to this program.

LIST OF FY1998 EXTERNAL OVERSIGHT REPORTS

1. Conduct of Operations Appraisal of PNNL, STO-RW-98-A01, October 1997
2. AMT Weekly Walkthrough, 5/12/1998, Facility Use Agreements Compliance
3. Sandia National Laboratory/DOE-62, Supplier Quality Program Survey of PNNL Commercial Light Water Reactor (CLWR) Tritium Qualification Target Project (TTQP), VS98-1002, March 17, 1998
4. Supplier Surveillance Report, No. SR 98-143
5. Training Approval Program (TAP) Review of Richland Operations Office, Pacific Northwest National Laboratory and B&W Protec, Inc., February 16, 1998
6. DOE-RL Surveillance Report, 98-PAD-012, Review of Contractor Injury and Illness Reporting Processes, April 3, 1998
7. Memorandum to W. J. Madia, Director, Pacific Northwest National Laboratory, from Paul Rice, Chair, PNNL Operations Improvement Advisory Panel, Subject: PNNL Operations Improvement Advisory Panel Meeting, October 10, 1997
8. Investigation of the Tritium Release from Building 324 In Which the Stack Tritium Sampler was Off, April 14-17, 1998, Revision 0
9. Summary of PNNL Activities to Resolve Preliminary Observations Identified During EPA Multi-Media Inspection
10. Defense Contract Audit Agency, Audit Report, Report on OMB Circular A-133 Review of Fiscal Year 1996 Internal Control Used in Administering Research and Development Program, 13 January 1998
11. Department of Energy, Richland Operations Office Operational Readiness Review for Full Operations/KD-4 of the Environmental Molecular Sciences Laboratory, Revision 0, September 5, 1997
12. Richland Operations Office Performance Evaluation of the Pacific Northwest National Laboratory Fiscal Year 1997, December 1997
13. Independent Management Assessment Results – PNNL ES&H Program (September 8-11, 1997)
14. State of Washington, Department of Health, Division of Radiation Protection, Notice of Violation, May 13, 1998
15. U.S. Department of Energy, Richland Operations Office Employee Concerns Program Office, Investigation Report on Employee Concern #960150, Filed by Employees of Pacific Northwest National Laboratory, Issued September 5, 1997
16. DOE-RL Surveillance Report, S-OTR-97-EFH-010, Training Program, July 8, 1997
17. DOE-RL Surveillance Report, PAD-SURV-97-024, Criticality Safety Program, March 11-13, 1997
18. Defense Contract Audit Agency (DCAA), Audit Report No. 4261-97G10260009 OMB Circular A-133 Audit of Fiscal Year 1996 Internal Compliance with Requirements Applicable to the Federal Research and Development Program, 26 January 1998
19. Defense Contract Audit Agency, Audit Report No. 4261-96D13010002, Report on Audit of Labor Accounting System and Related Internal Controls, 24 March 1998
20. Periodic Safeguards and Security Survey of Battelle Memorial Institute, Pacific Northwest National Laboratory, Karen L. Flynn, Safeguards and Security, March 11, 1999
21. Integrated Safety Management System Verification, Pacific Northwest National Laboratory, June 1998, Volume I, U.S. Department of Energy
22. Letter from the U.S. Department of Labor, Employment Standards Administration, Office of Federal Contract Compliance Programs – POL-5.2 (IJ 2033), dated July 24, 1998

Pacific Northwest National Laboratory
FY1998 Annual Self-Evaluation Report, 10/19/98

23. Review of the Effectiveness of the Richland Operations Office and the Hanford Contractors' Occurrence Reporting and Lessons Learned Programs, Performance Assessment Division, Appraisal PAD-APR-98-019, Revision 1, February 1998
24. QAA-PQA-1418, July 14, 1998 - Knolls Atomic Power Laboratory (KAPL) Trip Report, June 22-23, 1998
25. Surveillance Summary, PMD-SKP-98-005

APPENDIX A: RESULTS OF PEER REVIEW

Overview of the Peer Review Process

Peer review is one of the universally accepted methods to determine the direction of and assess the quality of science, engineering and technology. As one of the Department of Energy's (DOE) national laboratories, the Pacific Northwest National Laboratory (PNNL) is committed to the principals and practices of peer review. PNNL's peer review process has both internal and external components.

Laboratory-initiated peer review has three primary components:

- The Division Review Committees (DRCs),
- The Laboratory Review Committee (LRC), and
- The internal peer review of communications sent by Laboratory personnel.

Each Laboratory Division has established a DRC to review its science, engineering, and technology portfolio, and the DRC chairs serve as members of the LRC. Both committees report to the Laboratory Director. This process was developed in 1997 and fully implemented this year. Each of the above three components has been formalized and documented by publication in the Laboratory's Standards-Based Management System.

Major DOE programs (usually ER & EM) are reviewed annually by panels of subject matter experts brought to the Laboratory by sponsors of the research.

Finally, the Laboratory also establishes special ad hoc internal review committees to address specific submissions of proposals in response to RFPs (request for proposals) for major programs published by Laboratory sponsors of research and development (usually DOE).

Scope of FY1998 Submission

Included in this report are summaries of the (1) proceedings of the LRC, (2) proceedings of the DRCs, (3) results of DOE-initiated peer reviews, and (4) results of special ad hoc internal review committees.

Laboratory Review Committee

The Laboratory Review Committee met with Bill Madia and his Associate Laboratory Directors (or their representatives) on August 14, 1998. The Director presented the Laboratory's strategic plan, the role of peer review in the Laboratory, and his expectations of the LRC. Since this was the first LRC meeting, the committee spent the bulk of its time considering the review process itself. Following is a synthesis of the meeting content. Recommendations for conduct of DRC meetings will be forwarded to the Associate Laboratory Directors for their use, and the formal agreements made will be instituted.

Recommendations/Observations on approach, format, and processes for reviews

- Environmental Technology Division committee members (with concurrence from the Energy Technology Division committee) believed that a 1.5 day review was too short. Two days were believed to be the minimum time for an effective review with a three-day review preferred.
- Divisions should commit to a series of meeting dates early to minimize "no shows" then hold firmly to those dates.
- Begin meetings on a Monday to permit Sunday travel.
- Start the review the evening before formal presentations begin with an outline of the review, introductory overviews, and other preliminary material.
- Written committee reports of the meetings do not have to conform to a common format, but LRC members agreed that action items would be suggested and clearly identified within the body of the reports.
- Committees prefer relatively brief high level descriptions of a Division's strategic direction rather than long descriptions with detailed technical material.
- Confirmed that 3 years is the minimum tenure for a committee member with terms less than 5 years used only initially to achieve the appropriate committee membership turn over. Thereafter, five-year terms will be the norm. In addition, it was recommended that the three, four, and five-year members of each committee be designated after the 1999 meetings. DRC chairs agreed to assist the process by providing the Laboratory information on committee dynamics.
- A Laboratory organization chart with accompanying demographics was requested by the LRC.
- With respect to individual visits by committee members, it was suggested that the Divisions issue invitations for such visits. Ideally, these visits should deal with issues raised by the committees or those for which the Division wants input from committee members.

Recommendations/Observations from the executive session

- It was suggested that not all presentations be delivered from the podium. The LRC believed that Laboratory staff members deserve (and desire) recognition and that this can be accomplished by poster sessions with each poster seen by all committee members and specifically reviewed by two committee members designated beforehand.
- With respect to Division action plans dealing with committee recommendations, the LRC requested that the action plan be shared with the committee chair before general circulation.
- Guidelines for the review process state that committee chairs will serve a three-year term. The LRC agreed to serve three-year terms with the stipulation that reappointment is not an option.
- The LRC prefers electronic communication with copies to other committee members.
- ETD has five committee members. The number should be increased to six or seven.
- If a Division has an annual report, the LRC requested that the report be shared with them.
- If a committee is asked to evaluate markets, they need to have some financial and manpower information given to them.
- The LRC believed that LDRD funding should be increased from the current level.
- Trend information on the Laboratory's investments in LDRD, program development, etc. would be very useful to the LRC.
- Energy Technology Division and Environmental Technology Division committee chairs did not think that (at least) some PIs were adequately knowledgeable of their program environment

(i.e. technical developments, external competition, etc, especially the business aspects of the portfolio).

- Committees will be asked to review products of the decision making process without knowledge of the process by which information is acquired. The LRC would like more information on Laboratory decision-making processes. An example cited was strategic planning at the Laboratory. Specifically requested was information on how and with whom decisions are made within the Laboratory and what is the process for input to and dissemination of decisions.
- The LRC suggested a mixer with the staff be scheduled during the meeting (but not the first night).
- Suggestions for content of presentations to the committees included the following: Why are you doing the work? What have you done? What are your findings? Build into the presentation a request for advice from the committee (i.e. the competition, technical suggestions etc).
- Suggested a pre-screen of LDRD proposals before asking for full proposals.
- Obtaining a suite for the chair's lodging allows the committee to meet off line without having to make arrangements for a meeting place.

Suggestions for next year's LRC meeting

- Each chair should have time to meet one-on-one with their respective Associate Laboratory Director (at least 1.5 hr).
- Assure that each chair has a time scheduled to discuss their report. In addition, each chair should be provided copies of reports from each of the other Divisions.
- Provide an hour for four fifteen-minute presentations to present committee findings to Madia and the ALDs.
- The LRC requested that the 1.5 hr Bill Madia spent with the LRC this year be retained in future meetings.

LRC suggestions/observations have been passed to the appropriate organizations for consideration. With respect to the review process, LRC observations have been sent to the appropriated Divisions for planning FY1999 DRC meetings.

Formal agreements made

- Send committee reports to the ALD with copies to Bill Madia and Ron Walters.
- Change name of DRC to Division Visiting Committee

Division Review Committees

Division Review Committees for each of the Laboratory's four technical Divisions met during FY1998. The results of these reviews and DRC recommendations are summarized below. Each Division is committed to addressing the recommendations during the next fiscal year.

Energy Technology Division

Review Scope: The Division's DRC met November 20-21, 1997. The Energy business and the Information Technology business were reviewed. Specific topics of the review included global climate change; production of lighter, more fuel efficient vehicles; improving electric grid reliability

and capacity; technical response to industrial "grand challenge" computing; development of next generation technical competence, and expert delivery.

General Comments: The DRC was "very impressed" by the quality of the Division's work. The DRC rated the combined Energy Technology business and Information Technology business "excellent" noting both the good work in the businesses and opportunities for improvement.

Specific Comments: Because of the large number of projects reviewed, it is not possible to include here comments for each program. The quality of the science and engineering technology projects ranked from excellent to outstanding, and the DRC noted that the Division "has some valuable core competencies that few others have." Generally, the DRC found a "rich interdisciplinary mix of skills and points of view" in the information technology projects. Also, the energy projects (found to be of high overall quality) would benefit from more crosscutting interaction with a broader range of the disciplines available at PNNL. The DRC also recommended continued work on establishing a clear strategy for the future energy business.

Noting the Division's stated intent for the Energy business was to move from a technology transfer dominated project portfolio to one that includes more research and development, the Committee identified two significant organizational issues: (1) how to provide cross-fertilization in a project-oriented laboratory, and (2) how to shift the project mix over time from technology transfer to research and development. The Committee made a number of observations that should be considered when implementing such a shift in emphasis including the need for change in staff competencies, more training and personal development, recognition of different sets of competitors, increased risk, and the necessity for cross-fertilization. The Division must be prepared to address these issues as it moves to a less project-centered portfolio.

The Division has established and is tracking an action plan to address the observations made by the DRC. Feedback on DRC observations and progress against the action plan will be provided to the committee.

Environmental and Health Sciences Division

Review scope: The review was held May 6-7, 1998. Components of the review included descriptions of the Fundamental Science Product Line, the Global Change Research Program Overview, Subsurface Science Research, Advanced Materials Product Line, materials science, and EMSL.

General Comments: The DRC found that the Division is conducting an excellent research program of relevance to DOE and the nation. The high quality of the research is reflective of the high quality of the staff. It was found that management displayed a good understanding of their role in serving various kinds of clients and was adept in marketing. In addition, the Division is proficient in seeking a program portfolio that the staff can solve while at the same time partnering with others to provide coordinated attacks on key issues. The DRC assigned ratings ranging from excellent to outstanding for the components reviewed. The DRC did not believe it had the appropriate expertise to provide a meaningful review of the global change program, particularly the computation and modeling components that were subjects of considerable discussion.

Specific Comments: Component-specific comments are summarized below.

Advanced Materials: The program has two thrust areas and "follows a successful strategy which in principle integrates well basic and applied research and technology development." The reviewers thought that with the "strategy for materials integration so successful, it may be fruitful to consider expanding the basic materials thrusts somewhat to lay the foundation for growth into other areas." All three of the program's areas demonstrated "a willingness to work with others and publish results in the open literature." They are "well poised for growth into the future."

Subsurface Science: The program to understand the fundamental mechanisms of behavior of subsurface contaminants "has contributed a number of significant publications and accomplishments" and has brought together different disciplines to undertake the science. This approach has been successful in attracting NABIR funding and the work on microbes is "commendable."

EMSL: EMSL is "a state-of-the-art facility, extremely well constructed and equipped." The EMSL is unique in "the complement of instruments in close proximity and under one roof which can be used to study a single specimen." The potential exists for the EMSL concept to "produce outstanding results."

Global Change: The reviewers stated the "Laboratory deserves credit for taking a leadership position in the national Global Change Research Program and in establishing one of the few hard data measurements activities, the Atmospheric Radiation Measurements program." PNNL's program "is appropriate" and enables the program "to bring the fruits of research down to the practical level of public policy and private sector decision making." The reviewers did not believe they could provide a meaningful assessment of the science and related activities of this complex program and suggested a separate meeting of a few days with more experts.

Response to Review: The four major DRC recommendations and the Laboratory/Division actions taken in response are summarized below:

- The Laboratory should consider strengthening fundamental science. Action: The Division agrees with the reviewers, and actions have already been taken. In the FY1999 DOE-RL Laboratory performance appraisal, the weighting factor for the Scientific and Technical Excellence Critical Outcome has been increased. In addition, Division ALD Gerry Stokes has acquired support for fundamental science by successfully sponsoring major LDRD initiatives in environmental health, advanced computational modeling and computational reactive transport, and the catalysis programmatic outreach (in cooperation with other National Laboratories) led by Ray Stults.
- More visibility should be provided to the materials science program and use its integration techniques as a model for the Division. Action: TBD
- A separate review of the Division's component of the Global Change Program should be considered. Action: The Division has added Jeff Kimpel, a global climate change expert, to the DRC. He will be asked to assemble and chair a global change review committee during FY1999.
- The marketing plan of EMSL should be strengthened. Action: This is an ongoing need that will continue to be one of the major challenges of the EMSL leadership. A new EMSL Director was recently hired, and his leadership will be instrumental for the success of EMSL as a user facility. Among his first actions will be the hiring of two new EMSL Associate Directors. —

National Security Division

Review Scope: The review was held June 8-11, 1998. Components of the review included: Nuclear Arms Control and Nonproliferation Product Line; Material Protection, Control and Accountability; International Safeguards; Isotope Separation and Analysis; Proliferation Prevention; Resource Capabilities; Laboratory Directed Research and Development; Radionuclide Aerosol Analyzer; Automated Radioxenon Sample-Analyzer; Fiber Optic Neutron Detectors; Initiatives for Proliferation Prevention; Long-range Neutron Detection; Safeguards and Security Product Line; Chem-Bio Defense Product Line; Biopathogen Initiative; Team Leader; Starlight; IR Spectroscopy; and RF Tags.

General Comments: The DRC found that "much of the work that NSD does for DOE/NN and other government agencies is in response to critical national needs," and the committee cited several noteworthy examples. They found NSD to be "very responsive to national needs in executing projects in an exemplary manner" and noted that while this kind of work may not contribute to economic goals per se it "represents quite valuable contributions to national security and nonproliferation." The DRC ranked the NSD work "excellent to outstanding."

Specific Comments: The review report was received on August 27, and the response process to this year's review has been underway for only a short time. In addition, the review consisted of twenty-one components; thus, it will not be possible to include here comments for each component.

Response to Review: Individual contributors/presenters have been asked to address DRC comments that pertain to their efforts, and the categories of responses are being categorized as follows. (1) No issues—the work is going well, and no actions need to be taken. (2) NSD agrees with DRC recommendation, and an action plan is being prepared to resolve the issues. (3) NSD believes that more discussion with the DRC is needed to fully represent the complete set of issues that impact the project/program, and these issues will be included in the agenda for the next National Security Division Review Committee meeting to be held in January of 1999.

Environmental Technology Division

Review Scope: The review was held July 26-27, 1998. Overviews were presented of the DOE Environmental Management Sub-sector, the DOE Defense Programs Sub-sector, the DOE Nuclear Energy Sub-sector, the DOE Environmental Health Sub-sector, intellectual property management, and the seven ETD Product Lines. Technical programs reviewed included: International Nuclear Safety Program, Tritium Target Qualifications Program, Tanks Focus Area, Waste Disposal Integration Team, and the Environmental Management Science program. Overviews of Resource Management and the Future of the Environmental Quality Mission were also included.

General and Specific Comments: The DRC report has not yet been sent to the Division. When the Division receives the report, responses to recommendations/observations will be evaluated and actions taken as appropriate.

External Peer Review of PNNL Programs

A number of programs were peer reviewed under sponsor auspices during FY1998. The results of these reviews are summarized below. The reports present a brief summary of the overall review, reviewer comments and accompanying recommendations on issues that need to be addressed, and the Laboratory's response and actions taken to address reviewer recommendations/suggestions.

Tanks Focus Area FY1998 Midyear Technical Review

Review Scope: The review was held March 9-14, 1998. To be as conservative as possible of financial resources and time of reviewers and staff, the review format differed from past Tanks Focus Area (TFA) reviews. The new format incorporated multiple reviews and permitted in-depth comments and recommendations. The new format combined technology maturity review (stage/gate review of 13 technologies) with peer review by the Technical Advisory Group (four technologies). Peer review also included the involvement of an independent peer review agency (EM-50 ASME Peer Review Team). The Technology Integration Managers (TIMs) developed a set of review questions (which included review and comment by the Technical Advisory Group and user representatives) to assist in identifying the state of development for each technology that will be used in the EM-50 stage/gate decision process. Principal Investigator teams answered each question before a review group consisting of selected members of the Technical Advisory Group (TAG), DOE site users, contractor site users, and ASME review team members. Thus, this single review captured TAG review, independent peer review, and technology maturity review.

Seventeen technologies were reviewed (in contrast to the six technical areas reviewed last year). For each technology, reviewer analysis, reviewer comments and recommendations, and TFA responses were captured and published (PNNL-11906). The results of the reviews will (1) assist the TFA in improving the technical management of these activities and (2) provide technical input to the upcoming stage/gate reviews of each technology.

General Comments: From the Laboratory perspective, this was one of the most useful reviews to date. There was the general sense that in as much as the TAG reviewers have participated in the process for four years, their insight and comments are more direct and useful with each succeeding review. The TAG could (and did) ask more pertinent questions than could be posed in earlier years when technologies were for the most part immature. Two general review outcomes were particularly beneficial and noteworthy. First, the TIMS acquired information that will allow them to be more effective in determining technology performance objectives for field use. Secondly, principal investigators will obtain more reliable information on technology requirements to allow them to provide much more relevant performance data to field users for cost effectiveness analyses and technical comparisons.

Specific Comments: Technologies peer reviewed included transuranic extraction (TRUEX), strontium extraction (SREX), control of leachate solids formation, and parametric studies of Hanford sludge washing technology.

- For TRUEX and SREX, the reviewers found the technologies to be "sound and appropriate" for the tasks with an "excellent chance for success." The reviewers made a number of recommendations with respect to implementation, all of which the TFA will implement.

- For control of leachate solids formation, the reviewers recommended that the TFA "exert greater control over the part of the work that deals with formation and control of solids in sludge leachates, especially with respect to focus on user needs." As a result of the review, that part of the technology was put on hold pending further assessment. This assessment was completed on September 22, 1998, with a Technical Advisory Group recommendation for the task to proceed.
- For parametric studies of Hanford sludge washing technology, the reviewers believed that the technical approach and technical requirements have been correctly defined but recommend that the project acquire a tighter focus in the future. The TFA agreed noting that the project has been of substantial value but is below the FY1999 funding line. If activities are re-started, the TFA will "work to streamline efforts to be consistent with recommendations."
- Corrosion Probe for Hanford and SRS: The reviewers found the technology to be sound and a "highly cost-effective development project, and it has the potential to be one of TFA's best buys."

Thirteen technologies received stage/gate reviews.

- Cone Penetrometer: Hanford Tanks Initiative: The reviewers found the technology to be sound for demonstration of the CPT but not for comprehensive characterization of the vadose zone. They recommended that performance objectives be better defined and expectations of data use be clarified to help guide development.
- Borehole Miner Technology: The reviewers recommended that the application of the technology should be given with better defined requirement specifications to which the TFA replied that a separate meeting between the TAG and the TIM is being planned to discuss adequacy and definition of performance objectives.
- Heel Retrieval for SRS Type IV Tanks: The reviewers made a number of specific recommendations regarding performance testing of system components prior to use in full scale operations. The TFA agreed with the recommendations and is addressing them.
- Salt Removal Systems for SRS Annulus Technology: The reviewers found the technology to "have been adequate for application." They recommended that the test plan address the issue of extending the kinetics of dissolution under laboratory conditions to large scale application. The TFA agreed and has passed the recommendation to Savannah River Site.
- Enhanced Sluicing Systems-Nozzles and Pumps: The reviewers "strongly encouraged full-scale tests that include the same kind of uncertainties the operators are likely to face" to which the TFA agreed. The TFA also agreed with a number of specific recommendations regarding actual operation before fielding the technology.
- Solid-Liquid Separations: Reviewers gave the TFA "kudos for an extremely well integrated program that has done much to pass useful knowledge throughout the complex." However, they did not agree with the use of development funds to fabricate a unit for a user noting that TFA was a technology supplier to EM-30, not just a checkbook. The TFA noted that demonstration leading to deployment is within their scope but will work to address the issue of a balanced portfolio.
- Waste Form Product Acceptance Testing: The reviewers saw the effort as a necessary technical element of the Hanford privatization process. The work was "well done," and the presentations and organization of material were well done and addressed the questions posed to the reviewers.
- Pulsed Air for GAAT Retrieval: The reviewers found the system to be ready for transfer. The reviewers made a number of recommendations. The TFA agreed with the recommendations,

and in most cases the response indicated that the recommendations were already being addressed with ongoing work.

- Waste Loading Improvement for High-Activity Waste Glass: The reviewers found that "the presentations were well prepared and responsive to the TFA questions. The experimental program "is technically sound and focused on the objectives which can be efficiently applied." The continuation of this program is "considered essential."
- GAAT Closure and Isolation Technology: The reviewers stated that the injection and isolation technologies were ready to deploy. The reviewers found that efforts "to identify low-pressure jets to mobilize and mix waste and grout should continue to reduce grouting costs and increase flexibility."
- Pulse Jet Fluidic Mixer Technology: This technology is already deployed. The reviewers recommended that "documentation of the deployment be prepared comparing this technology to alternatives." The TFA replied that this had already been done. Since the technology is already deployed, there were few comments made by the reviewers.
- GAAT Retrieval Systems Technology: This technology is already deployed to clean tanks. Reviewer suggestions were confined to transfer of the technology from one site to another, and the TFA replied that this is the intent of the Retrieval Technology Guide whose information will be available. The reviewers commended the increased TFA dialogue between sites and the information sharing that has resulted.
- Grout/Glass Waste Forms for ORR Technology: The reviewers found that the "session was well focused on the questions" and included an excellent series of presentations." They concluded the "experimental designs are entirely appropriate."

*Chemical Physics Program, Office of Energy Research, Office of Basic Energy Sciences,
Chemical Sciences Division*

Review Scope: This review was held in March of 1998. This is an annual review in which the Office of Basic Energy Sciences (OBES) reviews projects every two to three years. This year the OBES sponsored and staffed review included the Chemical Physics program (four external reviewers) and the Separations and Analysis programs (three external reviewers). For the Chemical Physics program, the experimental research projects of L-S Wang and D Ray and the theoretical research projects of TH Dunning, DF Feller, BC Garrett, SS Xantheas, and GK Schenter were reviewed. The Separations and Analysis projects reviewed included those of BS Bushaw, CR Yonker, and JL Fulton.

General Comments for the Chemical Physics Program: The reviewers described the program as one of an "outstanding collection of scientists working with first class equipment and facilities." It was noted that "the program at PNNL is one of the strongest in the country whose strengths lie in the quality of the people and facilities there and the strong ties that have been established between theory and experiment." It was also stated that "the choice of research project struck a good balance between fundamental physical chemistry and problems related to environmental cleanup mission of PNNL." It was found that the "PNNL is a resource for DOE scientists and others and is focused on environmental remediation issues" in which the scientists and PNNL are doing a superb job.

Specific Comments for the Chemical Physics Program: The reviewers provided comments on the projects of individual principal investigators.

Dr. Wang's work on negative ion photoelectron spectroscopy is "certainly of fundamental importance and highly relevant to the environmental mission of EMSL." Dr. Wang is doing "excellent work both in terms of quality and quantity, and he should be congratulated." The work was found to be "exciting, state-of-the-art research," and the reviewers suggested additional theoretical support for the project.

Dr. Ray's spectroscopy investigations of clusters and gas-liquid interfaces "rank among the most relevant to the mission of EMSL, the most promising in terms of their potential for providing new tools and insights, but also among the most challenging" to carry out. He was described as being an extremely impressive scientist of deservedly high reputation who is most productive.

Dr. Dunning was described as an "outstanding researcher in the field of computational quantum chemistry" whose high-level theoretical calculations are truly benchmark. His work has had an enormous impact on the theory of electronic structure that has established rigorous criteria for the accuracy of quantum mechanical calculations of molecular and intermolecular structures and binding energies. It was specifically noted that the impact of his work does not stop with his technical contributions; he has also made a significant contribution to the field by the excellent training that he has given to young investigators who have studied with him.

Dr. Feller's ligand binding work has direct application to the cleanup of waste sites and is consistent with the EMSL mission. It has been carefully done and has provided a "wealth of information on a number of issues related to ether-metal ion complexation" for which calculations on crown ethers is the "best being done anywhere." His is also developing a quantum chemistry database and Dr. Feller has "many good ideas about how chemists would want to access and correlate the data therein." The database would be of "tremendous value to those chemists" who do not have the knowledge to make the decision on types of calculations that should be done.

Dr. Xantheas' research is based on accurate determination of structure and energies of molecular clusters. He has established himself as an expert in the field of water clusters and ion solvation and has "become recognized as a leader in the study of water polymers." His work was described as "very worthwhile, important and consistent with the EMSL mission."

Dr. Garrett performs calculations on chemical kinetics pathways, and "he is world-renowned for his work in this area." His work on reactions of chlorinated hydrocarbons is very important and addresses issues of immediate interest to the Hanford cleanup. The findings on molecular transport between gas-liquid and liquid-liquid interfaces are also directly relevant to the transport of contaminant in ground water.

Dr. Schenter studies statistical mechanics for both classical and quantum degrees of freedom of molecular systems. His work is described as "very challenging from the point of view of theoretical and computational methodology." He is very skilled at developing and implementing new theoretical approaches and is a "bright young theory person" whose physics background is a positive attribute since the vast majority of his PNNL colleagues are chemists.

General Comments for the Separations and Analysis Program: Without exception, the reviewers commented on the state-of-the-art research and diagnostic instrumentation available within EMSL. They also commented on the "formidable group at PNNL" to study solvation coupled with a powerful theory group." (See Garrett above).

Specific Comments for the Separations and Analysis Program: Project-specific reviewer comments are provided below.

Dr. Bushaw's work in high-resolution laser spectroscopic analytical techniques is "an excellent example of applied research undertaken from a fundamental point of view." He uses state-of-the-art tools, and the reviewers were "very impressed with the research that is being conducted" and the experimental apparatus that has been constructed and optimized. He is a skillful experimentalist whose work is "very elegant."

Dr. Fulton's work has focused on development of a molecular-level view of the solvation of ions in supercritical water reactions and microemulsion/micelles in supercritical carbon dioxide. These studies are a step to environmentally benign remediation and synthesis. Dr. Fulton is described as "the most rapidly rising star in supercritical fluid and technology." His work is intriguing and extremely important, and one of his published papers is "one of the very best papers the reviewer had ever read concerning ion pair formation."

Dr. Yonker's and his coworkers are directing their energies to development of a molecular level view of solvation in supercritical fluid systems and have incorporated both experimentation and theory. Their work employs NMR spectroscopy, and Dr. Yonkers was described as "a pioneer in the truest sense of the word." He and his coworkers have developed much of the current understanding in supercritical fluid science and technology and have lead the way in many areas. His proposed future work is "very exciting and extremely important."

Reviewer Recommendations: From the summary above, it is clear the technical content of the projects and quality of the principal investigators (PIs) are both extremely impressive. There was a near unanimous expression by the reviewers of the great need for additional postdoctoral associates to assist the PIs. Not only could productivity be enhanced, it would provide a great opportunity for training young investigators in a world-class program and facility. The reviewers also stressed the importance of fostering additional interactions between experimentalists and theorists and the need for better access to NMR facilities for the super critical fluid research.

Response to Review: The needs for (1) additional postdoctoral support and (2) additional theoretical support (See Wang above) are controlled by the general effects of inflation and other cost factors that have placed considerable stress on project funding. Hence, the PNNL management teams have held several discussions with HQ program managers on the potential for obtaining additional funding. These discussions culminated in a formal presentation to OBES/CS Program Managers on September 17, 1998. A proposal was discussed that would (1) add a theorist to provide additional support for Wang and meet other program needs, and (2) increase project budget to permit maintaining scope and adding postdoctoral fellows.

Special systems are being built in EMSL that will permit high-pressure NMR studies and will increase the NMR time for Dr. Yonker. In addition, the OER program manager (Dr. Ray Stults) will investigate the possibility of using BES-Chemical Science capital equipment funds in FY1999 to purchase a dedicated NMR magnet for Dr. Yonker's use. Actual purchase of the magnet will depend on FY1999 funding, and this won't be known until November or December.

In summary, our discussions resulted in agreement with the merit of additional funding to address review recommendations, but the reality of the budget situation in BES/CS will not allow any increased funding at this time. A proposal is being prepared to formally request the support of an

additional theorist. It will be communicated for peer review but is not expected to generate additional funding in FY1999. Thus, we are limited in our ability to respond to reviewer recommendations. Two new postdoctoral staff positions are planned for the theory program this year, but the total number of postdoctoral positions is still significantly lower than two years ago. In addition, the experimental chemical physics program will be working at reduced scope until additional funding can be obtained.

*Materials Science Program, Office of Energy Research, Office of Basic Energy Sciences,
Materials Science Division*

Review Scope: The review was held August 12-13, 1998. This is an OBES-sponsored and staffed annual review in which projects are examined every two to three years.

General Comments: The reviewers stated that there was good utilization of and communication between staff scientists with different expertise, and there are excellent facilities to support research. Productivity is high with large numbers of papers and seminars. With respect to the programs and staff, the reviewers found the staff "highly qualified and excited about their work." There is a good mix of theory and experiment, and "most of the fundamental work seemed very well chosen to help with real problems." The reviewers recommended that PNNL work be placed in the context of global scale research (i.e. how does the work compare with what has been done elsewhere). The reviewers also recommended some changes in the mechanics of the review including a change in the structure of the review process and presentation content.

Specific Comments: Reviewer comments on individual projects are summarized below.

Interfacial Dynamics during Heterogeneous Deformation: The reviewers made specific suggestions to assist each of the four tasks of the projects. Overall, the project deals "with an important research area and holds the promise of considerable value to fundamental knowledge." The project's modeling is vital part of the project and the "work appears well conceived and underway in good order."

Fundamental Studies of Stress Corrosion Cracking and Corrosion Fatigue: The reviewers stated that this project is an effort that "addresses truly fundamental problems in a very long-standing topic area." It makes evaluations of failure mechanisms that are "difficult and important if materials are to realize their considerable promise," and the work incorporates a "vital area to clarify understanding of aqueous stress corrosion cracking." The project has demonstrated good productivity.

Environmental Degradation Mechanisms in Lightweight Transportation Alloys: The problem of stress corrosion cracking in aluminum alloys is 50 years old. This project uses "sophisticated analytical tools, and the results look promising." Productivity of the project is good, and this "is a fine example of use of fundamental techniques and ideas to address an important applied problem," and the project "deserves commendation."

Irradiation-assisted Stress Corrosion Cracking. This project addresses "difficult and long-recognized processes" which continue to be a problem. Few laboratories can address the problem, and "commendation is accordingly expressed for this work, which is certainly important and needed." The significance of obtaining data for this problem "cannot be overstated, and continuing work will be welcome in this area."

Bulk Defects & Process in Ceramics: This project "addresses very worthwhile fundamental issues of defects in ceramic lattices and the overall accomplishments seem fine." The project is an "important one of considerable scientific value." The reviewers requested that the wide variety of detailed data be brought together to enable evaluation of the status and progress of the overall program.

Molecularly Tailored Nanostructured Materials: Mesoporous materials "offer great potential value in a wide array of fields," and the PNNL group is clearly aware of the diverse possible applications since they are engaged in many applications. The project includes the important component of synthesis of new nanocrystalline materials. The PNNL group has effectively used solid state NMR to study the basic structure of these exciting composite materials, and overall the project "looks very promising for the development of industrially important material." Project publication productivity is significant.

Design and Synthesis of Nanoscale Ultracapacitor Materials Using Lyotropic Liquid Crystal Templates: Although the effort to synthesize and characterize titanium oxides is still in its early stages, there appears to "be potential for generating one or more commercially significant processes." There is a growing need for very high surface area electroactive films, and "this research may help fill that need."

Thin Film Optical Materials: The reviewers described this project as "a nice mix of experiment and theory in an area of great general importance—the effect of defects in optical thin films." The work is providing insight into a number of important problems, and it is "sound science conducted by a team that has just the right mix of expertise to make significant advances." The number of publications is good.

Chemistry and Physics of Ceramic Surfaces: This project attempts to "satisfy all the needs" of understanding surface properties of oxides in general. The project's goal "is clear and important, and they have made significant progress." The reviewer "strongly supports continued research in this area by this group." The facilities available and the personnel involved are "all of the highest quality."

Ceramic Composite Synthesis Utilizing Biological Processes: The development of aqueous interface-controlled synthesis route for ceramic thin films is the goal of this project, and the research is "exciting and a significant component of the very new area of biomimetic inorganic chemistry. The ongoing work on crystallization "is stimulating and complex." The reviewer suggested that more characterization of the deposited films would strengthen the project and would also be of great interest. Publication productivity was fine.

Reviewer Recommendations: Since the review report was received on September 17, 1998, no actions have yet been taken on recommendations/observations.

Wiley Environmental Molecular Science Laboratory (EMSL) Operations Review, Office of Energy Research, Office of Biological and Environmental Research, Environmental Research Division

Review Scope: The review was held on March 3, 1998. The review focused on the operation of EMSL rather than on the quality of the scientific research program.

General Comments: The reviewers stated "it was a pleasure to review the operations at this magnificent scientific facility. The operations are extremely well managed. A vigorous user program is in place, and the entire team is well positioned in conjunction with its users to make major and critical contributions to the advancement of environmental sciences in the United States." EMSL is "well positioned to be *the* key environmental laboratory in the United States, and at this early stage in its operation there is every evidence that it is moving in that direction."

Specific Comments: Specific comments are summarized below.

Overall Operation and User Facility Aspects: The review found the "management approach and execution of the overall operation including user aspects of the EMSL are ranked very high." A strong experienced management team with a user facility culture is in place and some of the specialized facilities are already receiving high use. The user processes have been "very well thought out and put into place so that external users have ready access to the procedures necessary to utilize EMSL." EMSL has recruited "high quality scientific staff and the quality of the staff combined with the quality of the facilities will inevitably lead to high quality use of the facility." As the operation matures, it will be important to expand the number of facility users, and will be especially important "to involve users from the industrial research community."

Management of Major Facilities: The major facilities within EMSL "are being appropriately managed at this early date in its operational history," and EMSL has "quite appropriately responded with a graded approach to the formality of proposals for facility use" with respect to variations in the demand for specific facility components. The computing facility was singled out for special comment. The reviewers found that the "facility represents a unique national resource in computational chemical sciences."

Operations Budget: The reviewers found the EMSL budget "to be carefully managed by the management team, with requests in the several major areas being weighed against one another with criteria such as user demand being appropriately factored in." Management recognizes "that strategic decisions must often be made in which facilities which are likely to provide users with unique advantages in the future may not have heavy user demand in the current year." The reviewers believe that "it is very important for the EMSL management team to articulate and for the DOE sponsor to recognize that an EMSL operating at full capacity and contributing fully to solutions of the Nation's critical environmental problems will of necessity require an operations budget significantly larger than the present budget."

Following is a summary of reviewer recommendations.

- Continue proactive management of EMSL as a major user facility
- Encourage the management team to continue to look for possibilities to increase the number of external users, especially industrial users.
- The EMSL management team should articulate a budget need to DOE that is consistent with a full operation of the user facility and tremendous public investment in the new laboratory.
- Computing facilities and ability to handle radioactive samples in selected experimental facilities are insufficient to support the level of utilization that could be obtained, and management should seek additional operating budget from DOE.

In addition to the specific recommendations below, the reviewers made two observations. They believed that "although difficult to achieve, it would be highly desirable to the EMSL directly connected in a modest way to the resolution of some of the key unresolved problems in environmental sciences that impact the cleanup of the Hanford site." In addition, "EMSL will need to address issues of support and living accommodations as its base of external users increases."

Response to Review: EMSL leadership is addressing reviewer recommendations. Interactions with the appropriate DOE-OBER managers continue.

Peer Review of New Proposal Submissions

Environmental Management Science Program (EMSP): The results of EMSP awards to PNNL were outstanding. Of the approximately \$30M available for new starts, PNNL staff were awarded \$8.92M (30% of the total) for new EMSP research (which exceeded the \$6M goal). If one includes those proposals in which PNNL staff partner with others, then approximately \$14.2M of research has a PNNL component (47% of new funding to all institutions). PNNL now leads 25 EMSP projects and collaborates on 29 others. Thus, PNNL is involved in 23% of all the awards made by EMSP since it began in FY1996.

The internal PNNL process for selecting proposals to be submitted to DOE-EMSP for its peer review is a rigorous one. Several multi-disciplinary teams are formed months in advance of the submission date. The teams include a steering committee, technical teams, proposal-writing teams, review groups, and a support production team. A fraction of the research ideas generated by a Laboratory-wide call are selected for which pre-proposals are prepared for DOE examination. Full proposals are prepared for those receiving approval from DOE.

Natural and Accelerated Bioremediation (NABIR) Program: Four new PNNL proposals were accepted for funding in this program. As in previous years, this number far exceeds the number of awards made to any other National Laboratory. This program uses a proposal selection process much like the EMSP process described above.

Health Effects and Life Science Research Re-competition: The Laboratory submitted proposals to a \$13M re-competition sponsored by OBER-Health Effects and Life Sciences Division. Twelve pre-proposals were submitted, and seven were selected by OBER for preparation of full proposals. The results of the effort were disappointing. No PNNL Laboratory proposals were selected for funding. In addition, no projects were selected from Argonne and Brookhaven National Laboratories, some of which had PNNL partners. The internal process used was not a duplicate of the EM-SP process described above, and a formal evaluation of the results showed that the decision to submit program-project type proposals was a mistake. In the future, an EMSP-like process will be used for major OBER competitions. However, we did receive important feedback from OBER program managers on specific scientific subjects and systems which reviewed well within the program projects and for which encouragement was given to resubmit in the expected OBER call for proposals in low dose effects of exposure to hazardous agents.

Overall Assessment of Results of Peer Review

During FY1998, all Laboratory commitments made with respect to peer review were achieved.

- **Laboratory Review Committee (LRC):** The LRC held the first of its annual meetings. Composed of chairs of the DRCs, this committee reports to the Director. The LRC and the Director agreed to a set of expectations and the means by which they will be achieved. Process improvements were discussed, and the formal commitments made will be implemented during the next fiscal year. The Director reaffirmed the Laboratory's commitment to formally respond to DRC review reports and share the response with the DRC.
- **Division Review Committees:** The process of Laboratory-initiated external peer review by Division Review Committees was fully implemented this year. DRCs of each of the Laboratory's four technical Divisions met during the year, and reports of the review results were prepared. The Laboratory has received final reports for the Energy Technology Division, the Environmental and Health Sciences Division, and the National Security Division. The report for Environmental Technology Division is expected by the end of October 1998. The divisions were ranked excellent (1) to excellent-outstanding (2). Each of the Divisions is formally responding to the observations/recommendations.
- **External Peer Review of PNNL Programs:** The results of the four external reviews were superb. The Tanks Focus Area review was very productive, and valuable input was received from the reviewers; this review differed from past reviews and was considered by the TFA to have provided the most valuable information of the reviews to date. The BES reviews of the Chemical Physics and Materials Science were quite extraordinary in describing the projects and their principal investigators. It is not common to see such praise-worthy remarks.
- **Wiley Environmental Molecular Sciences Laboratory Operations Review:** This review validated the process by which EMSL is discharging its responsibilities as a national user facility with the review statements "it is a pleasure to review the operations at this magnificent scientific facility" and the "operations are extremely well-managed."
- **Peer Review of New Proposal Submissions:** The results here are mixed. The EMSP and NABIR program results were outstanding, while the outcome of the health effects competition was disappointing. A formal evaluation of this effort has been completed and the results will be used in subsequent responses to calls for proposals.

The Laboratory made a commitment to institutionalize peer review and utilize the information acquired to improve both the peer review process and the quality of science, engineering, and technology. It is important to note that interactions between Laboratory and DOE-RL staff have led to creation of a peer review program in which the process itself and the utilization of derived information are the most important elements. The descriptors/rankings applied to reviewed work are useful and informative to identify issues that must be addressed but in themselves neither drive the process nor provide its most important product.

The Laboratory's performance in "Results of Peer Review (2.1.1)" is outstanding. All commitments and milestones were completed. The Laboratory Review Committee and Division Review Committees were established and are operational. Each Division for which DRC reports have been received has established formal procedures to deal with observation/recommendations. All sponsor-initiated reviews were completed and actions taken on recommendations/findings. The descriptors applied to the reviewed work ranged between excellent and outstanding. Finally, the Laboratory's process for selection and submission of proposals in response to major RFPs issued by funding agencies has been very useful and successful.

APPENDIX B: ORGANIZATIONAL STRENGTHS AND AREAS FOR IMPROVMENT IDENTIFIED THROUGH SELF-ASSESSMENT

The following sections (B.1 through B.6) represent a Laboratory level rollup of performance in specific areas as reported by the Laboratory's Divisions and Directorates in their FY1998 self-evaluation reports. The information is organized in terms of the *Assessment Planning and Evaluation Framework Criteria* used in IAP's assessment planning and evaluation process

B.1 BUSINESS AND OPERATIONAL RESULTS - This section refers to performance outcomes in relationship to the key goals/objectives and indicators established by the Division/Directorate in their self-assessment and business plans.

Strengths

- (+) Progress continues towards full integration of the self-assessment process with the business planning process.
- (+) Customer's key goals and objectives are used to help define candidate business-thrust areas.
- (+) Communication of business drivers and key performance objectives and indicators across organizations is improving. Attempts are being made to establish "ownership" for achievement of organizational objectives and alignment with individual objectives.
- (+) There were few gaps in the monitoring of performance objectives and indicators (POIs) and execution of planned assessments.
- (+) Performance metrics are undergoing refinement. Self-assessment plans include newly developed elements that should pay dividends in future performance.
- (+) Substantive improvements in documenting business and operational results have been made.
- (+) Cycle time reductions and other operational process improvements realized cost savings to the Laboratory's Building and Utility budget were realized.
- (+) The objective of optimizing horizontal stewardship is being met in the Laboratory's largest technical division.*
- (+) Strength in relationship management and emphasis on business results has led to outstanding performance
- (+) Leadership in technical capability and project/program management continues to bring in sales and maintain business volume.
- (+) Effective business development further enhances the cost effectiveness of business results.
- (+) Multiple capabilities across organizational boundaries are brought to bear on the customers' needs in an effective manner.

Improvement Themes

- (-) Lack of a process to identify business thrusts for the Division information technology LDRD
- (-) Inadequate ability to develop realistic forecasts, i.e., sales, business volume, etc.
- (-) Absence of a Laboratory-level change control process for adjusting forecasts so that only one set of forecasts is used to track/measure performance against.
- (-) Tendency towards tracking too many performance objectives in a given year.
- (-) Performance results reporting is improving but still cumbersome in some cases.
- (-) The lessons learned from this year's Self-assessment program performance will need to be incorporated into FY1999 planning to ensure more clarity in our research focus and investments. The Fundamental Science Product Line metrics will weigh in heavily.
- (-) Self-Assessment has not yet permeated the organization. This will be a focus in FY1999 and beyond.

- (-) QWL data/Laboratory survey results are not provided until after the self-evaluation process has been completed.
- (-) There needs to be a better understanding of the progress made in achieving strategic intent and linkage to Lab level objectives.*
- (-) The number of direct Full-Time Equivalent staff (FTEs) has been an area of concern and emphasis for the entire Laboratory during FY1998. Most if not all organizations are having difficulty meeting their FTE targets even though recruiting efforts have kept pace with attrition.

B.2 LEADERSHIP - This section refers to how well senior managers provide leadership and sustain clear values, directions, performance expectations, and customer focus through personal involvement, and sustain a leadership system within their organizations.

Strengths

- (+) Managers work as a team to manage business and operations within their organization, and provide recognized leadership for accomplishing objectives.
- (+) Succession planning and 360 leadership evaluations are actively promoted.
- (+) Communication of management expectations to staff is increasing using various methods such as surveys, focus groups, brownbag sessions, all-hands meetings, and one-on-one interviews.
- (+) Management involvement at all levels is increasingly apparent, personal and meaningful to self-assessment and achievement of performance objectives. There is a strong and consistent focus on values, performance expectations, and priorities by the Level 1 Manager and the leadership team.
- (+) Commitment to using the self-assessment process as a management tool is increasing and becoming a part of the Laboratory's business planning culture.
- (+) Performance goals relating to setting and communicating strategic intent and purpose are included in management-level performance expectations.
- (+) A Self-Assessment Program Coordinator position was developed and deployed in several organizations to enhance on-going communication with both internal (division/directorate) and external (DOE RL, MET) counterparts.
- (+) Staff understanding of the Customer Service Model (CSM) has been enhanced using techniques such as all-staff meeting discussions, workshops tailored to individual work, and in one organization, issue of a formal rationale for CSM implementation to all staff.
- (+) The performance feedback process has been improved by providing ongoing performance feedback in addition to scheduled SDR reviews, and through the distribution of promotion criteria to all staff.
- (+) Use of Web sites as a vehicle to communicate to all staff on various levels of detail is increasing. Staff response is encouraging based on increased usage rates and personal feedback from individuals.
- (+) High expectations are set by the Level 1 Manager for all areas of business performance, and communicated to management team.

Improvement Themes

- (-) Ability to maintain a balance between customer needs and staff needs is not always well balanced. External customer demands need to be reconciled with the internal leadership necessary to establish and maintain a positive working environment that empowers staff.
- (-) Communication with staff still needs improvement within some organizations.
- (-) Inconsistencies exist in working with staff to help them understand their role and contributions to the organization's goals.

- (-) Some organizations over-rely on the Level 1 Manager to communicate the organizational vision, roles and values to staff.
- (-) Not all organizations have a clear picture of their role and responsibilities in the Customer Service Model as it relates to the relationships between Market Sectors and Product Lines.
- (-) Succession plans for key organization Leadership team members need to be finalized, and self-assessment program responsibilities need to be captured in all self-assessment program descriptions.
- (-) Long range goals/plans are not well articulated and thus not understood by staff.
- (-) Although some organizations are involving staff in the Leadership process, there is still insufficient involvement of staff at the more junior levels with self-assessment and the achievement of key objectives.
- (-) There are inconsistencies in some organizations conducting progress reviews against staff performance plans.
- (-) An integrated system for customer focus and satisfaction has not been fully established fully.

B.3 HUMAN RESOURCES DEVELOPMENT - This section refers to those efforts necessary to develop and retain the full potential and participation of all staff in personal and organizational growth.

Strengths

- (+) Immediate managers support for innovation is viewed positively by staff.
- (+) Resources necessary for the career and professional development of staff are provided; staff-training plans are under development.
- (+) Customer satisfaction is used as a measure of effectiveness and to identify developmental opportunities for staff.
- (+) Rotational assignments are used to promote staff growth; responsibility for monitoring POIs is delegated by some managers to staff to develop staff capability in the area of self-assessment.
- (+) Rewards and Recognition Programs are being strengthened (successes celebrated; staff activities and accomplishments publicized; rewards and recognition used to encourage and acknowledge strong performance against organizational objectives).
- (+) Quality of Work Life (QWL) improvement efforts are increasing. Examples are: formation of a standing QWL team to address QWL issues on an ongoing basis; formation of a separate Supportive Workplace Environment Team which meets on a regular basis and provides management with recommendations and possible solutions to problems within the organization; performance of follow-up QWL surveys to evaluate results of actions taken within the organization to increase staff satisfaction with the work place environment.
- (+) We proactively explore our staff issues and look for ways to retain the staff we have while growing new staff that will contribute to our overall success. We have implemented a variety of communication mechanisms and are exploring ways to offer staff greater opportunity for innovation and creativity.
- (+) There are examples of staff going on entrepreneurial leave and undertaking formal educational efforts.
- (+) Leadership development is a high priority for the Level 1 Manager.
- (+) The management team is empowered to make decisions when the Level 1 Manager is away from the Laboratory. They work well together to make those decisions.
- (+) The management team is committed to staff projects with the best people available.
- (+) Leadership ensures on an ongoing basis that it will meet the needs of the product lines and sub-sectors through allocation of funding and or capabilities.

(+) Leadership is sensitive to retention of staff and the need to respond to staff needs in order to retain the best capabilities available for customers.

Improvement Themes

- (-) Information on conferences and journals is incomplete because the system we are using to collect and provide this data has not been fully implemented.
- (-) Some staff remain dissatisfied with their opportunities for growth although several indicators show some improvement in staff perception of training and development opportunities. (-) Junior staff are noticeably absent in assessment planning activities.
- (-) Again, we are striving to focus on action items deemed important by staff.
- (-) Human resource requirements are not linked to long-term planning and less than adequate attention is being given to the development of human resources consistent with long-term needs
- (-) Although alignment of individual staff goals and organizational objectives is improving and continues to be an area of attention, there is insufficient clarity in alignment of the organization's goals with staff functions.

B.4 CUSTOMER FOCUS AND SATISFACTION - This section refers to how well the organization satisfies customer expectations, meets customer needs, determines customer requirements, and gathers information to understand and anticipate future customer needs that will lead to new business opportunities.

Strengths

- (+) Data continues to show that the work conducted by organizations on average is highly valued by customers, is important to them and their missions, and that the Laboratory delivers value in terms of product quality, project management, and price/value comparisons.
- (+) The external Peer Review Committee was extremely valuable in evaluating the quality of science and technology in the Energy Division and provided helpful suggestions to improve Laboratory performance.
- (+) The Laboratory actively seeks input and feedback from both internal and external customers through an annual Laboratory-level customer survey, organizational-level customer surveys, and focus groups held with customers. One organization's performance resulted in the highest rating obtained in three years of tracking.
- (+) Improvements in the Laboratory's working relationship with DOE-RL have been noted, although it has also been noted that staff turnover has had a negative impact on team building with RL.
- (+) During the POI development stage, extensive input was solicited from the entire management team, RL counterparts, the Laboratory Agenda and Critical Outcomes, Battelle Memorial Institute (BMI) initiatives, and line management customers. A process for integrating that feedback and developing long-term strategic objectives was achieved.
- (+) We have been highly focused upon our primary customer and feel we understand their needs. We have been somewhat aggressive in our approach with that customer. It has been to our favor.
- (+) A high degree of customer satisfaction is evidenced by budget growth from repeat business.
- (+) The Laboratory has unique capabilities (facilities and staff) to work on customers' strategic problems as noted by positive feedback from customers.
- (+) The Laboratory has a process for managing projects that contributes to increased customer satisfaction.

Improvement Themes

- (-) The results of the Laboratory Customer Feedback Survey were not available for inclusion in the year-end reports. Alternative measures for FY1999 that do not rely solely on this data need to be developed.
- (-) In some cases, customer accessibility to and communication with project managers needs improvement.
- (-) The process used to conduct an environmental/market scan and identification of customer requirements needs to be documented and formalized.
- (-) Customer metrics should be expanded to include complaint management and behavioral elements that measure customer loyalty and return business potential.
- (-) We need to gain greater strategic intent in pursuing both primary and secondary customers to ensure we have a broader sustainable future.
- (-) Customer relationship management is not systematic.
- (-) In some organizations, engagement with DOE RL staff in self-assessment activities is not occurring at a significant level.
- (-) There is no system to capture and communicate customer input elicited from informal satisfaction surveys

B.5 PROCESS MANAGEMENT - This section refers to how well the organization addresses the actions necessary to improve that its key processes are continually improved and deliver high value to the customer.

Strengths

- (+) Organizations have implemented a number of significant process improvements based on assessment results including reductions in operating costs; improved communications within the organization; increased integration of assessments; and efficient /effective use of electronic media to communicate performance results to staff.
- (+) The process for identifying performance objectives and indicators is formalized and in place in many organizations.
- (+) The process for tracking and informing staff and management of training requirements continues to produce high levels of training completion and identification of future training needs.
- (+) Use of subject matter experts on a dedicated basis continues to provide a cost-effective way of ensuring compliance while providing value added to technical staff.
- (+) Teaming during the year with BMI has resulted in the sharing of best practices and cost savings. Key internal (to the Laboratory) working relationships have been identified and improved during the year.
- (+) We have made outstanding progress in many strategic areas with IP and business operations standing out among the crowd.
- (+) The LDRD process is a strong, structured business planning process.
- (+) Realignment of work processes in order to improve customer satisfaction is enhanced through the involvement of staff in assessing the processes.
- (+) Business planning templates were streamlined and integrated with particular emphasis on the Sector business plan and investment proposals. Opportunities for further improvements are being identified.
- (+) Business analysis processes continue to become more efficient through the use of new computer tools and financial models.
- (+) Leadership expectations in the area of performance evaluation are high which causes the management team to develop a very effective system for measuring performance.

- (+) Leadership expectations for continuous improvement based on self-assessment information are emphasized on a continuous basis.
- (+) The Self-Assessment process is linked to individual performance objective and goals.

Improvement Themes

- (-) The Information Resources Management System (IRMS) description needs to be revised to reflect expanded oversight responsibilities for setting the standards and requirements for staff in the four distinct customer populations it serves: DOE, other Laboratory management systems, users of the Software Systems Engineering Process (SSEP), users of the computing and communications infrastructure (both desk top and major hardware systems), and other issues related to expert delivery and resource management.
- (-) The R&D organizations do not collectively evaluate their implementation of all aspects of the ES&H programs in a consistent manner.
- (-) Communication between waste generation and waste management operations personnel needs to be improved.
- (-) SBMS Subject Areas and Management System concepts are not well integrated, and their relationship is not well understood by many staff.
- (-) The BMI/PNNL/DOE planning processes are not well timed (synchronized) or integrated. The timing related to soliciting customer requirements and setting appropriate organizational goals needs to be changed in FY1999 in preparation for setting FY2000 goals.
- (-) The Management Information System that is part of the larger Acquisition Management System needs to be improved/replaced.
- (-) We have to carefully work with other management systems to ensure we can deliver high quality scientific research effectively and efficiently.
- (-) The 'continual improvement' component is missing in many internal processes.
- (-) Stronger documentation around "use of results" needs to occur.
- (-) During the FY1998 planning process the organization's Finance staff was not always consulted to establish the availability and feasibility of retrieving information for performance measures. A number of change control items were initiated because the data was not available by functional role of the Customer Service Model as needed.
- (-) The information system that measures the number of new science and technology clients does not easily provide this number.

B.6 COMPLIANCE - This section refers to performance outcomes based on current levels, improvements and trend in areas related to applicable laws, order, regulations and requirements.

Strengths

- (+) All issues identified in FY1997 in the area of Unclassified Computer Security were successfully resolved in FY1998.
- (+) There have been no repeat findings in Inspector General, GAO, DCAA, or DOE audits or reviews.
- (+) An unfavorable trend in compliance with the Laboratory's Time Charging policy was a concern in the middle of year; this trend was reversed as a result of increased emphasis by the Laboratory's Business Offices.
- (+) The Laboratory is exceeding its goal in the awards to small and small disadvantaged businesses.
- (+) Organizations are making strides in complying with the regulations that apply to their work.
- (+) Usage of the Laboratory's Standards Based Management System (SBMS) is increasing.

- (+) Records of Decision are used systematically to demonstrate management systems that are responsive to driving requirements (e.g. DOE Orders, etc.)
- (+) The Laboratory Divisions' programs are in compliance with DOE orders and their projects are closely linked to DOE programs, based on a review of each Division's LDRD management system and several selected projects.

Improvement Themes

- (-) Results of a division level assessment of in the area of project management compliance indicate that compliance and use of SBMS/SSEP for project management does not appear to be consistently adhered to.
- (-) An incidence of inadequate attention to working funds resulted in a loss of approximately \$40K. Procedures have been tightened and the number of working funds reduced from nine to two.
- (-) It has been identified that the Laboratory's method for accounting for intellectual property may not provide the government with an equitable share of cost and recovery. Practices will be changed in FY1999 and an adjustment made to DOE for past imbalances, if necessary.
- (-) Compliance with the Anticipatory Policy has been a concern this year. A corrective action plan including increased emphasis and review of the policy has been developed
- (-) A formal HR Directorate change control process needs to be put into place to address 1) changes in the regulatory environment, 2) changes in procedures and guidelines, 3) exceptions or waivers to policy and 4) assurance that Laboratory policies and practices emulate BMI policies and practices to the extent possible.
- (-) The Laboratory is not meeting its goal in the awards to women-owned small businesses.
- (-) As stated previously, we need to focus on staff involvement in our management systems to ensure we can maintain compliance in a cost effective and efficient manner.
- (-) The scope of assessments planned and performed does not always fully address the implementation of and compliance with external requirements.
- (-) There is no systematic process for gathering self-assessment information and then analyzing it relative to implementation of QA Rule related procedures.
- (-) Documentation that is easily retrievable for corrective actions of more minor consequence is weak in many areas excluding the RPL. The process will be improved in first quarter of FY1999.