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04-LMD-0013

**DEC 2 2 2003**

Dr. L. K. Peters, Director  
Pacific Northwest National Laboratory  
Richland, Washington 99352

Dear Dr. Peters:

**CONTRACT NO. DE-AC06-76RL01830 – FISCAL YEAR (FY) 2003 YEAR END  
EVALUATION OF BATTELLE FOR MANAGEMENT AND OPERATION OF THE  
PACIFIC NORTHWEST NATIONAL LABORATORY (PNNL)**

Enclosed is the U.S. Department of Energy (DOE) FY 2003 Year End Evaluation Report of Battelle's management and operation of PNNL. The DOE's overall rating of Battelle's performance for FY 2003 is Outstanding. This rating is based on the Critical Outcome matrices identified for FY 2003, for Science and Technology Excellence, Management and Operations Excellence, and Leadership Excellence.

This was the eighth year that the performance evaluation was centered on the attainment of mutually agreed upon Critical Outcomes and DOE continues to be very pleased with Battelle's overall performance. As in years past, the strong partnership between DOE and Battelle continues to move the Laboratory in an effective and efficient manner towards the future.

The DOE Pacific Northwest Site Office (PNSO) review indicated that Battelle's performance generally exceeded expectations throughout FY 2003, and although some areas for improvement were identified, these were more than offset by the identified strengths throughout the organization. PNSO's evaluation of each of the Critical Outcomes with a few exceptions agreed with Battelle's FY 2003 Annual Self-Evaluation Report. Following is a summary of each of the Critical Outcomes:

- The performance evaluations provided by the primary DOE-HQ program offices, which equated to 80 percent of the Scientific and Technological Excellence Critical Outcome, once again touted the high quality, externally recognized, scientific research and development programs managed by Battelle. With the exception of the Office of Assistant Secretary for Environmental Management, each of the HQ offices (Office of Science, Office of Defense Nuclear Nonproliferation, Office of Intelligence, Office of Counterintelligence, Office of Assistant Secretary for Energy Efficiency and Renewable Energy, and Office of Assistant Secretary for Fossil Energy) rated overall performance as Outstanding. The Office of Assistant Secretary for Environmental Management rated overall performance as Excellent.

PNSO's review further noted the continued success of the Biomolecular Networks, Computational Sciences, and Nanoscience and Technology initiatives and strategic academic partnerships that strengthen the scientific capabilities of the Laboratory, earning an overall rating of Outstanding for this outcome.

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- The Management and Operations Excellence Critical Outcome also earned an overall rating of Outstanding. Battelle continued to conduct work and operate the Laboratory facilities with distinction, supportive of and integrated with the Laboratory's science and technology mission, and protective of workers, the public, and the environment. Each of the indicators measuring the Contractor's Integrated Safety Management program (i.e., Total Recordable Case Rate, Lost Workday Case Incident Rate, Conformance to ISO 14001 Standard, Spread of Radioactive Contamination, etc.) met or exceeded targets established for FY 2003. Measures of the contractor's ability to sustain and enhance the effectiveness of the Integrated Safeguards and Security Management system indicated overall outstanding performance, however, Battelle did receive a rating of "significant weakness" (the lowest possible rating) in the unclassified cyber security arena during an external evaluation conducted by the DOE Office of Independent Oversight and Performance Assurance. This area should receive continued appropriate management attention during FY 2004 to ensure necessary corrective actions are completed.
- The Leadership Critical Outcome measured the Contractor's leadership and regional partnerships that enable the Laboratory to continue to be recognized as an enduring local, regional, and national asset. DOE continues to be very pleased with Battelle's efforts throughout the community in which they work and the innovative approaches and initiatives sought out by Battelle to continue to support the community's economic development activities. Furthermore, Battelle's performance in the area of Regional partnerships, and the increasing growth of Regional Collaborations intended to help identify regional needs with potential technology related solutions was noteworthy. These efforts are having a positive impact on regional perception of the Laboratory by positioning it as a leader in addressing regional needs via the technologies of regional research institutions. Battelle's impact on science, mathematics, and technology education also continues to be outstanding.

Although not specifically called out within the performance evaluation plan, the Contractor continues to make good progress in meeting milestones identified within key Contractor plans related to physical and intellectual capabilities at the Laboratory, however, we want to reiterate the need for comprehensive planning related to the inevitable loss of the 300 Area facilities. This has been a key issue for a number of years and while we understand there have been changes to the overall scope of the 300 Area cleanup plans, aggressive action to provide the planning and strategic foresight to realistically address the issue requires continued senior management attention and leadership. Aggressive management attention will allow appropriate plans for the disposition of the capabilities housed within these facilities to be developed and initiated to support the Laboratory's future vision.

PNSO has also noted that while the Laboratory does have a self-assessment process for most program and operational areas, the maturity level of the self-assessment process in many of these areas is low and Laboratory level performance measurement information is lacking. There have been numerous external and internal observations that point to inconsistencies and shortcomings in the self-assessment program over the past few years to include observations noted as part of a recent BMI corporate and DOE OA-50 review. This is an area of particular concern for DOE

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since the adequacy of self-assessment is a key factor in establishing an effective corporate assurance process and achieving the DOE oversight changes envisioned by the new contract.

Furthermore, PNSO's verification/validation efforts have raised concerns regarding the rigor, robustness, and credibility of the Contractor's FY 2003 Annual Self-Evaluation Report, specifically surrounding the reporting of actual performance of some indicators/measures.

The above concerns along with other areas for improvement noted by PNSO are provided in more detail within section III of the enclosed report. Although this section is provided for information purposes only and does not affect the evaluation rating or fee, PNSO expects the Contractor to take special note of the information provided, initiate appropriate action to insure continuous improvement, and provide a formal response reflecting the commitment to address the noted areas of concern.

Overall DOE continues to be pleased with Battelle's efforts and performance in managing and operating the Laboratory. The provisions of the new contract provide an avenue for continued improvements both in Laboratory performance and in streamlining the Department's oversight activities, as well as, a basis for improved partnering between the Department and Battelle for the operation of the Laboratory. As we implement these provisions we expect to see further performance enhancements and believe that we have the basis for a bright future for PNNL.

Based on the overall rating of Outstanding (3.7 value points) and in accordance with the fee determination section of Appendix E of the contract, Battelle earned 98% of the total available performance-based fee for FY 2003, which equates to \$7,154,000. To date, Battelle has withdrawn \$6,935,000 of fee from their DOE letter of credit bank account. Battelle is hereby authorized to draw down the remaining \$219,000 in fee payment for FY 2003.

If you have any questions, please contact me, or your staff may contact Paul W. Kruger, Manager, Pacific Northwest Site Office, on (509) 372-4005.

Sincerely,



for  
Keith A. Klein  
Manager

PD:RMA

Enclosure:  
FY 2003 Year End Evaluation  
for Battelle

cc w/encl:  
R. L. Orbach, SC-1

**Pacific Northwest Site Office**

**FY 2003**

**Performance Evaluation of  
Battelle Memorial Institute  
for the  
Management and Operations of the  
Pacific Northwest National Laboratory**

December 2003



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I. OVERALL SUMMARY/RATING

The basis for the evaluation of Battelle Memorial Institute’s (the Contractor) management and operations of the Pacific Northwest National Laboratory (the Laboratory) during FY 2003 centered on the measures found within the Scientific and Technological Excellence, Management and Operations Excellence, and Leadership Excellence Critical Outcomes. Although the Contractor’s self-evaluation of the Critical Outcomes and the associated objectives and indicators was the primary means for determining the Contractor’s performance, other means such as operational awareness (daily oversight) activities, U.S. Department of Energy, Richland Operations Office (RL) and Pacific Northwest Site Office (PNSO) reviews, and other outside agency reviews (OIG, GAO, DCAA, etc.) conducted throughout the year were utilized as appropriate to ensure the Contractor continued to meet minimum contract requirements throughout the performance evaluation period. In addition, a two-week field review was conducted from October 31 through November 14, 2003, during which time review teams followed up on (verified and/or validated) activities and issues associated with the outcomes and other areas of the Contractor’s Directorate/Division self-assessments.

The performance evaluation rating for FY 2003 was calculated utilizing the following methodology. The adjectival rating earned for each performance indicator was assigned the appropriate value points. The Objective rating was then computed by multiplying the value points by the weight of each performance indicator within an Objective. These were then added together to develop an overall score for each Objective. The score for each Objective within an Outcome was then computed in the same manner to arrive at a score for each Outcome. The scores for each of the Outcomes were then multiplied by the weight assigned and these were summed to provide an overall score for the Contractor. The total Contractor score was compared to an adjectival rating scale, see Table B below, to determine the overall Contractor adjectival rating for FY 2003. An adjectival rating may be identified at any level of the performance evaluation process (Outcome, Objective, or Indicator); however, the raw score (rounded to the nearest hundredth) from each calculation was carried through to the next stage of the calculation process. The raw score was rounded to the nearest tenth of a point for purposes of identifying the Contractor’s overall adjectival rating as indicated in Table B. A standard rounding convention of x.44 and less rounds down to the nearest tenth (here, x.4), while x.45 and greater rounds up to the nearest tenth (here, x.5).

Battelle’s performance generally met or exceeded PNSO expectations throughout FY 2003, and although there were several areas for improvement identified these were more than offset by the identified strengths throughout the organization. Based on this evaluation, the overall performance score was determined to be 3.69 value points, which corresponds to an adjectival rating of **Outstanding**. The ratings for each of the Outcomes, as well as the overall rating are indicated within tables A and B below.

Science & Technological Excellence	Outstanding	3.67	60%	2.20	
Management and Operations Excellence	Outstanding	3.70	25%	0.93	
Leadership Excellence	Outstanding	3.70	15%	0.56	
Total Score					<b>3.69</b>

**Table A: FY 2003 Contractor Evaluation Score Calculation**

Total Score	4.0 - 3.5	3.4 - 2.5	2.4 - 1.5	1.4 - 0.5	<0.5
Final Rating	Outstanding	Excellent	Good	Marginal	Unsatisfactory

**Table B: FY 2003 Contractor Adjectival Rating Scale**

Section III, Other Notables, of this report provides information regarding other PNSO/RL reviews/evaluations conducted as part of the FY 2003 performance review process. It should be noted that this section is provided for information purposes only and although some strengths and weaknesses were noted, no weakness were identified that would impact the otherwise earned fee. Even though these reviews



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do not affect the evaluation rating or fee, the PNSO expects the Contractor to take special note of the information provided, initiate the appropriate actions to insure continuous improvement in all aspects of the management and operations of the Laboratory, and provide a formal response reflecting the commitment to address the area of concern.



## II. CRITICAL OUTCOMES, OBJECTIVES & PERFORMANCE INDICATORS

### 1.0 SCIENTIFIC AND TECHNOLOGICAL EXCELLENCE (60%)

The Scientific and Technological Excellence critical outcome measured the overall effectiveness/performance in delivering science and technology as viewed by the DOE-HQ Office of Science (SC), and other appropriate HQ offices, performance against three primary science and technology initiatives, and creating and maintaining strategic academic partnerships that strengthen scientific capabilities. The HQ evaluations indicated that the Contractor continues to meet and/or exceed expectations regarding the overall scientific and technological programs conducted at the Laboratory. Table 1.2 shows the individual ratings and weighted value points awarded for each of the seven HQ program offices along with the overall value points earned. Two of the three initiatives evaluated as part of this outcome (Biomolecular Networks, and Computational Sciences) were rated as Outstanding, while the third (Nanoscience and Technology) was rated as Excellent. The Contractor continued its excellence in creating and maintaining strategic academic partnerships which was rated as Outstanding.

Overall the evaluation indicated that the Contractor continues to meet and/or exceed expectations regarding the overall scientific and technological programs, affording the Contractor an overall rating of **Outstanding** (3.67 value points) for this critical outcome. Table 1.1 and 1.3 shows how the outcome objective ratings were determined as well as the overall outcome rating.

#### 1.1 through 1.4 DOE-HQ Program Office Evaluations

The overall rating for these objectives is an **Outstanding** with a numerical score of 3.63 value points. Six Program Offices provided overall **Outstanding** ratings and one Office, Assistant Secretary for Environmental Management, provided an overall **Excellent** rating. Each of the Program Office evaluations included, as appropriate, the following four objectives: Quality of Science & Technology; Relevance to DOE Mission and National Needs; Success in Constructing and Operating Research Facilities; and Effectiveness and Efficiency of Research Program Management. The following summarizes the HQ evaluations received. The full evaluation reports provided by each Program Office are appended to this report. The overall rating from each of the HQ offices was weighted primarily based on business volume. The overall performance rating for this portion of the outcome was determined by multiplying the overall rating (value points) assigned by each of the seven program offices identified below by the weightings identified for each and then summing them (see Table 1.2). When no specific value points were assigned by the HQ reviewing office the appropriate value points were assigned in accordance with the adjectival rating definitions and value points identified in Figure I-1 of the FY 2003 Performance Evaluation and Fee Agreement (J-E-2).

#### Office of Science (SC)

SC has provided detailed narrative evaluations of performance from the program offices of Basic Energy Sciences (BES), Biological and Environmental Research (BER), Advanced Scientific Computational Research (ASCR), and Workforce Development (WD) to support an overall consolidated rating of **Outstanding** for FY 2003, with a numerical score of **3.6** out of a possible 4.0. The numerical score was calculated using a weighted average of the performance evaluations provided by SC program offices, with the budget for the Laboratory from each office as the weighting factor. For FY 2003 the Contractor received an 'Outstanding' for the four goals of Quality, Relevance, Facilities, and Program Management, which is an improvement over FY 2002 ratings where the Contractor was rated 'Outstanding' for Quality & Relevance, and 'Excellent' for Facilities & Program Management. The FY 2003 numerical score of 3.6 is a slight improvement over the FY 2002 score of 3.53.

SC has criticized the Contractor's scientific leadership, management and planning as being inadequate in the past due to what they perceived as a poor use of laboratory resources and science that was of lower quality than desired. SC has noted that they believe considerable progress was made in these areas of deficiency during FY 2003, citing new leadership and management practices



as being responsible for improving the Laboratory's quality and productivity. In particular, the Environmental Molecular Sciences Laboratory (EMSL) management team was highlighted for the excellent job they have done in implementing a new operational model for the EMSL. Of additional note was the outstanding quality of the Chemical Physics research, and the exceptional outreach to undergraduate interns visiting the Laboratory.

#### **Assistant Secretary for Environmental Management (EM)**

The Contractor's overall performance in the area of EM is rated at **Excellent** for FY 2003. This rating is based on a weighted average score computed using each Program's FY 2003 obligations at the Laboratory as the weighting factor. Evaluations were received from the Office of River Protection (ORP) and RL in the following areas: Technical analysis and support for ORP, Legacy Removal and Operations, for RL, Public Safety and Resource Protection, the Groundwater Protection Project, the Solid Waste Environmental Impact Study (EIS), the Life Cycle Model, DOE EM-50 support, Hanford Site Planning and Integration, and support to RL. Narrative evaluations of performance are provided in Appendix II. Although the Quality of Science and Technology is rated at an **Excellent** level there were some areas of concern over data quality with regard to maintaining quality standards used in calibrating instrumentation. The support to the Groundwater protection project was of a very high quality and very relevant in the mission areas. Overall the Effective and Efficient Program Management was only rated at a good level based mainly on Cost Accounting Standard violations associated with Analytical Services Office corrective actions and failure to comply with EM baseline change control expectations.

Note that other Hanford Contractor work was not considered in this evaluation, only work performed directly for the Federal client.

#### **Office of Defense Nuclear Nonproliferation (NA)**

The Contractor's overall performance in the area of Defense Nuclear Nonproliferation is rated **Outstanding** in the areas of Quality, Relevance, and Management Effectiveness (see Appendix III). The laboratory consistently accomplished challenging tasks on time and within budget, providing exceptional results in a highly professional manner. The Contractor met the challenge in FY 2003, providing the outstanding technical and managerial assistance the NA has come to expect from them. The Contractor's can-do attitude and focus on customer service set the standard for support to NA-20.

#### **Office of Intelligence (IN)**

The Contractor's performance in the areas of Quality, Relevance, and Management Effectiveness, as well as overall performance is rated at **Outstanding** (see Appendix IV). The Contractor has been extremely effective in meeting the quick response needs of the IN and has delivered the highest quality products on time and on budget. The technical and scientific content of these products is without peer. The operation and leadership demonstrated by the Contractor has shown that it is an organization that not only meets, but significantly exceeds, the exacting management standards necessary to effectively support the sensitive and time urgent mission of the IN.

#### **Office of Counterintelligence (CN)**

The overall performance of the Contractor in the area of counterintelligence is rated at **Outstanding** (see Appendix V). Contractor executive management and staff engaged in activities supporting DOE's Counterintelligence (CI) Program are of the highest professional caliber within the DOE Complex. The Contractor's CI activities are comprehensive, balanced, and so well integrated that the CI office has recommended that its management practices be used as a model for other sites to follow. The Office of Counterintelligence continues to find the Contractor CI Program employees courteous, timely, and thoroughly responsive to all requests. With respect to executive and program management in particular, Contractor CI elements have achieved strategic visions that are fully consistent with the fundamental goals and objectives established by the Office of Counterintelligence at the national level.

#### **Assistant Secretary for Energy Efficiency and Renewable Energy (EERE)**

The Contractor's overall performance for the Office of Energy Efficiency and Renewable Energy is



rated at **Outstanding** for FY 2003 with 3.79 value points awarded (based on the average of the scores for of the four objective as indicated within the table on page 7 of Appendix VI). This rating represents a weighted average score computed using each Program's "FY 2003 Obligations at the Laboratory as of August 31, 2003" as the weighting factor. Six of the eleven EERE Programs, namely Building Technologies; Federal Energy Management Program (FEMP); FreedomCar and Vehicle Technologies; Hydrogen, Fuel Cells, and Infrastructure; Industrial Technologies; and Weatherization and Intergovernmental submitted evaluations. These detailed narrative evaluations of performance are provided in Appendix VI. The Contractor has maintained a record of innovation and discovery. In FY 2003, the Laboratory received the Federal Laboratory Consortium (FLC) Award for Excellence in Technology Transfer, an award given for engine exhaust after-treatment system based on non-thermal plasma-assisted catalysis. The Contractor also does an outstanding job in assisting the advancement of the program goals of the Residential Building Energy-Efficiency Codes (RBEEC) activities, the DOE Energy Efficiency and Renewable Energy, Office of Building Technologies, nationally recognized energy code advancement program. In addition, the Contractor achieved significant achievement in determining indoor air quality in commercially manufactured housing units in support of the industrial housing partnership of the Building America Program. Of particular note, this year, has been the staff's knowledgeable expertise in assisting the new DOE American Society of Heating, Refrigeration, and Air Conditioning Engineering (ASHRAE) Medium Priority Products Rulemaking Team come up to speed and better understand the ASHRAE products and process. The Contractor has become the source of technical and building science information and the source of impact analyses of upgrading building energy codes. The Contractor has also continued to make outstanding contributions to the field of sensor development, on behalf of the Fluid Dynamics Research Program, as well. In the area of Hydrogen and Infrastructure, the Contractor's steam reformer design work provides exceptionally low combustion-side pressure losses. In addition, the Contractor has developed a differential temperature water gas shift reactor that is two to three times more compact than conventional, two-stage adiabatic designs.

The Contractor made significant achievements as it relates to DOE Mission and National Needs. The Contractor consistently met or exceeded all of its annual performance goals in the area of FreedomCAR and Vehicle Technologies, specifically illustrated in the sulfur trap cooperative research and development agreement (CRADA) with Caterpillar Corp. All milestones set by the industry partner for FY 2003 were greatly exceeded ahead of schedule. In the area of Building Technologies, the approved 2006 IECC code change proposal was submitted on schedule, and this marked the most extensive revision of the code in decades. It is believed that the Contractor's work in sensors and diagnostics will influence other EERE Program areas as well (i.e. Hydrogen and Biomass). In FEMP, the Contractor had a number of significant achievements in FY 2003, including making developments to aid Federal Agencies in improving their gas related efficiency. The Contractor continues to be efficient in all aspects of financial management of its programs and in ensuring personnel competencies. The Contractor staff were extensively published in numerous peer reviewed journals, trade journals, and conference proceedings. The Contractor maintains low uncosted balances and has seen a marked improvement demonstrated in its Building Technologies Program. The Contractor successfully completed the construction of the Emissions Characterization and Aerosol Laboratory in support of the DOE/Office of FreedomCAR and Vehicle Technologies Engine and Emission-control Technologies Program. This facility allows for the realistic testing of diesel after treatment and particulate filtration systems and validation of micro and bench scale results under "real world" conditions. Also, the Contractor has acquired a world class particulate analysis system known as SPLAT-MS (Single Particle Laser Ablation Time-of-Flight Mass Spectroscopy). This system can sample individual diesel particulates and their properties. In addition, the Contractor has successfully installed an SGI Linux Cluster parallel computing station dedicated to the computational fluid dynamics group.

Notwithstanding the outstanding performance identified above the following opportunities for improvement were noted:

- The Contractor is encouraged to continue trying to increase it's visibility with the Big Three automakers in order to become more 'mainstream' like Oak Ridge National Laboratory (ORNL) in the lightweight materials efforts.



- It is noted that in the Industrial Technologies Area, a more structured commercialization plan is needed.
- Notable deficiencies existed with the completion of some FreedomCAR and Vehicle Technologies Project milestones in a timely manner and should be given additional attention during the upcoming year.
- As noted previously, the selection of milestones and establishing their schedule should be given additional attention by the Contractor during the coming year.
- More attention needs to be paid to critically examining the balance between research and demonstration content of the Laboratory's activities.
- The internal technical review process should be reinforced.
- Improving the solidity of communications around the Building Technologies Program Multi-Year Program Plan (MYPP), its Annual Operating Plan (AOP), and Quality Control and Evaluation Plan could increase productivity.

#### **FE (Solid State Electrolyte Systems)**

The Contractor's overall performance for the Office of Fossil Energy is rated at **Outstanding** for FY 2003 with 3.71 value points awarded. FE provided narrative evaluations of performance for R&D – type projects that were valued at \$150,000 or more in FY03 (see Appendix VII). Two of the five projects, Fuel Cells and Solid State Electricity (representing 93% of FE's funding to the contractor in FY 2003) were rated Outstanding and three projects, Carbon Sequestration, Gas Hydrates, and NG Delivery Reliability, representing a total of 7% of the funding were rated Excellent. In the area of Fuel Cells, the Contractor has performed outstanding work technically and in support of SECA and HITEC program management including aggressive communication of results. The Contractor has pushed technical advances in SOFC seals, cathodes, failure analysis, stack design and contaminant tolerance of anodes that provides increased confidence the Programs will meet their objectives within the budget and time specified by the Office of Fossil Energy. Many of these advances have been transferred into industrial practice or planning. Promising new ideas or insights for existing concepts are part of current work plans in interconnects and understanding the basic mechanisms of SOFC performance and degradation that is essential to Program success. The Contractor has performed other Program support functions with equal ability such as conference support and Program outreach.

The Solid State Electrolyte Systems project has made outstanding progress in developing the technology to effectively join the thin electrochemically active YSZ (yttria stabilized zirconia) membrane to the metallic body of a device such that the resulting seal is hermetic, rugged and stable under both thermal cycling and continuous high-temperature operation. The project has been planned with foresight, aiming in the future to conduct a series of RAB experiments to examine the effects of composition and processing conditions on the strength, thermal cycling, and durability of the braze at high temperature.

### **1.5 Create Leading-Edge Scientific Capabilities to Support Evolving DOE Mission Needs**

PNSO concurs with Contractor's overall self-assessment rating of **Outstanding** for Objective 1.5. However, the Contractor's recommendation of Outstanding for the 1.5.2.3 Peer Review element did not meet the Outstanding criteria and was downgraded to **Excellent**, which did not affect the overall rating of Outstanding for 1.5.

#### **1.5.1 Progress Against Biomolecular Systems Initiative Expected Outcomes**

The overall Biomolecular Systems initiative (BSI) is rated as **Outstanding** for FY 2003. The initiative hired one lead (bioinformatics) scientist, two senior (bioinformatics and molecular) biologists, and three mid-level biologists/microbiologists exceeding the criteria of outstanding in the area of recruitment (1.5.1.1). The initiative submitted proposals to DOE and the National Institutes of Health with a focus on proteomics, computational biology and visualization, and microbial research that totaled over \$72M, far exceeding the target value of \$17M required for an outstanding rating (1.5.1.2). The initiative met the criteria for outstanding by achieving the



most complete viral proteome coverage to date (32 viral proteins), by successfully identifying, isolating and purifying Single Chain Antibody Variable Region Fragments (scFv) antibodies that specifically bind to calmodulin and developing assay techniques, and isolation of antigen specific scFv clones using a variety of selection techniques, including multiplex screens, individual screens, screens accomplished by flow cytometry, magnetic bead, based screens, or a combination of two techniques was accomplished including complete characterization for affinity, purification, and epitope binning (1.5.1.3). More than 60 papers were submitted for publication in peer-reviewed journals, greatly exceeding the target of 50 or more articles (1.5.1.4). In the peer-review sub-indicator (1.5.1.5), the criteria for an outstanding was met by submission of a comprehensive peer-review committee report that provides feedback on the specific focus areas and scientific-technical content of the initiative, the alignment of the BSI to DOE's missions and programs (Genomes to Life in particular), guidance with respect to the Initiative's future activities, and input on collaboration direction and efforts. Attending the peer-review sessions and reviewing the peer-review committee report accomplished validation of the rating by the PNSO point of contact for the initiative.

Sub-Indicator	Performance	Actual Score	Weighting	Weighted Score
1.5.1.1 Recruiting	Outstanding	4.0	20%	0.80
1.5.1.2 Program Development and Scientific Partnership	Outstanding	4.0	20%	0.80
1.5.1.3 Technical Achievements	Outstanding	4.0	20%	0.80
1.5.1.4 Continued Technical and Scientific Progress	Outstanding	4.0	20%	0.80
1.5.1.5 Peer Review	Outstanding	4.0	20%	0.80
Total Weighted Score for 1.5.1				4.00

#### 1.5.2 Progress Against Computational Sciences and Engineering Initiative Expected Outcomes

The Computational Sciences and Engineering Initiative expected outcome was rated overall as **Outstanding**. The initiative completed 6 of the 6 technical and scientific progress goals to achieve a rating of 'outstanding' for element 1.5.2.1. The Contractor successfully met sub-indicator 'outstanding' criteria for 1.5.2.2. For sub-indicator 1.5.2.3, Peer Review, the Advisory Committee report is not sufficient to warrant a rating of 'outstanding' as per the sub-indicator description, and 'excellent' is a more appropriate rating.

Sub-Indicator	Performance	Actual Score	Weighting	Weighted Score
1.5.2.1 Continued Technical and Scientific Progress	Outstanding	4.0	60%	2.40
1.5.2.2 Increase Visibility of Computational Science Activities at PNNL	Outstanding	4.0	20%	0.80
1.5.2.3 Peer Review	Excellent	3.0	20%	0.60
Total Weighted Score for 1.5.2				3.80

#### 1.5.3 Progress Against the Nanoscience and Nanotechnology Initiative Expected Outcomes

The Nanoscience and Technology Initiative expected outcome was rated overall as **Excellent** upon validation, rather than the Laboratory's Self-Assessment rating of Outstanding. The initiative completed four of the four elements of 1.5.3.1 – Increase Visibility of Nanoscience and Nanotechnology Activities at the Laboratory – to earn an 'outstanding'. Two of three elements were completed for 1.5.3.2 – Project and program development – to earn an 'excellent', with one element being partially completed. For sub-indicator 1.5.3.3, Scientific



Impact, two of four goals were completed, and two were only partially completed earning a rating of 'good'.

Sub-Indicator	Performance	Actual Score	Weighting	Weighted Score
1.5.3.1 Increase Visibility of Nanoscience and Nanotechnology Activities at PNNL	Outstanding	4.0	33%	1.32
1.5.3.2 Project and Program Development	Excellent	3.0	33%	0.99
1.5.3.3 Scientific Impact	Good	2.0	34%	0.68
Total Weighted Score for 1.5.3				2.99

### 1.6 Improve Scientific Impact of EMSL User Program

The Pacific Northwest Site Office concurs with the Contractor's self-assessment rating of **Outstanding** for Critical Outcome 1.6, based on the successful completion of the elements identified in indicators 1.6.1 and 1.6.2. The Contractor developed and issued a plan for development of the scientific grand challenges, established a steering committee of recognized authorities for each grand challenge, conducted/facilitated workshops for the purpose of establishing the scope of the science grand challenges, assisted in developing scope for SC science grand challenges as described in 1.6.1, and developed and implemented an optimal model for EMSL user facility operations as described in 1.6.2.



ELEMENT	Adjectival Rating	Value Points	Indicator Weight	Total Points	Objective Weight	Total Points
<b>Objectives 1.1 through 1.4: Program Office Total Scores (from Table 1.1)</b>	Outstanding			3.63	80%	2.90
<b>1.5 Create Leading-Edge Scientific Capabilities to Support Evolving DOE Mission Needs</b>						
1.5.1 Progress Against Biomolecular Systems Initiative Expected Outcomes	Outstanding	4.0	50%	2.00		
1.5.2 Progress Against Computational Sciences and Engineering Initiative Expected Outcomes	Outstanding	3.8	35%	1.33		
1.5.3 Progress Against the Nanoscience and Nanotechnology Initiative Expected Outcomes	Excellent	2.99	15%	0.45		
Objective 1.5 Total				3.78	10%	0.38
<b>1.6 Improve Scientific Impact of EMSL User Program</b>						
1.6.1 Increase the Impact of the EMSL User Program by Establishing Science Grand Challenges that Engage High Visibility User Communities.	Outstanding	3.7	50%	1.85		
1.6.2 Develop and Implement an Optimal Model for EMSL User Facility Operations (User Program).	Outstanding	4.0	50%	2.00		
Objective 1.6 Total				3.85	10%	0.39
Critical Outcome 1.0 Total						<b>3.67</b>

**Table 1.1 Science and Technological Excellence Critical Outcome Overall Score Calculation**

HQ Program Office	Adjectival Rating	Value Points	Weight	Weighted Score	Overall Weighted Score
Office of Science	Outstanding	3.6	30%	1.08	
Assistant Secretary for Environmental Management	Excellent	3.02	20%	0.60	
Office of Defense Nuclear Nonproliferation	Outstanding	4.0	20%	0.80	
Office of Intelligence	Outstanding	4.0	5%	0.20	
Office of Counterintelligence	Outstanding	4.0	5%	0.20	
Assistant Secretary for Energy Efficiency and Renewable Energy	Outstanding	3.79	10%	0.38	
Assistant Secretary for Fossil Energy	Outstanding	3.71	10%	0.37	
				Overall Program Office Total	3.63

**Table 1.2 Objectives 1.1 - 1.4 S&T Excellence Evaluation Score Calculation for Program Offices**

Total Score	4.0 - 3.5	3.4 - 2.5	2.4 - 1.5	1.4 - 0.5	<0.5
Final Rating	Outstanding	Excellent	Good	Marginal	Unsatisfactory

**Table 1.3 Scientific and Technological Excellence Critical Outcome Final Rating**



## 2.0 MANAGEMENT AND OPERATIONS EXCELLENCE (25%)

**The Contractor will manage and operate PNNL with distinction, becoming the DOE benchmark standard for Laboratory management, providing stewardship of DOE's assets, and protecting the health and safety of workers, the public, and the environment.**

The Contractor's performance within the Management and Operations Excellence Critical Outcome indicates that overall Battelle continues to conduct its work in a secure manner that ensures the safety of the worker, public and environment and does so utilizing systems which are increasingly integrated into the day-to-day operations of the Laboratory. Our review also indicated that the Contractor has made some progress in maintaining and enhancing the Laboratory's capability needs. Although the measures for the integrated safeguards and security arena, called out within indicator 2.1.3, indicated an overall outstanding performance, a review of the Contractor's unclassified computer security arena by DOE OA-10 was given a rating of "significant weakness" (the lowest possible rating) and should receive appropriate management attention. Although the Contractor failed to meet all the milestones called out as part of indicator 2.2.1 which measured the Contractor's success in enhancing the capabilities of the EMSL 900MHz NMR, the Contractor's efforts in rectifying numerous complex contractual issues pertaining to the 900MHz NMR was noted. The Contractor's expert handling of these issues resulted in turning a potential catastrophe into a successful acquisition of very valuable piece of equipment for the Laboratory. Given the events surrounding contractual and repair issues with the EMSL 900MHz NMR, as much of the intent of the indicator was accomplished as allowable under the circumstances, and therefore partial credit for the accomplishments was provided.

Based on the overall results of the objectives and their corresponding indicators discussed below this Outcome was rated as **Outstanding**, with 3.70 value points earned.

### 2.1 Provide Management and Operational Excellence in Achieving Key Contract Performance Requirements

Throughout FY 2003 the Contractor's performance met or exceeded expectation in most areas reviewed indicating that the Contractor continues to provide excellent management and operations ensuring key contract requirements are met in a timely fashion. In the Safeguards and Security area there were no major areas of concern. However, the Contractor did receive a "significant weakness" rating in the unclassified cyber security area during an external evaluation. Based on PNSO's evaluation of the following indicators this objective is awarded an overall rating of **Outstanding**.

#### 2.1.1 Provide ESH&Q Management Systems that Sustain and Enhance Excellence in Laboratory Operations

The ESH&Q management system performance is rated as **Outstanding** as evidenced by the Contractor's success in meeting or exceeding the target levels for each of the performance measures designed to provide an overall picture of ESH&Q performance. Details of the eight performance measures are shown below:

Performance Measures	Targets	FY 2003 Actual Levels
1) Demonstrate Excellence in the Safety and Health Program - Total Recordable Case Rate	The Contractor's 3yr rolling average is $\leq$ 2.6 cases per 200,000 work hours	2.0 cases per 200,000 work hours
2) Demonstrate Excellence in the Safety and Health Program - Lost Workday Case Incident Rate (now DART)	The Contractor's 3yr rolling average is $\leq$ 1.0 cases per 200,000 work hours	1.0 cases per 200,000 work hours
3) Demonstrate Excellence in the Safety and Health Program to Enable Retention of Voluntary Protection Program (VPP) Star Status. Maintain an Annual Self-Evaluation Rating Sufficient to Retain VPP Star Status.	Overall numerical rating of 9-12 – (Based on a scale of 1-12)	9.5



Performance Measures	Targets	FY 2003 Actual Levels
4) Conformance of the Environmental Management System to ISO 14001 Standard	ISO 14001 registration retained through FY 2003	ISO 14001 registration Was maintained and re-certified in October 2003
5) Reportable Occurrences of Release to the Environment	≤ 2 events	0 events
6) Low-Level Radioactive Waste Generation (P2). Reduce amount of Waste Generated by Laboratory	≤ 224 Cubic Meters/yr	93.6
7) Hazardous Waste Generation (P2). Reduce Amount of Waste Generated by Laboratory	≤ 11.9 MT/yr	8.55
8) Spread of Radioactive Contamination	≤ 3 events	0 events

### 2.1.2 Performance Against Business Management Sub-Indicators

This indicator measured three primary business indicators, which form a basis for measuring the ongoing efforts to improve cost efficiency through business growth and optimization of overhead cost. Overall, the Contractor did an excellent job of managing to the sub-indicators which comprise this area earning an overall rating of **Excellent** for this indicator.

The following provides a summary for each of the sub-indicators:

#### 2.1.2.1 Overhead cost as a percent of Laboratory's 1830 fully burdened average charge out rate

The Contractor exceeded expectations in lowering overhead costs as a percent of the Laboratory's 1830 fully burdened average charge out rate moving past the FY 2002 mark of 52% to 50.4% in FY 2003 earning a rating of **Outstanding**. DOE is very pleased with the progress achieved to date and encourages the Contractor to continue its efforts.

#### 2.1.2.2 Total Overhead cost as a multiplier on the Laboratory's total direct costs charged to customers

The Contractor was not successful in meeting the full expectations of this indicator, and is assigned a rating of **Good**. This indicator measures the Contractor's success in minimizing the multiplier on which overhead is added. This multiplier is achieved by taking the total operating cost of the Laboratory and dividing it by the amount of direct costs incurred. The goal for FY 2003 was to improve the multiplier by two percent over that of FY 2002 (outstanding performance), however, the Contractor was only able to minimize the multiplier by one percent equating to the rating of Good.

#### 2.1.2.3 Direct FTE's as a percent of the total Laboratory FTE's

The Contractor also performed well in the balance of direct FTE's as a percent of the total Laboratory FTE's. In FY 2003, the Contractor increased the number of staff funded directly while limiting the growth of indirect funded staff resulting in just over 50% of the Laboratory's total FTEs being direct funded, earning a rating of **Excellent**.

### 2.1.3 Sustain and Enhance the Effectiveness of Integrated Safeguards and Security

The Contractor receives a score of 3.5 for this indicator for their performance in sustaining and enhancing Safeguards and Security (SAS) by protecting assets; identifying, reporting, and mitigating emerging threats; and completing all agreed upon deliverables on time or ahead of



schedule. It is also noted that the Contractor continued to demonstrate regulatory compliance in the Safeguards and Security function in which they received a composite rating of satisfactory during the Periodic Security Survey conducted by RL. The contractor did, however, receive a "significant weakness" rating in the unclassified cyber security arena during an external evaluation. Due to this less than satisfactory rating, the points assessed for the "External Evaluations" Performance measure of this indicator are assigned 0 points versus the 2 points assigned within the Contractor's self-evaluation report, which accounts for the overall score of 3.5 above.

#### 2.1.4 Provide Management and Operational Excellence in Achieving Investment in Maintenance and Energy Conservation Efforts

Performance was outstanding in the areas of facilities operations, maintenance and energy conservation. Performance sub-indicators were all met or exceeded earning an **Outstanding** rating for each (see Table 2.3). The receipt of the International Facility Management Association Golden Circles Award independently validated this superior performance. DOE Departmental and Federal Energy Management Program awards were also earned for impressive achievements in energy and water conservation.

The Contractor implemented a multi-faceted approach to energy and water conservation resulting in the following accomplishments: exceeded government 2010 goal in FY 2002 for energy reductions in laboratory facilities; Sigma V Energy Star® certification; benchmark Stateline Wind Farm Green Power purchase; energy audits of major facilities, water conservation improvements; success obtaining Bonneville Power Administration funding for energy conservation improvements. This performance earned an overall rating of **Outstanding** for this indicator.

## 2.2 Maintain and Enhance Laboratory Capabilities/Infrastructure to Meet Current and Future Mission Needs

This objective was developed to track the Contractor's progress in meeting the milestones identified within key Contractor plans, which are important in ensuring the current and future needs of the Laboratory are met. Although this objective is rated overall as **Outstanding**, DOE's evaluations did not agree with the Contractor's self-evaluation report regarding some of the indicators that make up this objective resulting in 3.39 value points versus the Contractor's self rating of 3.88 value points.

### 2.2.1 Enhance the Capability of EMSL to Support the Scientific User Community

The overall this indicator is rated as **Outstanding**, with 3.5 value points awarded. Details concerning the two sub-indicators utilized to evaluate the Contractor's success in enhancing the capabilities of EMSL to support the scientific user community are provided below:

#### 2.2.1.1 Develop Facility and Capability activities for Effective Operation of the 900 MHz Magnet.

The 900MHz NMR was unavailable for use during much of rating period due to a vacuum pump being incorrectly wired. As a result, acceptance of the NMR has been delayed into FY 2004 due to repair and contractual considerations. This has impacted completion of Milestones 2, 3, 5, and 6 according to the specific language written in the indicator. Milestone 1 was not impacted, and the completion of design and commencement of procurements & engineering were completed by 2/1/03 to satisfy the Milestone. Milestone 2, the modification of the existing recovery system was delayed, but 90% of the work was completed by the 6/1/03 Milestone date, and fully completed before the end of FY 2003. Milestone 3, the start of actual He recovery, was tested and started by the 9/30/03 Milestone date, but was discontinued due to contractual issues with the vendor and will be restarted when the issues are resolved.



Milestone 4, the design and construction of a probe was completed by the 2/1/03 Milestone date. Milestone 5, the testing and use of a probe by 6/30/03, was partially completed by using a narrow-bore 900MHz NMR located at Oxford. The probe was tested, but not used as planned during much of the rating period because of the repair and contractual issues. Milestone 6 was not met with the wide bore 900MHz NMR. However, a 900MHz narrow bore NMR located at Oxford was used to produce results that were used to produce a peer reviewed publication (H. J. Jakobsen, P. Daugaard, E. Hald, D. Rice, E. Kupce, and P. D. Ellis, "A 4 mm Probe for  $^{13}\text{C}$  CP/MAS NMR of Solids at 21.15 Tesla", *J. Magn. Reson.*, 156, 152-154, 2002). Given the events surrounding contractual and repair issues with the EMSL 900MHz NMR, only 2 of 6 Milestones were completed fully. However, much of the intent of the milestones was accomplished, and thus a rating of **Excellent** was awarded earning 3.0 value points.

2.2.1.2 Enhance the Environmental Molecular Sciences Laboratories Ability to Meet its Users and DOE's Computational Challenges by Installing the HP Supercomputer.

Battelle has contracted with the Hewlett-Packard Corporation to install a \$24.5 M supercomputer based on Linux, the Quadrics interconnect, and 950 dual-processor nodes using the Intel Itanium 2 processor. The Contractor has achieved an **Outstanding** rating for 2.2.1.2 by bring the Phase 1 HP Supercomputer to full operational status and migrating operations off the IBM system such that the IBM was shutdown by December 31, 2002. Additionally, the facilities modifications were finished, and the Phase 2 HP Supercomputer was brought to full operational status by July 30, 2003.

2.2.2 Establish Systems Biology and Computational Capabilities Required to Realize PNNL 2010 Strategy

2.2.2.1 Establish an Operating Pilot Proteomics Facility in LSL II

Establishing the Systems Biology capabilities expected outcome was rated overall as **Outstanding**. Research equipment was obtained, installed, and made operational in LSL II Laboratory space, renovated in FY 2002, and staff was relocated in FY 2003 and the facility became an operating and productive pilot proteomics facility characterizing 5 protein complexes, exceeding the outstanding metric by a factor of 20%.

2.2.2.2 Provide Adequate Capability to Meet the Computational Science Needs Across Major PNNL Research Areas

The Contractor completed 2 of 3 of the following actions to earn a rating of **Excellent**. The third action, "Successful selection and hiring of a Director of Computational Sciences by the third quarter of FY2003, was not completed during FY 2003.

1. The Laboratory will present to the PNSO an assessment and requirements report that captures the gaps necessary to fill computational sciences needs in support of the major research missions for DOE and the Laboratory. Delivered third quarter of FY 2003.
2. Successful procurement, installation, and acceptance of a computational high performance cluster computer to include at least 0.3 teraflops of peak processing power, a high performance communications fabric, Linux, and associated development software. This system was accepted and available for full use by researchers across the Laboratory by end of FY 2003.
3. Successful selection and hiring of a Director of Computational Sciences by the third quarter of FY 2003.



### 2.2.3 Align the Laboratory's Nuclear Science Capabilities with Future DOE Mission Needs

The overall Nuclear Science Capabilities indicator is rated as Excellent, with 2.5 value points earned. The Contractor obtained a rating of outstanding for sub-indicator 2.2.3.2 by establishing five new joint R&D projects with academic organizations. Sub-indicator 2.2.3.1 is rated marginal based on the incompleteness of the submitted documents required for the successful completion of this milestone.

#### 2.2.3.1 Identify and Implement Measures that are Commensurate with the Laboratory's Strategy to Consolidate and Sustain Radiological and Radiochemical Capabilities.

The Contractor's performance related to identifying and implementing measures that are commensurate with the Laboratory's strategy to consolidate and sustain radiological and radiochemical capabilities is rated at **Marginal** versus the Contractor's self-evaluation of Outstanding. This rating is based on one of three documents (milestones) being satisfactorily completed. The first document, Integrated Nuclear Strategy Document (INSD) delivered on April 9, 2003 lays out the Contractor's strategy for future business volume growth potential in the nuclear science and technology arena and is a good start at developing a marketing strategy. The document, however, does not lay out the contingency plan for the potential demise of the 300 Area Facilities-housing Nuclear Capabilities nor does it explain the Laboratory's need to maintain or divest its current nuclear science capabilities as it relates to current/future DOE mission needs. This feedback was communicated to the Contractor, as identified on page 7 of the Contractor's September 30, 2003 deliverable. Based on this feedback the Contractor agreed to provide, along with the other two deliverable, a concise/clear lay out of the Laboratory's Integrated Nuclear Strategy Capabilities, in relation to staff, equipment, and facilities, and how these capabilities tie back to the overall DOE Mission(s) in order to satisfy the intent of the indicator. After review of all three deliverables, it was found that the other documentation does not address the issues noted above and while major components of the desired information are included; important pieces are missing, such as, the absence of written documentation of a Management Council Path Forward Decision being issued. In addition, the information is not comprehensive, skeletal and hard to follow/find and the flow of information is very disjointed and doesn't paint a clear picture.

The second deliverable, a CD-0 document specific to the Laboratory's Integrated Nuclear Strategy Document was found to be lacking the identification of specific facility capabilities as explicitly required by the measure. The Contractor placed a copy of the 300 Area Transition CD-0 Document in the September 30 submittal appendix instead of creating a separate document specific to the Laboratory's Integrated Nuclear Strategy.

The third deliverable, SWOT Document is acceptable and met the requirements as outlined in the measure. It identifies the Laboratory's various disciplines and lays out the strengths, weaknesses, opportunities, and threats associated with those disciplines.

#### 2.2.3.2 Establish New, Joint Research and Development Projects with Academia, Using the Laboratory's Nuclear Capabilities, Which will Provide Opportunities to Develop and Recruit Future Nuclear Scientists and Engineers.

The Contractor's performance related to this indicator is rated at **Outstanding** and is consistent with the Contractor's self-evaluation rating. In making this evaluation the link between new joint R&D collaborations and the creation of student positions was necessary in order to adequately address the description of the indicator. The Contractor is credited with establishing five new joint R&D projects (University of



California at Santa Barbara/University of California at Berkley Collaboration; University of Michigan Collaboration; and a joint effort with the University of Michigan/University of Wisconsin, a collaboration with University of Cincinnati, and a joint effort with the University of the Virgin Islands) with a nuclear science and technology focus. Although the Contractor's self-evaluation report did not address these new collaborations, information was obtained from the September 30, 2003 document and additional discussions with the Contractor. Two student positions were created as a result of the new joint R&D with the University of Virginia. Although not directly included in this measure it is noted that continuing joint R&D projects with academia have resulted in five student positions. In addition to the development of these new collaborations and ongoing collaborations, the Contractor initiated a new internship program and expanded four of its existing student programs which helped to create 15 additional new positions for students in nuclear science and engineering. The National Security Internship Program is viewed as a unique program and an effective way to recruit students into the field of Nuclear and Engineering sciences.

#### 2.2.4 Identify and Provide Cross Cutting Physical and Supporting Infrastructure Capabilities Consistent with the Laboratory's 2010 Strategy

The Contractor overall performance for this indicator is rated as **Outstanding** with 4.0 value points awarded. The Contractor completed 5 of the 6 milestones for sub-indicator 2.2.4.1 and 4 of the 5 milestones for sub-indicator 2.2.4.2. The two missed milestones for these sub-indicators did not create any impact to the work being performed. The Contractor met the criteria to obtain an outstanding rating for the above sub-indicators.

The Contractor completed all of sub-indicator 2.2.4.3 milestones on or ahead of schedule, and their performance was outstanding. The Contractor has formulated a strategy for transitioning the Laboratory's research and development activities from the legacy facilities to other facilities. This was demonstrated by relocating staff and research equipment and material from 3720 facility to the Radiochemical Processing Laboratory (RPL). The Contractor hired a subcontractor to perform the modifications needed in the RPL to accommodate this relocation and the work was completed ahead of the deadline. Research equipment was moved to the RPL rooms and the researchers were present to direct and assist in the reinstallation and restart

### 2.3 Provide Integrated Management Systems that Enable Effective and Efficient Business Performance

The Contractor's performance against the single indicator that made up this objective is rated as **Outstanding**. This is consistent with the Contractor's self-assessment. This objective was designed to measure the Contractor's ability to provide integrated management systems that enable effective and efficient business performance within the Laboratory. The Contractor successfully completed eight of the nine improvement initiatives identified within indicator 2.3.1 demonstrating their commitment to integrate the management systems. For example, the Contractor maintained the Integrated Safety Management System certification through continued improvement in the Voluntary Protection Program (VPP) Star status. In addition, the Contractor was recommended by NSF-International Strategic Registration for maintaining the ISO 14001 registration.

Other Contractor accomplishments included:

- The Contractor completed a three-year plan for deploying the Integrated Operations System (IOPS) to all Laboratory facilities. This year the Contractor rolled out the IOPS concepts and tools to the Marine Science Laboratory in Sequim. The Contractor integrated the new (EPR) process with the IOPS at the bench-level and enhances the capabilities for identifying and mitigating hazards on funded projects.
- Made three major improvements in the area of the Radiological Control Program by first developing and implementing a mapping tool that provides "one stop shopping" for the SBMS requirements associated with radioactive materials; second, by developing and implementing a



- web-based Radioactive Material Tracking database tool for use within the RPL to assure reliable, cost effective, and fully compliant tracking of RPL's radioactive materials. The third improvement was the implementation of a risk-based radiological control program for work with low-level radioactive tracers.
- Implemented a new Proposal Pricing system, which streamlined the process and tools associated with proposal pricing.
  - Implemented corrective actions and improvements related to authorization of work and funds control.



ELEMENT	Adjectival Rating	Value Points	Indicat or Weight	Total Points	Objective Weight	Total Points
<b>2.0 Management and Operational Excellence</b>						
<b>2.1 Provide Management and Operational Excellence in Achieving Key Contract Performance Requirements</b>						
2.1.1 Provide ESH&Q Management Systems that Sustain and Enhance Laboratory Operations	Outstanding	4.0	25%	1.00		
2.1.2 Performance Against Business Management Sub-Indicators	Excellent	3.25	25%	0.81		
2.1.3 Sustain and Enhance the Effectiveness of Integrated Safeguards and Security	Outstanding	3.5	25%	0.88		
2.1.4 Provide Management and Operational Excellence in Achieving Adequate Investment in Maintenance and Energy Conservation Efforts	Outstanding	4.0	25%	1.00		
Objective 2.1 Total				3.69	50%	1.85
<b>2.2 Maintain and Enhance Laboratory Capabilities/ Infrastructure to Meet Current and Future Mission Needs</b>						
2.2.1 Enhance the Capability of EMSL to Support the Scientific User Community	Outstanding	3.5	25%	0.88		
2.2.2 Establish Systems Biology and Computational Capabilities Required to Realize PNNL 2010 Strategy	Outstanding	3.5	25%	0.88		
2.2.3 Align the Laboratory's Nuclear Science Capabilities with Future DOE Mission Needs	Excellent	2.5	25%	0.63		
2.2.4 Identify and Provide Cross Cutting Physical and Supporting Infrastructure Capabilities Consistent with PNNL 2010 Strategy	Outstanding	4.0	25%	1.00		
Objective 2.2 Total				3.39	25%	0.85
<b>2.3 Provide Integrated Management Systems that Enable Effective and Efficient Business Performance</b>						
2.3.1 Progress Against Selected Improvement Initiatives on the Laboratory's "Operations Improvement Agenda."	Outstanding	4.0	100%	4.00		
Objective 2.3 Total				4.00	25%	1.00
Critical Outcome 2.0 Total						<b>3.70</b>

**Table 2.1. Management and Operational Excellence Critical Outcome Performance Rating Development**



ELEMENT	Adjectival Rating	Value Points	Weight	Weighted Score	Overall Weighted Score
2.1.2 Performance Against Business Management Sub-Indicators					
2.1.2.1 Cost Management Trends: Overhead Cost as a Percent of Laboratory's 1830 Fully-Burdened Average Charge-Out Rate	Outstanding	4.0	50%	2.00	
2.1.2.2 Cost Management Trends: Labor Overhead as a Multiplier on the 1830 Direct Charged Operating Labor Costs	Good	2.0	25%	.50	
2.1.2.3 Resource Management Trends: Direct FTEs as a Percent of the Total Laboratory FTEs	Excellent	3.0	25%	.75	
Indicator 2.1.2 Total					3.25

**Table 2.2. Performance Indicator 2.1.2 Score Calculation**

ELEMENT	Adjectival Rating	Value Points	Weight	Weighted Score	Overall Weighted Score
2.1.4 Provide Management and Operational Excellence in Achieving Investment in Maintenance and Energy Conservation Efforts					
2.1.4.1 Stewardship Index	Outstanding	4.0	60%	2.40	
2.1.4.2 Identification and Implementation of Energy Conservation Measures that are Commensurate with the Laboratory's Strategy to Establish a Sustainable Environment for Conducting Research and Development	Outstanding	4.0	40%	1.60	
Indicator 2.1.4 Total					4.00

**Table 2.3. Performance Indicator 2.1.4 Score Calculation**



ELEMENT	Adjectival Rating	Value Points	Weight	Weighted Score	Overall Weighted Score
2.2.1 Enhance the Capability of EMSL to Support the Scientific User Community.					
2.2.1.1 Develop Facility and Capability Activities for Effective Operation of the 900 MHz Magnet.	Excellent	3.0	50%	1.50	
2.2.1.2 Enhance the Environmental Molecular Sciences Laboratories Ability to Meet its Users and DOE's Computational Challenges by Installing the HP Supercomputer.	Outstanding	4.0	50%	2.00	
Indicator 2.2.1 Total					3.50

**Table 2.4. Performance Indicator 2.2.1 Score Calculation**

ELEMENT	Adjectival Rating	Value Points	Weight	Weighted Score	Overall Weighted Score
2.2.2 Establish Systems Biology and Computational Capabilities Required to Realize PNNL 2010 Strategy.					
2.2.2.1 Establish an Operating Pilot Proteomics Facility in LSL-II.	Outstanding	4.0	50%	2.00	
2.2.2.2 Provide Adequate Capability to Meet the Computational Science Needs Across Major PNNL Research Areas.	Excellent	3.0	50%	1.50	
Indicator 2.2.2 Total					3.50

**Table 2.5. Performance Indicator 2.2.2 Score Calculation**



ELEMENT	Adjectival Rating	Value Points	Weight	Weighted Score	Overall Weighted Score
2.2.3 Align the Laboratory's Nuclear Science Capabilities with Future DOE Mission Needs.					
2.2.3.1 Identify and Implement Measures that are Commensurate with the Laboratory's Strategy to Consolidate and Sustain Radiological and Radiochemical Capabilities.	Marginal	1.0	50%	0.50	
2.2.3.2 Establish New, Joint Research and Development Projects with Academia, Using PNNL's Nuclear Capabilities, Which will Provide Opportunities to Develop and Recruit Future Nuclear Scientists and Engineers.	Outstanding	4.0	50%	2.00	
Indicator 2.2.3 Total					2.50

**Table 2.6. Performance Indicator 2.2.3 Score Calculation**

ELEMENT	Adjectival Rating	Value Points	Weight	Weighted Score	Overall Weighted Score
2.2.4 Identify and Provide Cross Cutting Physical and Supporting Infrastructure Capabilities Consistent with PNNL 2010 Strategy.					
2.2.4.1 Increase Internet Connection to Accommodate Strategic Research Collaborations Requiring Extensive Computation and Transfer of Large Data Sets.	Outstanding	4.0	20%	.80	
2.2.4.2 Increase Computer Network Capability to Accommodate Strategic Classified Research Collaborations Requiring Extensive Computation and Transfer of Large Data Sets.	Outstanding	4.0	20%	.80	
2.2.4.3 Develop and Commence Implementation of a Strategy to Maintain Continuity of the Department Of Energy Science Mission While Enabling Accelerated Cleanup of the Hanford 300 Area.	Outstanding	4.0	60%	2.40	
Indicator 2.2.4 Total					4.00

**Table 2.7. Performance Indicator 2.2.4 Score Calculation**



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<b>Total Score</b>	<b>4.0 - 3.5</b>	<b>3.4 - 2.5</b>	<b>2.4 - 1.5</b>	<b>1.4 - 0.5</b>	<b>&lt;0.5</b>
Final Rating	Outstanding	Excellent	Good	Marginal	Unsatisfactory

**Table 2.8. Operational Excellence Critical Outcome Final Rating**



### 3.0 LEADERSHIP EXCELLENCE (15%)

**Through the Contractor's leadership and regional partnerships, PNNL will become recognized as an enduring local, regional and national asset.**

The PNSO review and verification of the objectives and corresponding indicators concurs with the Contractor's self-evaluation rating of **Outstanding** (3.70 value points) for this Critical Outcome. The evaluation indicates that Battelle leadership continues to look for and implement new methods for engaging and motivating staff towards identified outcomes and to provide outstanding regional and community support through the growth of technology-based businesses and working with regional research institutions in finding science and technology solutions to regional needs.

Items of note for each of the objectives that make up this outcome are addressed below:

#### Objectives and Performance Indicators:

### 3.1 Attract, Develop and Retain the Critical Staff Necessary to Achieve Simultaneous Excellence in S&T, Operations, and Community Trust

- 3.1.1 Identify the Contractor "best in class" workgroups by examining staff engagement assessment scores and objective performance data. Utilize this data to develop best practices training programs and talent profiles.

The Contractor successfully completed three of the four criteria established for this indicator; this equates to **Excellent** performance per the FY 2003 Performance Evaluation and Fee Agreement (PE&FA) and earns 3.0 value points.

The Contractor has performed well in this area, successfully completing three of the four sub-indicators and making significant progress on the fourth. It is noteworthy that they exceeded the overall number of Strengthfinder assessments (50) required by December 31, 2002. The Contractor completed 58 by December 31, 2002, and overall for the FY 2003, completed 90. They successfully completed the analysis to define talent profiles for Technical Group Managers by the due date, submitting a report to the PNSO on March 28, 2003. The Contractor also completed an analysis of productivity measures for Research Division work groups, utilizing the Council of Fellows. This analysis identified twelve characteristics exhibited by highly productive work groups. Finally, the Contractor's grand mean score for the Gallup Q12 survey improved from 3.75 to 3.81. While this improvement did not meet the goal of 3.84, it is noteworthy nonetheless considering the uncertainty that has faced the Laboratory this year in terms of accelerated 300 Area cleanup.

### 3.2 Demonstrate the Relevance of Pacific Northwest National Laboratory to the Needs of the Community and the Region

The Contractor has performed very well on this objective this year, achieving outstanding performance against each of the indicators associated with Economic Development, Northwest West (NW) Regional Programs, and Technology Commercialization. The PNSO agrees with the Contractor's self-evaluation that their overall performance in these areas merits a rating of **Outstanding** and equates to 4.0 value points. The Contractor's continued outstanding performance in these areas is noteworthy and continues to have a significant impact on the economic development of the local community and region, as well as having a positive impact on community and regional perception of the Laboratory.

The PNSO has met regularly with the Contractor Economic Development, NW Regional Programs and Technology Commercialization Office staff throughout the course of this fiscal year to review performance against the indicators related to indicators 3.2.1, 3.2.2, and 3.2.3, as well as general program activities (contract requirements, etc.). Additionally, PNSO staff visited the 6 businesses that the Contractor claimed under indicator 3.2.1 as new business starts, relocations, or additional product



lines in order to confirm that the businesses were viable per the criteria under indicator 3.2.1 and that the Contractor had a material role in their establishment, expansion, or relocation. These regular meetings and interactions, and in the case of economic development, business visits, have provided the level of oversight and operational awareness necessary to allow the PNSO to indicate our agreement with the Contractor's self-evaluation for Objective 3.2.

### 3.2.1 Support Growth of the Local and Regional Technology-Based Primary Business Sector

The Contractor successfully met or exceeded the target levels established for each of the sub-indicators under 3.2.1 achieving an overall rating of **Outstanding**. Below is a brief summary of the performance measures evaluated for 3.2.1:

#### **The Number of New Businesses Started or Expanded in the Local Area Where the Contractor had a Material Role in Their Establishment**

Based upon PNSO evaluations, it was determined that the Contractor had a material role in the establishment of five expansions of existing businesses, and relocation of one business into the local area, for a total of six new businesses or expansions. Therefore, the Contractor successfully achieved an adjectival rating of **Outstanding** for this sub-indicator and earned 4.0 value points. Staff members of the PNSO visited all six businesses claimed, and confirmed that each business was viable and that the Contractor played a material role in their creation, expansion, or relocation as applicable. In all cases, the businesses were extremely satisfied with the support and are looking forward to continue working with the Contractor.

#### **Effectiveness in Providing Technical Assistance to Regional Firms**

The Contractor claimed to have initiated forty-six (46) technical assistance's, with one-hundred percent (100%) of the firms responding to a customer satisfaction survey indicating they were satisfied or better with the administration and usefulness of technical assistance. Topics of the Technical assistance covered a broad range, including environment, energy, industrial processes, medical, materials, computers and software and sensors. As part of the verification of the measure the PNSO staff interviewed a small sample of the businesses to verify that the technical assistance supplied met the businesses expectations. In all cases, we found that the expectations were met and the companies are expecting to utilize the program again in the future (when applicable). This verification concluded that the Contractor successfully achieved a rating of Outstanding, earning 4.0 value points.

#### **Develop and Champion at Least One New Economic Development Initiative**

Part of the vitality of the Contractor's economic development efforts is that new approaches and initiatives for economic development be devised and pursued. This performance sub-indicator was designed to assess the degree to which the Contractor developed and implemented useful and effective new approaches for economic development. The evaluation looked at 5 major initiatives that were developed and implemented during FY 2003. Those five initiatives consisted of two educational seminars for entrepreneurs, a recruiting assessment study, sponsorship of the Delta Angel Group, and establishment of the first satellite downlink location in Southeastern Washington for the Massachusetts Institute of Technology Enterprise Forum broadcasts.

Based upon PNSO's evaluation of the above initiatives, the information supplied by the Contractor and the external input, it was concluded that an adjectival rating of **Outstanding** for this sub-indicator was accomplished and 4.0 value points were earned.

### 3.2.2 Document the Success of the Region's Major Research Institutions in Their Collaboration to Find Science and Technology Solutions to Regional Needs



The Contractor performed very well in this area, achieving outstanding performance against each of the sub-indicators associated with this indicator. The PNSO agrees with the Contractor's self-evaluation that their overall performance in this area merits a rating of **Outstanding** equating to 4.0 value points. The Contractor's continued outstanding performance in the area of Regional partnerships, and the increasing growth of Regional Collaborations intended to help identify regional needs with potential technology related solutions is noteworthy. These efforts are having a positive impact on regional perception of the Laboratory by positioning it as a leader in addressing regional needs via the technologies of regional research institutions.

The NW Program Office helped identify and describe capabilities from northwest institutions, which could address certain regional needs. Water Resources management needs for the NW were characterized as a priority. The Contractor teamed with Pacific Northwest Regional Collaboratory (PNWRC), which is a multi-institutional partnership. Using Starlight, 10 new capabilities were identified in the area of water resource management needs. Another 30 capability areas were identified that may have a technical and/or programmatic role for the collaborators.

### 3.2.3 Enhance the Laboratory's Ability to Generate Revenues from Commercialization for Uses Consistent with the Mission of PNNL

Based upon the DOE evaluation against the criteria, which was accomplished through regular interactions and review of provided documentation, the Contractor has increased licensing revenues from DOE-derived inventions for FY 2003 in an amount that significantly exceeded the goal, therefore earning an adjectival rating of **Outstanding** for this indicator.

There were several changes made in FY 2003 that have made a difference in enhancing the value generated from Intellectual Property at the Laboratory. These changes, include better alignment of resources, organizing intellectual property by crosscutting technology portfolios, improvements, improvements were made to the assessments that are used for investment decisions, cycle times were improved, and greater attention was paid to managing existing agreements. All these changes have played a role in improving the overall health of the Technology Commercialization Program.

The outlook for FY 2004 should see some additional changes that will only further enhance efficiencies which will increase the value of DOE-derived inventions.

## 3.3 Impact Leadership and Diversity in Science and Engineering Education Through Laboratory-Sponsored Programs for Students and Educators

The Contractor's performance on this Objective is rated as **Outstanding**. This is consistent with the Contractor's self-evaluation. During the last year, the PNSO has been active in participating in Contractor hosted monthly meetings which have served as a communication/interface tool. The monthly highlights write-up outlining the various ongoing activities within the program has been useful in outlining project status and progress. The PNSO recommends continued and improved communication and involvement in various visits, informational sessions, and meetings pertaining to the University/Fellowship Programs. The K-12 Program is proving to be successful and has made great strides in impacting leadership and diversity in science and engineering education. In the Universities/Fellowships Program, the Contractor increased its in-person recruiting at universities with large populations of under-served students yielding dividends in diversity of applicants for Laboratory sponsored educational fellowship programs.

### 3.3.1 Impacts of Laboratory-Sponsored Programs for K-8 Science Education Leaders

The Contractor's performance for this indicator is rated as **Outstanding** equating to 4.0 value points. In the K-12 Program, the Contractor enhanced their leadership in K-8 education in



Washington State through its Leadership and Assistance for Science Education Reform (LASER) Program. The LASER Program enhanced the capacity of school district leadership teams to initiate and implement their strategic plans for K-8 science education reform. The LASER program enabled leadership teams to network with other leadership teams to learn “best practices,” provided presentations and workshops that enhanced knowledge and skills, and fostered the development of action plans for science education reform. Ninety-three percent of participating leadership teams provided LASER evaluations with a sum of 10 points or higher, exceeding the target of 75%.

### 3.3.2 Enhanced Diversity of the Applicant Pool for Laboratory-Sponsored Student Programs

The Contractor’s performance for this indicator is rated as **Outstanding**, equating to 4.0 value points. The Contractor’s Self Evaluation indicated an increase of 76% in the number of diverse applicants, exceeding their “outstanding” target of a 50% increase. In FY 2003, the total number of completed applications for educational fellowships was increased to 846, and 81 of those were from African American, Hispanic, and Native American students as compared to FY 2002 totals of 679 completed applications and of those 46 were from African American, Hispanic, and Native American students. The Contractor credits its success in increasing the number of diverse applicants to a greater investment in recruiting in person rather than mass mailings. However, there is not a robust statistical method to track how effective those visits were in generating applicants and the Contractor is looking into ways to more effectively determine what its most fruitful recruiting techniques are.



ELEMENT	Adjectival Rating	Value Points	Indicator Weight	Total Points	Objective Weight	Total Points
<b>3.0 Leadership Excellence</b>						
<b>3.1 Attract, Develop and Retain the Critical Staff Necessary to Achieve Simultaneous Excellence in S&amp;T, Operations, and Community Trust</b>						
3.1.1 Identify PNNL “Best in Class” Workgroups by Examining Staff Engagement Assessment Scores and Objective Performance Data. Utilize this Data to Develop Best Practices Training Programs and Talent Profiles	Excellent	3.0	100%	3.00		
Objective 3.1 Total				3.00	30%	.90
<b>3.2 Demonstrate the Relevance of Pacific Northwest National Laboratory to the Needs of the Community and the Region</b>						
3.2.1 Support Growth of the Local and Regional Technology-Based Primary Business Sector (Roll Up from Table 3.2)	Outstanding	4.0	40%	1.60		
3.2.2 Document the Success of the Region’s Major Research Institutions in Their Collaboration to Find Science and Technology Solutions to Regional Needs (Roll Up from Table 3.3)	Outstanding	4.0	40%	1.60		
3.2.3 Enhance the Laboratory’s Ability to Generate Revenues from Commercialization for Uses Consistent with the Mission of PNNL	Outstanding	4.0	20%	0.80		
Objective 3.2 Total				4.00	50%	2.00
<b>3.3 Impact Leadership and Diversity in Science and Engineering Education Through Lab-Sponsored Programs for Students and Educators</b>						
3.3.1 Impacts of Laboratory-Sponsored Programs for K-8 Science Education Leaders	Outstanding	4.0	50%	2.00		
3.3.2 Enhanced Diversity of the Applicant Pool for Laboratory-Sponsored Student Programs	Outstanding	4.0	50%	2.00		
Objective 3.3 Total				4.00	20%	0.80
Critical Outcome 3.0 Total						<b>3.70</b>

**Table 3.1. Leadership Excellence Critical Outcome Performance Rating Development**



ELEMENT	Adjectival Rating	Value Points	Weight	Weighted Score	Overall Weighted Score
3.2.1 Support Growth of the Local and Regional Technology-Based Primary Business Sector					
3.2.1.1 The Number of New Business and Expansions in the Local Area Where The Contractor had a Material Role in Their Establishment	Outstanding	4.0	30%	1.20	
3.2.1.2 Effectiveness in Providing Technical Assistance to Local and Regional Firms	Outstanding	4.0	35%	1.40	
3.2.1.3 Develop and Champion at Least One New Economic Development Initiative	Outstanding	4.0	35%	1.40	
Overall Indicator 3.2.1 Total					4.00

**Table 3.2. Performance Indicator 3.2.1 Overall Score Calculation**

ELEMENT	Adjectival Rating	Value Points	Weight	Weighted Score	Overall Weighted Score
3.2.2 Document the Success of the Region's Major Research Institutions in Their Collaboration to Find Science and Technology Solutions to Regional Needs					
3.2.2.1 Find Solutions to Significant Regional Needs from the Science and Technology Resources Available in the Northwest's Major Research Institutions	Outstanding	4.0	35%	1.40	
3.2.2.2 Determine, or Cause to be Determined, the Applicability of the Identified Potential Science and Technology Solutions and Identify and/or Develop and Utilize Mechanisms for Implementing Them	Outstanding	4.0	30%	1.20	
3.2.2.3 Demonstrate the Relationships Established Among the Research Institutions of the Northwest and the Successes of this Group in Developing a Process for and Finding Science and Technology Solutions to Regional Issues and Needs	Outstanding	4.0	35%	1.40	
Overall Indicator 3.2.2 Total					4.00

**Table 3.3. Performance Indicator 3.2.2 Overall Score Calculation**

Total Score	4.0 - 3.5	3.4 - 2.5	2.4 - 1.5	1.4 - 0.5	<0.5
Final Rating	Outstanding	Excellent	Good	Marginal	Unsatisfactory

**Table 3.4. Leadership Excellence Critical Outcome Final Rating**



### III. Other Notables

This section of the report provides information regarding other PNSO/RL reviews/evaluations conducted as part of the FY 2003 performance review process. Our operational awareness and other review activities conducted throughout the year identified the following areas of noteworthy performance and areas for improvement. The PNSO expects the Contractor to take special note of the information provided below and to take appropriate actions to ensure continuous improvement in all aspects of the management and operations of the Laboratory.

#### 1. Areas of Noteworthy Performance

During the evaluation process, PNSO/RL noted the following key examples of noteworthy performance.

- 900MHz NMR: The Contractor is to be commended for their resolve in rectifying numerous complex contractual issues pertaining to the 900MHz NMR. Their astute management and business skills resulted in turning a potential catastrophe into a successful acquisition of very valuable piece of equipment which will be instrumental in the growth and recognition of the Laboratory. This success resulted in avoidance of potential length legal proceeding and thus save the Government and taxpayer time and money. In addition, DOE mission objectives will be able to proceed.
- New Laboratory Director: The Contractor is to be commended on their aggressive undertaking of advertising, interviewing, and hiring a new Laboratory director within a three month period of the previous Directors departure. This successful undertaking ensured continuity and a smooth transition within the Laboratory and with the PNSO. Thus, there was minimal impact to the daily operations of the Laboratory, and more importantly to its users, and customers.
- ISO 14001 Re-Certification: An external review of the Laboratory Environmental Management System resulted in the recommendation that, "PNNL continue to be recommended to ISO14001 registration with no conditions." This re-certification is a positive example of achievement of third party certification by the Laboratory. External certifications (e.g., ISO 14001 and the Voluntary Protection Program) are consistent with the principles of the new PNNL contract, which emphasizes the desire to achieve nationally recognized, independent third party certifications and we encourage the Contractor to continue to search out such certifications, where appropriate.
- Emergency Preparedness Accomplishments: The Emergency Preparedness (EP) Management System exceeded expectations in many areas. The Contractor not only completed the 32 building emergency preparedness drills that were planned, but also performed 32 additional tabletop drills during the fiscal year. In addition, EP developed a web-training platform for those selected as administrative facility Building Emergency Directors and developed a general emergency preparedness training video for all employees, which has received outstanding reviews from staff. EP also provided timely emergency operations metrics data to RL as well as to the HQ SC.
- Facility Management Accomplishments: The Facility Management (FM) Management System completed all of their requirements on or before milestone due dates, with several exceeding original commitments. Two buildings were qualified as Energy Star facilities where the commitment was to qualify one building. Energy audits were performed on eight buildings where the commitment was to audit one building. The Laboratory was also honored with two Departmental Energy Awards and received awards from the International Facility Management Association and the Association of Washington Businesses.



- Response to External Assessments: In the latter part of FY 2003, the Laboratory was subjected to numerous external audits and evaluations, including assessments by OSHA, NRC, OA-20, and OA-50. These assessments were extensive and required significant time and effort by the Contractor management and staff. The Contractor responded well to each one of these assessments and provided professional and proactive response to requests for information and access to facilities.
- Safeguards and Security Services: DOE HQ (Office of CIO for Cyber Security) conducted inspections of the COMSEC, TEMPEST and Protected Transmission Systems in May 2003, and there were no findings in any of these areas. The Information Classification and Control Policy conducted an appraisal of the Classification program earlier this year, and the overall rating received was “meets expectations.” A PNNL Safeguards and Security workflow process was submitted and selected as one of the finalists for the 2003 Government Technology Leadership Awards (GLTA). PNNL Safeguards and Security diligently responded to and implemented SECON 2 and 3 security measures several times throughout the year due to changes to the national threat level.

## 2. Areas for Improvement

During the evaluation period PNSO/RL noted the following key examples of areas in need of improvement:

- Self-Assessment: While the Laboratory does have a self-assessment process for most program and operational areas, the maturity level of the self-assessment process in many of these areas is low and Laboratory level performance measurement information is lacking. In several cases, the DOE has observed that the Contractor performs self-assessment to determine whether a process or system is in place, but has not matured to the level of determining the effectiveness of the processes or systems. While there are some areas that have made good progress in the area of self-assessment and are obtaining feedback, there have been numerous external and internal observations that point to inconsistencies and short comings in the self-assessment program over the past few years to include observations noted as part a recent BMI corporate and DOE OA-50 review. DOE is concerned that the guidance provided by the Contractor for conduct of self-assessment is difficult to apply and ineffective. This is an area of particular concern for DOE since the adequacy of self-assessment is a key factor in establishing an effective corporate assurance process and achieving the DOE oversight changes envisioned by the new contract. Furthermore, the PNSO’s verification/validation efforts have raised concerns regarding the rigor, robustness, and credibility of the Contractor’s FY 2003 Annual Self-Evaluation Report, specifically surrounding the reporting of actual performance of some indicators/measures. The PNSO found cases (i.e., indicators 1.5.3, 2.2.1, & 2.2.3) where the Contractor’s report failed to appropriately indicate actual performance. The format of the overall report was also found to be somewhat disjointed which made it difficult in many cases to make direct ties to the indicators and the corresponding measurement basis.
- Capability Planning: The PNSO continues to be concerned with the lack of comprehensive planning related to physical and intellectual capabilities at the Laboratory. This issue has been highlighted by recent issues related to the accelerated cleanup of the 300 Area facilities. DOE can not over emphasize the importance of the R&D programs continuing to work closely with the Laboratory, DOE, and other interested parties on the 300 Area Facility issue. The specific lack of planning related to the inevitable loss of the 300 Area Facilities has been particularly troubling. This has been a key issue for a number of years and while we understand there have been changes to the overall scope of the 300 Area cleanup plans, aggressive action to provide the planning and strategic foresight to realistically address the issue requires continued senior management attention and leadership.
- Procedure Content and Use: The PNSO has observed multiple instances where procedures were not maintained, understood, and/or used properly over the last year. These observations included instances of out-of-date and/or incomplete procedures, failure to comply with procedural requirements, and use of procedures that were not controlled. These issues were also observed in



use of other guiding documents such as radiological work permits and awareness summaries. In addition, a recent surveillance at the Radiological Processing Laboratory (RPL) observed fume hood radiation workers that were not following procedures that apply to the movement of radiological material from one contamination area fume hood to another. This, and other similar observations, indicates the need for management attention in the control and use of procedures at the Laboratory.

- Conduct of Operations/Safety Culture: PNSO staff have noticed an apparent decline in safety culture as evidenced by poor housekeeping in many lab and support spaces, hazard identification incidents (e.g., magnet injury), negative work control trends (e.g., radiological control area), and an increase in procedural violations. While most of these issues have been immediately addressed by the Contractor, the recurrence of these issues causes a concern that the safety culture in some areas needs to be improved. An example of this problem was evidenced by housekeeping and safety issues identified at the 350 Facility. PNSO identified numerous issues at this facility in August 2003 and validated the correction of these issues several months later. Subsequently, the OA-50 inspection team found similar issues once again at this facility in November of 2003. The Contractor needs to determine the cause of these types of issues, in addition to correcting the immediate concern, to ensure that they do not re-occur.
- Communications/Partnering: There are clearly areas of strong relationships between Contractor personnel and PNSO. Given the SC's desire for the DOE Site Office to maintain a strong "sense of the Laboratory" and to act as the local stewards for the institution, these relationships need to be maintained and strengthened. Inclusion of and communication with the Site Office in the R&D program areas is essential. It is important that Site Office personnel be informed of meetings with and visits by outside entities to the Laboratory and to foster open dialogue with the Site Office (at all levels) where external partnering and communicating is occurring.
- Safeguards and Security Evaluations: The Contractor received a rating of "significant weakness" (the lowest possible rating) in the unclassified cyber security arena during an external evaluation conducted by the DOE Office of Independent Oversight and Performance Assurance. Due to this less than satisfactory rating, the Contractor should reassess its performance metrics and self-assessment processes in the Safeguards and Security functional area to better identify and correct deficiencies internally and to allow for continuous improvement.

# Appendix I



**Department of Energy**  
Office of Science  
Washington, DC 20585

Office of the Director

December 11, 2003

Mr. Paul W. Kruger  
Assistant Manager for Science and Technology  
U.S. Department of Energy  
Richland Operations Office  
825 Jadwin Avenue  
Richland, Washington 99352

Dear Mr. Kruger:

For fiscal year 2003, the overall performance of the Pacific Northwest National Laboratory (PNNL) on Office of Science (SC) science and technology programs is rated as Outstanding. This rating relates to a scale that includes Unsatisfactory, Marginal, Good, Excellent, and Outstanding. It is a weighted average of performance evaluations provided by SC program offices, with the budget for PNNL from each office as the weighting factor. This summary rating combines overall performance evaluations by the SC offices of Basic Energy Sciences (BES), Biological and Environmental Research (BER), Advanced Scientific Computational Research (ASCR), and Workforce Development (WD).

I am pleased to note that the scores for Goals 3 and 4, Facilities Operation and Program Management, have improved from Excellent last year to Outstanding this year. We have previously criticized PNNL's scientific leadership, management and planning as being inadequate. This had resulted in poor use of laboratory resources and science that was less than the quality we expect. This year, PNNL is to be congratulated for the dramatic progress made in these areas. *New scientific leadership at PNNL and new management practices have resulted in research programs that are now of the highest quality and are also highly productive.*

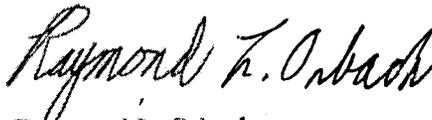
For example, the Environmental Molecular Sciences Laboratory (EMSL) management team has been performing an excellent job in implementing a new operational model for the EMSL. In addition, EMSL managers and staff have been working extremely hard to ensure that the new high performance computational capabilities and the new 900 MHz NMR are fully evaluated and made available to users as fast as possible. Further, the Laboratory's program in Chemical Physics is outstanding. It integrates experiment and theory in a very positive manner with the result that significant advances in understanding at a molecular level have been made. Finally, PNNL does an outstanding job in making the experience of undergraduate interns among the very best of all of the DOE laboratories.



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Enclosure 1 summarizes the overall SC weighted-average ratings by each goal. Enclosure 2 provides the individual SC program ratings of the Laboratory's performance for each of the performance evaluation factors. Full narrative evaluations from each program area will be e-mailed separately.

Sincerely,

A handwritten signature in cursive script that reads "Raymond L. Orbach".

Raymond L. Orbach  
Director  
Office of Science

Enclosures

**Enclosure 1:**

**OFFICE OF SCIENCE  
PACIFIC NORTHWEST NATIONAL LABORATORY EVALUATION  
FY 2003 SC WEIGHTED AVERAGE RATINGS BY GOAL:**

Overall Consolidated Rating: Outstanding  
Weighted Average Score: 3.6

Goal: 1      Quality of Science & Technology

Consolidated Rating: Outstanding  
Weighted Average Score: 3.6

Goal: 2      Relevance to DOE Missions or National Needs

Consolidated Rating: Outstanding  
Weighted Average Score: 3.7

Goal: 3      Success in Constructing and Operating Research Facilities

Consolidated Rating: Outstanding  
Weighted Average Score: 3.6

Goal: 4      Effectiveness and Efficiency of Research Program Management

Consolidated Rating: Outstanding  
Weighted Average Score: 3.6

**Enclosure 2**

**PACIFIC NORTHWEST NATIONAL LABORATORY  
FY 2003 RATINGS OF EACH GOAL BY EACH OSC PROGRAM**

G = Good; E = Excellent; O = Outstanding

	Goal 1: Quality	Goal 2: Relevance	Goal 3: Facilities	Goal 4: Program Mgt.	Overall Program Rating	Overall OSC Weighted Average
BES	3.6 - O	3.6 - O	N/A	3.6 - O	3.6 - O	
BER	3.6 - O	3.7 - O	3.6 - O	3.6 - O	3.6 - O	
ASCR	3.9 - O	3.8 - O	N/A	3.8 - O	3.8 - O	
WD	3.8 - O	3.8 - O	N/A	3.8 - O	3.8 - O	
<b>OVERALL L</b>	<b>3.6 - O</b>	<b>3.7 - O</b>	<b>3.6 - O</b>	<b>3.6 - O</b>		<b>3.6 - O</b>

**SCORING RANGES for PACIFIC NORTHWEST NATIONAL LABORATORY:**

Outstanding 3.50 - 4.0  
 Excellent 2.50 - 3.49  
 Good 1.50 - 2.49  
 Marginal 0.50 - 1.49  
 Unsatisfactory 0.0 - 0.49

**Office of Basic Energy Sciences**  
**FY 2003 Science and Technology Performance Evaluation for**  
**Pacific Northwest National Laboratory (PNNL)**

**1. Quality of Science: (3.6) Outstanding**

The Materials and Engineering Physics program at PNNL was subjected to mail peer review during the first quarter of FY 2002. The quality of science and technology for the Materials and Engineering Physics program at PNNL is excellent, and in some areas, outstanding. Programs viewed as outstanding included: Defects and Defect Processes in Ceramics, Molecular Organized Nanostructural Materials, and Chemistry and Physics of Ceramic Surfaces.

The program in Chemical Physics at PNNL is outstanding. External peer reviewers have viewed the research as high quality, very relevant to the environmental issue that was the origin of the program, an ability to attract outstanding researchers, and very well-managed. The program integrates experiment and theory in a very positive manner with the result that significant advances in understanding at a molecular level are made. PNNL management has recognized the strength of the particular program and its relevance and importance to the future directions of the laboratory. Dr. Sotiris Xantheas was awarded the Humboldt Fellowship, a significant external recognition, in recognition of his work in collective phenomena associated with aqueous salvation.

The Energy Biosciences program provides partial support for research encompassing the proteomics component of the *Rhodopseudomonas palustris* Microbial Cell Project that is jointly funded with the Office of Biological and Environmental Research. Progress on this collaborative project has been excellent towards generating the knowledge base to model microbial physiology under different environmental and growth conditions.

The BES Molecular Processes and Geosciences programs at PNNL support outstanding basic research on computational, theoretical, and experimental surface geochemistry, analytical chemistry, separations science, and catalysis. New experimental and modeling geosciences projects were selected for funding in FY 2002 and FY 2003 based on excellent peer reviewed proposals. Also in FY 2003, PNNL was awarded a new effort in catalytic science in a highly competitive solicitation for new collaborative science directions. These new projects bring collaborations with major university research groups that will contribute to the success of the PNNL effort.

**2. Relevance to National Needs and Agency Missions: (3.6) Outstanding**

The programs above are very relevant to the national needs and agency missions. An example is tight coupling between the Materials and Engineering Physics program with technology programs at PNNL funded by the Department's Office of Energy Efficiency and Renewable Energy and the Office of Fusion Energy Sciences, as well as a program funded by the Electric Power Research Institute.

**3. Performance in the Technical Development and Operation of Major Facilities: Not Applicable**

#### **4. Research Management, Programmatic Performance and Planning: (3.6) Outstanding**

For the Chemical Physics program at PNNL, the recent management reorganization has worked out well with positive effect on the program. In addition, the performance of the coordinator of the Materials and Engineering Physics program at PNNL, Dr. Gregory J. Exarhos, is outstanding. He is the leader of a focus area "Smart Materials Based on Electroactive Polymers" under the Basic Energy Sciences/Division of Materials Sciences and Engineering supported distributed Center of Excellence for the Synthesis and Processing of Advanced Materials, which involved 10 national laboratories. Dr. Exarhos organized a workshop with participation by eight national laboratories on "Smart Materials Derived through Molecular Assembly" held in Santa Fe on September 29 – October 1, 2002.

#### **5. Overall Evaluation: (3.6) Outstanding**

EVALUATION FORM FOR PROGRAMMATIC APPRAISALS

LABORATORY: PNNL PROGRAM: \_\_\_\_\_  
 B&R (s): KP11  
 EVALUATOR Thomassen DATE: 10/31/2003  
 FY2003 Funding: \_\_\_\_\_

EVALUATION FACTORS

RATINGS\*

O E G M U

	3.6				
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1. Quality of Science. Review committees will consider recognized indicators of excellence, including impact of scientific contributions, leadership in the scientific community, innovativeness, and sustained achievement. As appropriate, they may also evaluate other performance measures such as publications, citations and awards.

Comments:

PNNL life sciences research has made marked improvements in recent years. The majority of funding (~80%) is for Genomes to Life and microbial genomics research. PNNL is currently among the leaders in large-scale microbial research through its outstanding coordination of the Shewenella Federation and in high throughput proteomics research using mass spectrometry. PNNL is also conducting leading edge low dose radiation biology research.

\*Ratings: O=Outstanding; E=Excellent; G=Good; M=Marginal; U=Unsatisfactory

RATINGS\*

O E G M U

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3.8				
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2. Relevance to National Needs and Agency Missions. Committees will consider the impact of Laboratory research and development on the mission needs of the Department of Energy and other agencies funding the programs. Such considerations include national security, energy policy, economic competitiveness, national environment goals, as well as the goals of DOE and other Laboratory funding agencies in advancing fundamental science and strengthening science education. Committees will assess the impact of Laboratory programs on industrial competitiveness and national technology needs. As appropriate, they may consider such performance measures as licenses and patents, collaborative agreements with industry, and the value of commercial spin-offs and effectiveness of outreach efforts to industry.

Comments:

PNNL's life sciences research is directed at high priority DOE needs – (1) understanding microbes so well that we can use them to develop biotechnology solutions for clean energy, environmental cleanup, and carbon sequestration and (2) understanding the molecular mechanisms underpinning biological responses to low doses of ionizing radiation.

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\*Ratings: O=Outstanding; E=Excellent; G=Good; M=Marginal; U=Unsatisfactory

RATINGS\*

O E G M U

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3. Performance in the Technical Development and Operation of Major Facilities. Elements to be considered: Performance measures include success in meeting scientific and technical objectives, technical performance specifications, and user availability goals. Other elements of consideration are: quality of user science performed, extent of user participation and user satisfaction, operational reliability and efficiency, and effectiveness of planning for future improvements.

Comments:

Not applicable

RATINGS\*

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4. Research Management, Programmatic Performance and Planning. The review should focus on the achievement of broad programmatic goals, including meeting established technical milestones, carrying out work within budget and on schedule, satisfying the sponsors, planning for the orderly completion or continuation of the programs, and appropriate publication and dissemination of scientific and technical information. In assessing the effectiveness of programmatic and strategic planning, the reviewers may consider the ability to execute projects in concert with overall mission objectives, programmatic responsiveness to changes in scope or technical perspective, and strategic responsiveness to new research missions and emerging national needs. In the evaluation of the effectiveness of programmatic management, consideration may include morale, quality of leadership, effectiveness in managing scientific resources (including effectiveness in mobilizing interdisciplinary teams), effectiveness of organization, and efficiency of facility operations.

Comments:

We have previously criticized PNNL's scientific leadership, management, and planning as being inadequate, resulting in poor use of laboratory resources, and science that was less than the quality we expect. PNNL is to be congratulated for the dramatic progress they have made in these areas. New scientific leadership at PNNL and new management practices have resulted research programs that are now of the highest quality and that are also highly productive.

\*Ratings: O=Outstanding; E=Excellent; G=Good; M=Marginal; U=Unsatisfactory

RATINGS\*

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Overall Evaluation: (Overall ratings of Outstanding, Marginal, or Unsatisfactory especially require a narrative explanation citing significant accomplishments or deficiencies to substantiate the rating.)

Summarize basis for this rating.

As noted above, PNNL is now among the leaders in aspects of systems biology research, our major life sciences investment at PNNL. This is due to PNNL's outstanding scientists, research facilities, and greatly improved scientific leadership.

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Summarize Any Programmatic Issues and/or Recommendations:

# EVALUATION FORM FOR PROGRAMMATIC APPRAISALS

LABORATORY: PNNL  
(SC-75) \_\_\_\_\_

PROGRAM: ERSD

KP1402

B&R (s): KP1401,

FY2003

Funding: \$0.6M

EVALUATOR Hirsch

DATE: 10/31/03

EVALUATION  
FACTORS  
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1. Quality of Science. Review committees will consider recognized indicators of excellence, including impact of scientific contributions, leadership in the scientific community, innovativeness, and sustained achievement. As appropriate, they may also evaluate other performance measures such as publications, citations and awards.

Comments: The nmr/optical imaging project in Measurement Science is highly productive and internationally recognized. One Principal Investigator, Richard D. Smith, received the highest award in his field, the American Chemical Society Award in Analytical Chemistry, in April 2003.

RATINGS\*

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2. Relevance to National Needs and Agency Missions. Committees will consider the impact of Laboratory research and development on the mission needs of the Department of Energy and other agencies funding the programs. Such considerations include national security, energy policy, economic competitiveness, national environment goals, as well as the goals of DOE and other Laboratory funding agencies in advancing fundamental science and strengthening science education. Committees will assess the impact of Laboratory programs on industrial competitiveness and national technology needs. As appropriate, they may consider such performance measures as licenses and patents, collaborative agreements with industry, and the value of commercial spin-offs and effectiveness of outreach efforts to industry.

Comments: Measurement Science research projects all are seeking improved analytical technologies highly relevant to national priorities in the life sciences.

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3. Performance in the Technical Development and Operation of Major Facilities. Elements to be considered: Performance measures include success in meeting scientific and technical objectives, technical performance specifications, and user availability goals. Other elements of consideration are: quality of user science performed, extent of user participation and user satisfaction, operational reliability and efficiency, and effectiveness of planning for future improvements.

Comments: not applicable to KP14

RATINGS\*

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4. Research Management, Programmatic Performance and Planning. The review should focus on the achievement of broad programmatic goals, including meeting established technical milestones, carrying out work within budget and on schedule, satisfying the sponsors, planning for the orderly completion or continuation of the programs, and appropriate publication and dissemination of scientific and technical information. In assessing the effectiveness of programmatic and strategic planning, the reviewers may consider the ability to execute projects in concert with overall mission objectives, programmatic responsiveness to changes in scope or technical perspective, and strategic responsiveness to new research missions and emerging national needs. In the evaluation of the effectiveness of programmatic management, consideration may include morale, quality of leadership, effectiveness in managing scientific resources (including effectiveness in mobilizing interdisciplinary teams), effectiveness of organization, and efficiency of facility operations.

Comments:

Measurement Science Research at PNNL is well planned and delivers excellent high-profile publications.

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Overall Evaluation: (Overall ratings of Outstanding, Marginal, or Unsatisfactory especially require a narrative explanation citing significant accomplishments or deficiencies to substantiate the rating.)

Summarize basis for this rating.  
Measurement Science Research is highly productive.

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Summarize Any Programmatic Issues and/or Recommendations:

EVALUATION FORM FOR PROGRAMMATIC APPRAISALS

LABORATORY: PNNL PROGRAM: Climate Change Research Program  
 B&R (s): KP12  
 FY2003 Funding: \$                       
 EVALUATOR SC-74 staff DATE: 10/29/03

EVALUATION FACTORS

RATINGS\*

O E G M U

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- Quality of Science. Review committees will consider recognized indicators of excellence, including impact of scientific contributions, leadership in the scientific community, innovativeness, and sustained achievement. As appropriate, they may also evaluate other performance measures such as publications, citations and awards.

Comments:

Climate modeling, PNNL has made excellent scientific progress on the subgrid orography scheme development as part of the co-laboratory SciDAC project. The research effort in ARM has a record of sustained achievement in publications and participation in ARM and external scientific working groups that have broadened the impact of ARM science on the general scientific community. The PNNL team led by Jae Edmonds has done outstanding work to construct one of the two US-sponsored, detailed integrated assessment models that have provided insights about the costs and benefits of different policy options for dealing with climate change that would that would not otherwise be available from traditional disciplinary research. This has been done by PNNL through a particularly efficient and effective strategy of partnering with scientists from other parts of the world to model non-US regions. PNNL scientists supported by the DOE Atmospheric Science Program's Atmospheric Chemistry Component have made considerable advances in (1) understanding the dependence of urban scale oxidant chemistry on boundary-layer processes and regional scale transport, (2) understanding the aerosol chemistry and microphysics of the troposphere, including optical properties and phase transformations, (3) acquiring important data to support the study of nighttime heterogeneous reactions of nitrogen oxides, ozone, and aerosols, and (4) acquiring important data to understand the role large urban areas (megacities) in coupling local scale processes to larger scales. PNNL scientists provided considerable community leadership in these areas, stimulating collaborative efforts with other DOE laboratories, other federal agencies, and the private sector. Numerous peer-reviewed publications resulted from these efforts. PNNL has made excellent progress with joint inter-laboratory (with ORNL & ANL) implementation of specific scientific projects of CSiTE (Carbon Sequestration in Terrestrial Environments). However, more effort by PNNL in the CSiTE work is needed on joint publication of scientific papers that emphasize integration of component activities and which illustrate actual/potential carbon sequestration of terrestrial ecosystems.

\*Ratings: O=Outstanding; E=Excellent; G=Good; M=Marginal; U=Unsatisfactory



RATINGS\*

O E G M U

3.6				
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2. Relevance to National Needs and Agency Missions. Committees will consider the impact of Laboratory research and development on the mission needs of the Department of Energy and other agencies funding the programs. Such considerations include national security, energy policy, economic competitiveness, national environment goals, as well as the goals of DOE and other Laboratory funding agencies in advancing fundamental science and strengthening science education. Committees will assess the impact of Laboratory programs on industrial competitiveness and national technology needs. As appropriate, they may consider such performance measures as licenses and patents, collaborative agreements with industry, and the value of commercial spin-offs and effectiveness of outreach efforts to industry.

Comments:

The ARM value added data products and the quality assured operational data are essential for meeting the DO goal of improving the representation of clouds and radiation in the climate models. The Integrated Assessment Research at PNNL is highly relevant to national and DOE mission needs. PNNL has done an outstanding job of conducting research, modeling, and analysis efforts that are useful to those stakeholders who need the information without becoming a target of one or another political constituency. PNNL's research supported by DOE Atmospheric Science Program's Atmospheric Chemistry Component is extremel relevant to national needs and the DOE mission, both in terms of air quality and climate change impacts of energy-related emissions. The PNNL carbon sequestration research under CSiTE is highly relevant to DOE science and technology mission needs. The PNNL research contributes important information on microbiological transformation of carbon, which supports scientific assessment of terrestrial carbon management strategies. Potential application of results appears strong.

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\*Ratings: O=Outstanding; E=Excellent; G=Good; M=Marginal; U=Unsatisfactory



RATINGS\*

O E G M U

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3. Performance in the Technical Development and Operation of Major Facilities. Elements to be considered: Performance measures include success in meeting scientific and technical objectives, technical performance specifications, and user availability goals. Other elements of consideration are: quality of user science performed, extent of user participation and user satisfaction, operational reliability and efficiency, and effectiveness of planning for future improvements.

Comments:

The ARM value added data products have a proven track record as an essential tool for the improvement of climate models. Engineering improvements to the ARM sites have assured scientists of a reliable data stream that is continuous and quality assured. Although it is not a DOE facility, PNNL's operation of the Gulfstream aircraft (ed by Battelle and used by the Atmospheric Science Program continues to be exemplary, as noted both by DOE' ice of Aviation Management and by the scientific community.

\*Ratings: O=Outstanding; E=Excellent; G=Good; M=Marginal; U=Unsatisfactory

RATINGS\*

O E G M U

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4. Research Management, Programmatic Performance and Planning. The review should focus on the achievement of broad programmatic goals, including meeting established technical milestones, carrying out work within budget and on schedule, satisfying the sponsors, planning for the orderly completion or continuation of the programs, and appropriate publication and dissemination of scientific and technical information. In assessing the effectiveness of programmatic and strategic planning, the reviewers may consider the ability to execute projects in concert with overall mission objectives, programmatic responsiveness to changes in scope or technical perspective, and strategic responsiveness to new research missions and emerging national needs. In the evaluation of the effectiveness of programmatic management, consideration may include morale, quality of leadership, effectiveness in managing scientific resources (including effectiveness in mobilizing interdisciplinary teams), effectiveness of organization, and efficiency of facility operations.

Comments:

The PNNL work on developing and applying a subgrid orography scheme is on schedule and on budget. Support of CCSP Office activities is carried out in an orderly way and is carried out in concert with overall mission objectives. PNNL has provided exceptional leadership for maintaining the excellence of the ARM sites and has forged essential, effective collaborations among the ARM interlaboratory structure. The PNNL integrated assessment team is successful in procuring funding from other government and non-government sources and leveraging the funding that is received from the Office of Science. The resources are well managed; one example of the team's outstanding ability to forecast a policy-relevant direction is the group's initiation of a new task several years ago called the "Global Energy Technology Strategy". PNNL anticipated DOE's focus on technology as a solution to climate change policy, and worked on understanding the role of new technologies, such as carbon sequestration and hydrogen production and use. In FY03, they initiated a workshop on biotechnology solutions to climate change mitigation and are putting together a research report similar to the report written a few years ago on terrestrial carbon sequestration. PNNL scientists contributed substantially to the continued success of the DOE Atmospheric Science Program's Atmospheric Chemistry Component, through effective management of ASP projects at PNNL, through coordination and integration of PNNL efforts and related efforts at other DOE labs and other federal agencies, and through representing the science in professional meetings. CSiTE component research is making good progress, but more attention needs to be given to integrated research products and publication of "ecosystem" level results that have clear relevance to the DOE/SC/BER mission of carbon sequestration in terrestrial environments.

\*Ratings: O=Outstanding; E=Excellent; G=Good; M=Marginal; U=Unsatisfactory



RATINGS\*

O E G M U

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Overall Evaluation: (Overall ratings of Outstanding, Marginal, or Unsatisfactory especially require a narrative explanation citing significant accomplishments or deficiencies to substantiate the rating.)

Summarize basis for this rating.

PNNL has provided leadership that has resulted in significant improvements in the operations of the ARM Climate Research User Facility. Scientific leadership has resulted in the improvement of climate models by the incorporation of ARM sub models into general circulation models and the use of ARM data for development and evaluation of models. The combination of (1) exceptional scientific performance, especially in nighttime chemistry and aerosol measurements in megacities, (2) relevance to national needs and DOE mission, (3) exemplary management of the DOE Research Aircraft Facility, and (4) continued scientific leadership within the DOE Atmospheric Science Program and the larger atmospheric science research community. The CSiTE consortium is making good progress producing meaningful data for component research activities at respective laboratories. However, more attention is needed by PNNL to integrate research products to represent "carbon sequestration in terrestrial ecosystems." The value-add of the joint CSiTE consortium is not yet fully developed.

Summarize Any Programmatic Issues and/or Recommendations:

\*Ratings: O=Outstanding; E=Excellent; G=Good; M=Marginal; U=Unsatisfactory



EVALUATION FORM FOR PROGRAMMATIC APPRAISALS

LABORATORY:   PNNL  

PROGRAM:   ERSD (SC-75)  \_\_\_\_\_

B&R (s):   KP130101, 130102, 130103  

FY2003 Funding:   \$48M  \_\_\_\_\_

EVALUATOR   Bayer/Palmisano/Hirsch  

DATE:   10/31/03  \_\_\_\_\_

EVALUATION FACTORS

RATINGS\*

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1. Quality of Science. Review committees will consider recognized indicators of excellence, including impact of scientific contributions, leadership in the scientific community, innovativeness, and sustained achievement. As appropriate, they may also evaluate other performance measures such as publications, citations and awards.

Comments: Several PNNL investigators are providing scientific leadership for multi-disciplinary and multi-institutional projects within the NABIR program. The efforts of Dr. Phil Long in leading and coordinating the biostimulation field experiments at the Old Rifle UMTRA site have been extremely well organized and show outstanding leadership. Publication of some of the most exciting aspects of this work has begun with a high profile paper in the journal Applied and Environmental Microbiology. Similarly, Dr. Tim Scheibe has shown initiative in coordinating a new multi-institutional field experiment at the NABIR Field Research Center in Oak Ridge, TN. Dr. John Zachara has provided outstanding leadership in the field of geochemistry to both NABIR and EMSP programs, and is leading the Grand Challenge in Biogeochemistry. PNNL scientists are making significant contributions to the high level waste and the subsurface-related EMSP elements.

\*Ratings:    O=Outstanding;    E=Excellent;    G=Good;    M=Marginal;    U=Unsatisfactory

RATINGS\*

O E G M U

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2. Relevance to National Needs and Agency Missions. Committees will consider the impact of Laboratory research and development on the mission needs of the Department of Energy and other agencies funding the programs. Such considerations include national security, energy policy, economic competitiveness, national environment goals, as well as the goals of DOE and other Laboratory funding agencies in advancing fundamental science and strengthening science education. Committees will assess the impact of Laboratory programs on industrial competitiveness and national technology needs. As appropriate, they may consider such performance measures as licenses and patents, collaborative agreements with industry, and the value of commercial spin-offs and effectiveness of outreach efforts to industry.

Comments: Several PNNL investigators are working toward resolving environmental cleanup challenges faced by DOE. For example, a number of PNNL scientists funded by the NABIR program are conducting in situ biostimulation experiments at DOE sites to assess the potential for immobilizing uranium in the subsurface. In addition, laboratory-based research of a very fundamental nature is being performed to improve the understanding of the transformation, fate and transport of radionuclides and metals. This information is vital to reducing the costs and increasing the effectiveness of the DOE cleanup effort. The EMSP research at PNNL is closely tied to needs for the massive cleanup efforts at the neighboring Hanford Site.

\*Ratings: O=Outstanding; E=Excellent; G=Good; M=Marginal; U=Unsatisfactory

RATINGS\*

O E G M U

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3. Performance in the Technical Development and Operation of Major Facilities. Elements to be considered: Performance measures include success in meeting scientific and technical objectives, technical performance specifications, and user availability goals. Other elements of consideration are: quality of user science performed, extent of user participation and user satisfaction, operational reliability and efficiency, and effectiveness of planning for future improvements.

Comments: The EMSL management team has been performing an excellent job in implementing a new operational model for the EMSL. In addition, EMSL managers and staff have been working extremely hard to ensure that the new high performance computational capabilities and the new 900 MHz NMR are fully evaluated and made available to users as fast as possible. However, planning efforts associated with the Collaborative Access Teams and both the Biogeochemistry, and especially the Biology, Grand Challenges have been slower than initially expected. Nevertheless, EMSL has made great strides in implementing a comprehensive resource tracking system and ensuring that unscheduled downtime for EMSL resources is minimal. Customer (user) satisfaction remains high for FY03.

\*Ratings: O=Outstanding; E=Excellent; G=Good; M=Marginal; U=Unsatisfactory

## RATINGS\*

O E G M U

3.7				
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4. Research Management, Programmatic Performance and Planning. The review should focus on the achievement of broad programmatic goals, including meeting established technical milestones, carrying out work within budget and on schedule, satisfying the sponsors, planning for the orderly completion or continuation of the programs, and appropriate publication and dissemination of scientific and technical information. In assessing the effectiveness of programmatic and strategic planning, the reviewers may consider the ability to execute projects in concert with overall mission objectives, programmatic responsiveness to changes in scope or technical perspective, and strategic responsiveness to new research missions and emerging national needs. In the evaluation of the effectiveness of programmatic management, consideration may include morale, quality of leadership, effectiveness in managing scientific resources (including effectiveness in mobilizing interdisciplinary teams), effectiveness of organization, and efficiency of facility operations.

Comments:

PNNL investigators who were funded by the NABIR program in FY03 to conduct field studies have worked very hard to ensure that planned activities are completed on time and within budget. Not only are these activities particularly difficult because of the nature of in situ research, but they are made more difficult by the need to coordinate with PI's and other individuals from other institutions. These investigators have done an outstanding job. Overall, the execution of laboratory-based projects has also been on time and within budget.

RATINGS\*

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Overall Evaluation: (Overall ratings of Outstanding, Marginal, or Unsatisfactory especially require a narrative explanation citing significant accomplishments or deficiencies to substantiate the rating.)

Summarize basis for this rating.

PNNL scientists conducting in situ research have been doing an outstanding job of managing multi-disciplinary, multi-institutional projects at locations that are quite far away from PNNL. The management team at EMSL has been doing an outstanding job in implementing a new operational model for EMSL.

Summarize Any Programmatic Issues and/or Recommendations:

\*Ratings: O=Outstanding; E=Excellent; G=Good; M=Marginal; U=Unsatisfactory

EVALUATION FORM FOR PROGRAMMATIC APPRAISALS

LABORATORY: PNL  
Development

PROGRAM: Workforce

B&R (s): KL0101, KL0102, KL0103

EVALUATOR Brian O'Donnell, SC-1  
2003

FY2003 Funding: \$547,000  
DATE: Nov. 24, 03,

EVALUATION FACTORS

RATINGS\*

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3.8				
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1. Quality of Science. Review committees will consider recognized indicators of excellence, including impact of scientific contributions, leadership in the scientific community, innovativeness, and sustained achievement. As appropriate, they may also evaluate other performance measures such as publications, citations and awards.

Comments:

The quality of the science and the research experience gained by the undergraduate interns, as demonstrated by the high quality of the intern deliverables, including research abstracts and posted presentations, are of outstanding quality.

RATINGS\*

O E G M U

3.8				
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2. Relevance to National Needs and Agency Missions. Committees will consider the impact of Laboratory research and development on the mission needs of the Department of Energy and other agencies funding the programs. Such considerations include national security, energy policy, economic competitiveness, national environment goals, as well as the goals of DOE and other Laboratory funding agencies in advancing fundamental science and strengthening science education. Committees will assess the impact of Laboratory programs on industrial competitiveness and national technology needs. As appropriate, they may consider such performance measures as licenses and patents, collaborative agreements with industry, and the value of commercial spin-offs and effectiveness of outreach efforts to industry.

Comments:

PNL's Science Education office aligns all education programs with the mission of the Office of Science and the Laboratory.

\*Ratings: O=Outstanding; E=Excellent; G=Good; M=Marginal; U=Unsatisfactory

RATINGS\*

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(Rating factor does not apply)

3. Performance in the Technical Development and Operation of Major Facilities. Elements to be considered: Performance measures include success in meeting scientific and technical objectives, technical performance specifications, and user availability goals. Other elements of consideration are: quality of user science performed, extent of user participation and user satisfaction, operational reliability and efficiency, and effectiveness of planning for future improvements.

Comments:

This evaluation factor does not directly applicable to the Workforce Development program, but use of the PNL facilities for undergraduate research is effective and well managed.

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\*Ratings: O=Outstanding; E=Excellent; G=Good; M=Marginal; U=Unsatisfactory

RATINGS\*

O E G M U

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4. Research Management, Programmatic Performance and Planning. The review should focus on the achievement of broad programmatic goals, including meeting established technical milestones, carrying out work within budget and on schedule, satisfying the sponsors, planning for the orderly completion or continuation of the programs, and appropriate publication and dissemination of scientific and technical information. In assessing the effectiveness of programmatic and strategic planning, the reviewers may consider the ability to execute projects in concert with overall mission objectives, programmatic responsiveness to changes in scope or technical perspective, and strategic responsiveness to new research missions and emerging national needs. In the evaluation of the effectiveness of programmatic management, consideration may include morale, quality of leadership, effectiveness in managing scientific resources (including effectiveness in mobilizing interdisciplinary teams), effectiveness of organization, and efficiency of facility operations.

Comments:

\*Ratings: O=Outstanding; E=Excellent; G=Good; M=Marginal; U=Unsatisfactory

RATINGS\*

O E G M U

3.8				
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Overall Evaluation: (Overall ratings of Outstanding, Marginal, or Unsatisfactory especially require a narrative explanation citing significant accomplishments or deficiencies to substantiate the rating.)

Summarize basis for this rating.

PNL's education office has a strong commitment to program improvement, as demonstrated by the vision detailed various program documents. PNL does an outstanding job in the numerous program tasks that combine to make for an undergraduate laboratory research experience that is among the very best of all the laboratories. PNL places maximum emphasis on selecting the laboratory principal investigators that will most effectively serve the needs of the undergraduate researcher.

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Summarize Any Programmatic Issues and/or Recommendations:

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\*Ratings: O=Outstanding; E=Excellent; G=Good; M=Marginal; U=Unsatisfactory



**Pacific Northwest National Laboratory  
 FY 2003 Appraisal  
 By the Advanced Scientific Computing Research Program**

ASCR Program Summary:

The Pacific Northwest National Laboratory (PNNL) carried out an outstanding science and technology program for the Advanced Scientific Computing Research Program in FY 2003. PNNL conducts basic research in the mathematics and computer science, as well as research in advanced computing software tools and collaboratory tools. PNNL also participates in several scientific application pilot projects and participates on a number of the SciDAC teams. A Paper entitled, "Fast Collective Operations Using Shared and Remote Memory Access Protocols on Clusters," received a Best Paper Award at the 17<sup>th</sup> IEEE/ACM International Parallel and Distributed Computing Symposium (IPDCS'03), held in April 2003, in Nice, France. This paper described a novel methodology for implementing a common set of collective communication operations, which was shown to deliver excellent performance as compared to collective operations provided in vendor and open source implementations of MPI. The research was performed at the Pacific Northwest National Laboratory with a collaborator at the Ohio State University under the DOE/ASCR Center for Programming Models for Scalable Parallel Computing project. The laboratory is involved in three National Collaboratory projects—The DOE Science Grid, the Collaboratory for Multi-Scale Chemical Sciences (CMCS), and the Scientific Annotation Middleware (SAM) project—and in addition has provide general coordination support across all the National Collaboratory projects.

ASCR Program Manager Reviews:

**EVALUATION FORM FOR PROGRAMMATIC APPRAISALS**

LABORATORY: \_\_\_\_\_ PNL \_\_\_\_\_ PROGRAM: \_\_\_ Computer Science \_\_\_  
 B&R (s): \_\_\_\_\_  
 FY2003 Funding: \_\_\_ \$919K \_\_\_  
 EVALUATOR \_\_\_ Fred Johnson \_\_\_ DATE: \_\_\_ 10/28/03 \_\_\_

EVALUATION FACTORS

RATINGS\*

O E G M U

3.8				
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- Quality of Science. Review committees will consider recognized indicators of excellence, including impact of scientific contributions, leadership in the scientific community, innovativeness, and sustained achievement. As appropriate, they may also evaluate other performance measures such as publications, citations and awards.

\*Ratings: O=Outstanding; E=Excellent; G=Good; M=Marginal; U=Unsatisfactory

Comments:

Computer Science research activities at PNNL are focused on efforts that continue the development of the Global Array programming model and the underlying runtime infrastructure for the model and related communication requirements and also on the development of methods for the effective management of very large scale cluster computers with emphasis on batch job resource management and utilization. Both of these activities have made outstanding progress during the past year. Indicators of this progress include the implementation of new algorithms for collective communications for parallel computers that were shown to deliver significant performance improvements in user codes. (A paper describing the methodology for implementing a common set of collective communication operation received Best Paper Award at the 17<sup>th</sup> IEEE/ACM International Parallel and Distributed Computing Symposium IPDPS'03, held in April 2003.) They have also developed Gold, a resource management system. Gold, being developed under the Scalable Systems Software Center SciDAC initiative, goes far beyond the customary homegrown accounting and allocation tools to become a dynamically integrated part of the resource management environment. Based on earlier successes proving that the approach is sound, Gold is currently moving from prototype stage to being alpha tested by a number of DOE sites.

RATINGS\*

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3.7				
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2. Relevance to National Needs and Agency Missions. Committees will consider the impact of Laboratory research and development on the mission needs of the Department of Energy and other agencies funding the programs. Such considerations include national security, energy policy, economic competitiveness, national environment goals, as well as the goals of DOE and other Laboratory funding agencies in advancing fundamental science and strengthening science education. Committees will assess the impact of Laboratory programs on industrial competitiveness and national technology needs. As appropriate, they may consider such performance measures as licenses and patents, collaborative agreements with industry, and the value of commercial spin-offs and effectiveness of outreach efforts to industry.

Comments:

The Computer Science research areas at PNNL address problems of fundamental importance to the effective application of large scale high performance computing systems to applications of importance to the Office of Science. For example, collective communication operations are used in virtually all parallel scientific codes, and are an important component of the run-time systems that support MPI, the essential programming model for high performance parallel computing. Consequently, new methodology for improving collective operation performance will reduce the execution time of a wide range of applications using MPI.

\*Ratings: O=Outstanding; E=Excellent; G=Good; M=Marginal; U=Unsatisfactory

RATINGS\*

O E G M U

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- Performance in the Technical Development and Operation of Major Facilities. Elements to be considered: Performance measures include success in meeting scientific and technical objectives, technical performance specifications, and user availability goals. Other elements of consideration are: quality of user science performed, extent of user participation and user satisfaction, operational reliability and efficiency, and effectiveness of planning for future improvements.

Comments: N/A

\*Ratings: O=Outstanding; E=Excellent; G=Good; M=Marginal; U=Unsatisfactory

RATINGS*				
O	E	G	M	U
3.6				

4. Research Management, Programmatic Performance and Planning. The review should focus on the achievement of broad programmatic goals, including meeting established technical milestones, carrying out work within budget and on schedule, satisfying the sponsors, planning for the orderly completion or continuation of the programs, and appropriate publication and dissemination of scientific and technical information. In assessing the effectiveness of programmatic and strategic planning, the reviewers may consider the ability to execute projects in concert with overall mission objectives, programmatic responsiveness to changes in scope or technical perspective, and strategic responsiveness to new research missions and emerging national needs. In the evaluation of the effectiveness of programmatic management, consideration may include morale, quality of leadership, effectiveness in managing scientific resources (including effectiveness in mobilizing interdisciplinary teams), effectiveness of organization, and efficiency of facility operations.

Comments:

Computer Science research management at PNNL continues to be effective and responsive to program management requirements. Leadership is high in the scientific community.

\*Ratings: O=Outstanding; E=Excellent; G=Good; M=Marginal; U=Unsatisfactory

RATINGS\*

O      E      G      M      U

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3.7				
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Overall Evaluation: (Overall ratings of Outstanding, Marginal, or Unsatisfactory especially require a narrative explanation citing significant accomplishments or deficiencies to substantiate the rating.)

Summarize basis for this rating.

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Summarize Any Programmatic Issues and/or Recommendations:

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\*Ratings:    O=Outstanding;    E=Excellent;    G=Good;    M=Marginal;    U=Unsatisfactory

EVALUATION FORM FOR PROGRAMMATIC APPRAISALS

LABORATORY: PNNL

PROGRAM: ASCR

B&R (s): KJ010200

FY2003 Funding: \$1.3M

EVALUATOR Mary Anne Scott

DATE: \_\_\_\_\_

EVALUATION FACTORS

RATINGS\*

O E G M U

3.9				
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- Quality of Science. Review committees will consider recognized indicators of excellence, including impact of scientific contributions, leadership in the scientific community, innovativeness, and sustained achievement. As appropriate, they may also evaluate other performance measures such as publications, citations and awards.

Comments:

laboratory is involved in three National Collaboratory projects—The DOE Science Grid, the Collaboratory for Multi-Scale Chemical Sciences (CMCS), and the Scientific Annotation Middleware (SAM) project—and in addition has provided general coordination support across all the National Collaboratory projects. Their work continues to be outstanding and their contribution to the enabling tools for collaboratories is quite valuable. They are well recognize in the field of collaborative technologies with personnel called upon to serve in an advisory capacity for projects in this area supported by other agencies.

The DOE Science Grid (DSG) is aimed at defining, integrating, deploying, supporting, evaluating, refining, and developing (as necessary), the persistent Grid services needed for a scalable, robust, high-performance grid. It will provide DOE science applications and workflow systems persistent services for security, resource discovery, resource access, system monitoring. It is a collaboration of four laboratories (ANL, LBNL, PNNL, ORNL). Over the past year, the project has made progress on involving additional applications using the infrastructure.

The pilot Collaboratory for Multi-Scale Chemical Sciences (CMCS) brings together leaders in scientific research and technological development across multiple DOE laboratories, other government laboratories and academic institutions (SNL, PNNL, ANL, LANL, LLNL, NIST, MIT, UCB) with PNNL playing a key role in leadership for th project. Focusing on combustion research, the goal of the CMCS is to demonstrate that an integrated multi-scale approach to scientific and engineering research is not only possible but can produce significant benefits in harnessing research to address real-world issues. Advanced collaboration and metadata-based data management technologies are being used to develop an MCS (Multi-scale Chemical Sciences) portal providing community communications mechanisms and data search and annotation capabilities. This portal will also provide capabilities for defining and browsing cross-scale dependencies between data produced at one scale that is used as input for computations at the r. Development of use cases has been an effective approach for defining requirements of the portal. The SAM

\*Ratings: O=Outstanding; E=Excellent; G=Good; M=Marginal; U=Unsatisfactory

project is working very closely with this project on data issues. A review conducted earlier this year pointed out the value of the software being developed out of the projects that is applicable to a much wider community than just nical sciences.

RATINGS*				
O	E	G	M	U
3.9				

3. Relevance to National Needs and Agency Missions. Committees will consider the impact of Laboratory research and development on the mission needs of the Department of Energy and other agencies funding the programs. Such considerations include national security, energy policy, economic competitiveness, national environment goals, as well as the goals of DOE and other Laboratory funding agencies in advancing fundamental science and strengthening science education. Committees will assess the impact of Laboratory programs on industrial competitiveness and national technology needs. As appropriate, they may consider such performance measures as licenses and patents, collaborative agreements with industry, and the value of commercial spin-offs and effectiveness of outreach efforts to industry.

Comments:

The field of combustion is critical to the DOE mission for clean and efficient energy, and the DOE has ongoing investments in research across the full range of relevant scales and disciplines. The CMCS will bring an integrated, informatics-based approach to combustion research that enhances and begins to automate the flow of information between sub-disciplines. The project is working actively with a larger community to facilitate adoption of this approach.

Large-scale science projects such as those found in high energy physics, observational astronomy and astrophysics, a sorts of multi-disciplinary problems, national user facilities such as synchrotron light sources, etc., all share the problems of accommodating collaborators from all over the country, and around the world, and of managing and sharing huge amounts of data, sharing computing resources, etc. "Grids" are intended to provide a common infrastructure to support large-scale, collaborative, and widely distributed science, and are the result of an international effort to define the basis of such infrastructure. The DOE Science Grid project is providing the research development, and deployment of a "Grid" in support of DOE's Office of Science programs.

\*Ratings: O=Outstanding; E=Excellent; G=Good; M=Marginal; U=Unsatisfactory



RATINGS\*

O E G M U

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4. Performance in the Technical Development and Operation of Major Facilities. Elements to be considered: Performance measures include success in meeting scientific and technical objectives, technical performance specifications, and user availability goals. Other elements of consideration are: quality of user science performed, extent of user participation and user satisfaction, operational reliability and efficiency, and effectiveness of planning for future improvements.

Comments:

Not applicable

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\*Ratings: O=Outstanding; E=Excellent; G=Good; M=Marginal; U=Unsatisfactory

RATINGS\*  
O    E    G    M    U

3.9					
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5. Research Management, Programmatic Performance and Planning. The review should focus on the achievement of broad programmatic goals, including meeting established technical milestones, carrying out work within budget and on schedule, satisfying the sponsors, planning for the orderly completion or continuation of the programs, and appropriate publication and dissemination of scientific and technical information. In assessing the effectiveness of programmatic and strategic planning, the reviewers may consider the ability to execute projects in concert with overall mission objectives, programmatic responsiveness to changes in scope or technical perspective, and strategic responsiveness to new research missions and emerging national needs. In the evaluation of the effectiveness of programmatic management, consideration may include morale, quality of leadership, effectiveness in managing scientific resources (including effectiveness in mobilizing interdisciplinary teams), effectiveness of organization, and efficiency of facility operations.

Comments:

Planning and managing multi-institutional projects is challenging. These projects involve planning across multiple organizations. The CMCS project is a collaboration of eight national laboratories and universities and involves chemical scientists working with computer scientists, DSG is a collaboration of four national laboratories, and SAM is a collaboration of two national laboratories. Management on the projects continues to do an outstanding job in getting all the activities well-planned, integrated across institutions and has established mechanisms for tracking. In addition, the laboratory has been instrumental in assuring coordination and integration across all the national collaborative projects.

RATINGS\*  
O    E    G    M    U

3.9					
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Overall Evaluation: (Overall ratings of Outstanding, Marginal, or Unsatisfactory especially require a narrative explanation citing significant accomplishments or deficiencies to substantiate the rating.)

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\*Ratings:    O=Outstanding;    E=Excellent;    G=Good;    M=Marginal;    U=Unsatisfactory

Summarize basis for this rating.

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Summarize Any Programmatic Issues and/or Recommendations:

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\*Ratings: O=Outstanding; E=Excellent; G=Good; M=Marginal; U=Unsatisfactory

# Appendix II



**Subject: Year-end Performance Evaluation of Battelle, FY 2003**  
**Fin Plan: \$1,039,172**  
**From: Department of Energy/Office of River Protection (ORP)**

**Workscope Description:** The on-site Pacific Northwest National Laboratory (PNNL) team supported the following EM and ORP mission elements:

- ▶ strategic planning and mission acceleration,
- ▶ the Waste Treatment and Immobilization Plant (WTP) critical decision for full-construction authorization by the Deputy Secretary of Energy,
- ▶ WTP and supplement technology technical assessments, and
- ▶ performance and risk analysis.

**Quality of technical support: Excellent**

- ▶ **Science:** The PNNL team assessed, provided options, and built technical foundations for mission acceleration – from glass product properties to WTP plant process capability to Tank Farm supplemental technology to immobilize waste. EM and ORP could confidently propose accelerating the clean-up mission 18 years ahead of schedule with up to \$20 billion dollars in savings.
- ▶ **Technology:** The PNNL team confirmed the technical viability by stand-alone analysis, modeling, and recommended pilot testing. The ORP received WTP full-construction authorization with the accelerated mission and authorized funding to proceed with supplemental research. All due, in large part, to the PNNL team support.

**Relevance to EM mission: Excellent**

- ▶ **Science:** The PNNL team's research and analysis to confirm acceleration clean-up capability met the EM challenge. The team's strategic and risk analyses confirmed mission acceleration plausibility, continuous waste delivery to support the WTP plant accelerated operation, and that the supplement technology was economical, effective, and efficient. The team members are recognized, respected and sought out by the ORP, the ORP-contractors, and the many project external independent experts.
- ▶ **Technology:** EM has valued the ORP analysis to confirm managing high level waste. As ORP confirms the viability of supplemental technology, EM can consider application within the DOE complex. The PNNL team provided significant technical basis directly to ORP in these efforts.

**Management effectiveness: Excellent**

- ▶ The FY03 PNNL team supporting ORP was small but very effective, provided quality analysis, and delivered extremely competent work – adjusting budget, schedules, and resources to accommodate ORP's dynamic FY03 mission and goals. Each member exceeded our expectations and we appreciated their support.

## **INPUT PERTAINING TO FY 2003 PERFORMANCE EVALUATION OF THE LEGACY REMOVAL AND OPERATIONS PROGRAM MANAGEMENT (LRO)**

During FY 2003 the purpose of this program was to disposition Cold War legacy wastes and facilities assigned to PNNL; and to operate and maintain the Radiological Processing Laboratory (RPL/325) in a "ready-to-serve" configuration to support accelerated Hanford cleanup. In FY 2000 these activities were part of EM PBS RS01. The LRO project scope consisted of four specific areas: Program Management, Operations of Radiochemical Processing Laboratory/ Building 325 (RPL), Legacy Waste & Facilities Management, and Facility Consolidation and 300 Area Transition.

### 1.6 Quality of Science & Technology Adjectival Rating: Good

Basis for Rating: Performance generally met expectations in delivering "ready-to-serve" capabilities, contributing value to RPL science and technology customer's expectations. Continued progress was achieved to enhancement scientific productivity through minimizing the facility legacy and operational impact to the S&T activities. However, during this performance period the Analytical Services Operations (ASO) failed to maintain the appropriate quality standards used to calibrate their instrumentation, particularly the ICP-MS. Reviews indicated that the standards employed for this instrument did not have the preparation calculations independently verified nor were the standards properly controlled at the bench. This resulted in substantial adverse impacts to reported data quality, delaying the availability of analytical results, and required additional analysis against new standards to determine data correction factors.

### 1.7 Relevance to DOE Mission and National Needs Adjectival Rating: Excellent

Basis for Rating: The RPL S&T capability enabled through this activity provided a substantial contribution to the Waste Treatment Plant Characterization/Processing Studies, Spent Fuel/PFP Facility Deactivation Program, and Tritium Target Qualification Program. Facility operational accomplishments against the objectives and commitments exceeded the scope, schedules and costs. Likewise, substantial progress was achieved in the legacy removal activities this fiscal year; 30 drums and/or waste boxes were packaged for shipment, including 377 individual waste items. At the close of the year the total number of legacy items remediated now totals 5,994 out of the original 6,262 items, reflecting the legacy project is 95.7% complete.

In the facility consolidation and 300 Area transition, buildings 332 and 3718S were closed ahead of schedule. Alterations to RPL and relocation of staff and equipment from the 3720 building were also completed on schedule. Two small facilities, 1615-D3 and 615 were demolished on schedule. Timely completion of this work saves operating, surveillance and maintenance funding.

### 1.8 Effectiveness and Efficiency of Program Management Adjectival Rating: Good

Basis for Rating: Program Management performance was mixed during this period. The effective management of substantial scope changes between FY02 to FY03 and then FY03 to FY04 lifecycle baselines exceeded expectations. However, the delayed recognition of the Cost Accounting Standard violations associated with the ASO corrective actions, and the failure to conform to the EM baseline change control expectations significantly eroded confidence in line management control and reflected marginal management performance.

## PNNL PERFORMANCE, October 29, 2003

October 2003  
Year-End Performance  
PNNL  
Public Safety and Resource Management

### Quality of Technical Support: Excellent

The quality of the technical support from PNNL for the Public Safety and Resource Protection Program is excellent. The staff during the performance year consistently exceeded the expectations by producing documents and meeting delivery schedules ahead of scheduled dates. Performance also exceeded expectations in routine work and special monitoring tasks.

### Relevance to EM Mission: Excellent

The Public Safety and Resource Protection Program did an outstanding job in support of the EM Mission by supplying appropriate resources in a timely manner to assure that clean-up projects were not delayed. Weather data, NEPA documentation, Cultural and biological reviews were completed well ahead of schedule to assure that no delays occurred to stall construction or slow decommissioning. The Program completed Historical Site Assessments in a timely manner. These assessments could not have been easily conducted by other site contractors as effectively and efficiently.

### Management Effectiveness: Excellent

The staff at PNNL's Public Safety and Resource Protection Program during the appraisal period used the state of the art in quality science and technology to conduct environmental surveillance and monitoring activities at the Hanford Site and produced nationally recognized documents summarizing their findings. The information produced is relevant to DOE's accelerated cleanup mission at the Hanford Site. Managing activities effectively and efficiently has been a hallmark of the Public Safety and Resource Protection Program. Also the Program has exceeded expectations in working with stakeholders and the public especially Environmental Activists and the news media.

October 31, 2003

BATTELLE PERFORMANCE EVALUATION FOR FY 2003 - Memorandum, Paul Kruger to Keith Klein, "Request for Year-End Performance Evaluation of Battelle for the Management and Operation of the Pacific Northwest National Laboratory (PNNL) for Fiscal Year (FY) 2003," dated October 14, 2003

## INPUT PERTAINING TO PNNL SUPPORT TO THE GROUNDWATER PROTECTION PROJECT DURING FY 2003

PNNL provides support to the Groundwater Protection Project (GPP) at the Hanford Site in four main areas. These are: Science & Technology to support cleanup; Groundwater Modeling; Risk Assessment; and Groundwater Monitoring. In FY03 the Science & Technology and Risk Assessment work is part of PBS SS04 and the Groundwater Modeling and Monitoring work is part of PBS SS03. In FY04 all of the PNNL activities to support the (GPP) will be under the new PBS RL030.

### 1.3 Quality of Science & Technology

Adjectival Rating: Outstanding

Basis for Rating: PNNL has successfully conducted original research in specific areas directly related to Hanford Specific cleanup challenges. Among these are state-of-the-art geochemical analyses of the movement of contaminants in the subsurface vadose zone beneath tanks, cribs, trenches and other waste disposal sites that pose the greatest cleanup challenges for the Hanford Site. PNNL's work is recognized by the other contractors and regulators to be of high quality and has been peer reviewed and published in refereed professional journals.

### 1.4 Relevance to DOE Mission and National Needs

Adjectival Rating: Excellent

PNNL's work on Vadose Zone contaminant migration and infiltration characteristics of native vadose zone conditions and alternative cap and cover designs has direct application to assessing the risk based end states and determining optimal remediation strategies for the Hanford Site. PNNL has made important discoveries on: the effects of clastic dikes on contaminant migration; the characteristics of carbon tetrachloride as it moves through the vadose zone; the mobility of Uranium and the importance in evaluating alternative remedial options; and the effects of Technetium 99 and Strontium on aquatic receptors. All of these efforts have direct bearing on cleanup decisions for the Hanford Site.

### 1.5 Effectiveness and Efficiency of Research Program Management

Adjectival Rating: Good

PNNL has done an good job meeting the expected standards of performance in managing the research program for the GPP. Detailed work plans are prepared annually and the four main areas are closely coordinated within PNNL to avoid any duplication of effort and find areas of synergy. PNNL also closely works with Fluor Hanford and the other site contractors to make sure research efforts are integrated and target the areas most in need of support by PNNL.

October 22, 2003

BATTELLE PERFORMANCE EVALUATION FOR FY 2003 - Memorandum, Paul Kruger to Keith Klein, "Request for Year-End Performance Evaluation of Battelle for the Management and Operation of the Pacific Northwest National Laboratory (PNNL) for Fiscal Year (FY) 2003," dated October 14, 2003

INPUT PERTAINING TO BATTELLE'S PREPARATION OF THE HANFORD SITE SOLID (RADIOACTIVE AND HAZARDOUS) WASTE PROGRAM ENVIRONMENTAL IMPACT STATEMENT (HSW EIS).

The objectives seem to mostly focus on research programs and the development of technology. Preparation of the HSW EIS does not fall neatly into either of these two areas of focus for any of the objectives. However, it is suggested that HSW EIS input is placed in Objective 1.2 as successful completion of the HSW EIS is an important link in DOE's nationwide cleanup efforts.

Suggested Adjectival Rating for the HSW EIS: Outstanding

Basis for Rating: Battelle fully understands the importance of the HSW EIS to DOE's nationwide cleanup efforts. They have put together a large dedicated staff that has worked extremely hard to meet deadlines despite continued changes in scope directed by others. All deadlines for the preparation and distribution of the HSW EIS that Battelle has been allowed to meet have been met. The staff has a large breadth and depth of knowledge, has been able to weld large amounts of disparate information into an understandable whole, and has been fairly cheerful in an environment that is often contentious and that sometimes seems to be without end.

BATTELLE PERFORMANCE EVALUATION FOR FY 2003 - Memorandum, Paul Kruger to Keith Klein, "Request for Year-End Performance Evaluation of Battelle for the Management and Operation of the Pacific Northwest National Laboratory (PNNL) for Fiscal Year (FY) 2003," dated October 14, 2003

Input pertaining to PNNL Activities and Deliverables associated with:

1. Life Cycle Model,
2. EM-50 (Office of Science and Technology)
3. Hanford Site Planning and Integration, and
4. Support to RL during FY03

Quality of Science & Technology

Adjectival Rating: Outstanding

Basis for Rating:

In addition to the EM-50 Science and Technology activities that the laboratory provides, PNNL delivers unique products and services to the Richland Operations Office. These services hinge on the laboratory's unique history here at Hanford and its talented, knowledgeable staff. Highlights include: 1) The Lifecycle Model, a tool that provides RL with a unique capability to visually display, review, integrate and conduct analyses using baseline information submitted by onsite contractors. The system combines traditional project logic and cost information with system engineering (waste flow, process capacities, and process rates) to provide a powerful planning tool that has application potential across the complex and with industry. 2) Providing technical assistance to technical evaluation for EM Cleanup through the EM-50 program, and 3) Technical analysis and support for activities like the integrated Hanford Baseline and the Risk Management Program.

1.1 Relevance to DOE Mission and National Needs

Adjectival Rating: Outstanding

PNNL delivers unique products and services to the Richland Operations Office.

RL has found the lifecycle model to be a useful tool for accelerated cleanup planning and alternative analysis. The tool was used most recently to initiate an assessment of the RL FY04 PHMC contract shortfall and develop potential recovery paths. PNNL supported RL during the review of the PHMC baseline submittal of June 30, 2003, through input and restructuring the LCM to reflect the PHMC baseline submittal. In another application of the LCM, PNNL provided invaluable support to RL in their assessment of potential lifecycle impacts of the Ecology Administrative Order (M-91 and TRU waste retrieval).

Laboratory work in support of EM-50 has focused on tackling specific project needs. Additionally, Lab staff has been proactive in working with the EM-50 program and the RL technical needs.

The PBS-level Hanford Site Integrated Schedule and WBS for 2035 cleanup completion was an excellent "first of a kind" product that was developed on schedule and right on target.

## 1.2 Effectiveness and Efficiency of Research Program Management

Adjectival Rating: Outstanding

PNNL has effectively supported RL development of the LCM planning tool during FY03. PNNL analysts, in conjunction with RL staff, deployed the LCM to facilitate the input of information to IPABS. This deployment is estimated to have saved RL approximately \$600K in FY03. Throughout FY03, PNNL staffs have been effectively training RL staff in the use, development, and maintenance needs associated with the future implementation of the Life-cycle Cost Model in order to transition the use of the LCM to RL during FY04.

PNNL staff providing planning and integration products have demonstrated an uncanny ability to bring a wide variety of complex technical issues and personnel, ranging from senior regulatory, federal and contractor management to contractor analysts and project personnel, together and lay out a path for success.

# Appendix III

**MEMORANDUM FOR:** Paul W. Kruger, Associate Manager  
For Science and Technology

**FROM:** *Ken Baker for* Paul M. Longworth, Deputy Administrator  
For Defense Nuclear Nonproliferation

**SUBJECT:** Request for HQ Year-End Performance Evaluation of  
Battelle for the Management and Operation of the Pacific  
Northwest National Laboratory (PNNL) for Fiscal Year  
(FY) 2003

In response to your letter, same subject as above, dated September 18, 2003, I am providing fiscal year 2003 performance evaluation input of Battelle related to their work in the area of Defense Nuclear Nonproliferation. As requested in your letter, performance was evaluated in three areas: quality of technical support, relevance to the Office of Defense Nuclear Nonproliferation (NA-20) mission, and management effectiveness. We have evaluated Battelle's performance against the adjectival ratings criterion that you provided.

This evaluation includes pertinent points from discussions held with Debbie Trader, Director, Laboratory Management Division, Julie Turner, Lead for Science and Technology, Mike Kluse, Associate Laboratory Director, National Security Directorate, PNNL, and Gretchen Gerke, Quality Manager, National Security Directorate, PNNL on September 24 and October 7, 2003.

- Battelle's overall performance is rated as Outstanding for FY 2003. PNNL consistently accomplished challenging tasks on time and within budget, providing exceptional results in a highly professional manner. We continue to trust PNNL's technical and management capabilities and would not hesitate to assign them any and all tasks. PNNL met the challenge in 2003 and provided the outstanding technical and managerial assistance we have come to expect from them. Their can-do attitude and focus on customer service set the standard for support to NA20.

#### Quality of Technical Support - Outstanding

From cutting edge research and development to unsurpassed contributions in nonproliferation and nuclear safety, Battelle's technical contributions to furthering our national security goals have been stellar. Their infrared spectroscopy, nuclear explosion monitoring, and radiation detection studies for the Office of Nonproliferation Research and Engineering have been top notch. The technology transferred by PNNL to operating soviet-designed reactors on behalf of the Office of International Nuclear Safety and Cooperation has directly improved the safety of these facilities. Battelle's exceptional expertise in nonproliferation technology has provided invaluable support to the Offices of

**Arms Control and Nonproliferation, International Material Protection and Emergency Cooperation, and Fissile Materials Disposition.**

**Relevance to the Office of Defense Nuclear Nonproliferation Mission – Outstanding**

The nearly 300 PNNL staff that support the Office of Defense Nuclear Nonproliferation provide a wealth of varied scientific, academic, and management expertise that is directly relevant to our mission. In 2003 their proficiency in nonproliferation, policy, and nuclear safety matters was applied to resolve today's national security issues as well as develop strategies for addressing the problems of the future. Battelle's knowledge and support have directly helped us on an international scale to secure weapons of mass destruction (WMD) and weapons useable material, reduce the proliferation of WMDs, improve our ability to detect weapons and weapons materials, and reduce the risks of nuclear accidents.

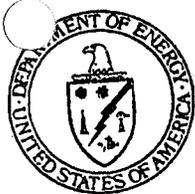
**Management Effectiveness – Outstanding**

In spite of the loss of their longstanding director of nonproliferation programs and some difficulty in hiring a suitable replacement, the PNNL management team pulled together to provide quality, cost effective, and timely service throughout the year. Originally selected to lead the Elimination of Weapons Grade Plutonium Production project, which changed due to reasons outside of their control, PNNL this year found themselves in the unforeseen position of assisting NA20 in transitioning this project to private contractors. They handled this situation with tact and professionalism, providing outstanding management support that facilitated a timely and smooth transition of EWGPP to two private firms. The highly successful International Nuclear Safety Program, which PNNL has managed for ten years, and the key leadership roles PNNL fulfills on the MPC&A infrastructure projects are prime examples of PNNL's outstanding management performance.

If you have any questions, please contact me at (202) 586-0645.

Cc: Bob McLeod, DOE-RL

# Appendix IV



**Department of Energy**

Washington, DC 20585

November 4, 2003

MEMORANDUM FOR: PAUL W. KRUGER  
ASSOCIATE MANAGER FOR SCIENCE AND  
TECHNOLOGY

FROM:

JOHN A. RUSSACK *John A. Russack*  
DIRECTOR  
OFFICE OF INTELLIGENCE

SUBJECT:

PNNL FY03 PERFORMANCE EVALUATION

In response to your memorandum of September 18, 2003, attached is the Office of Intelligence Evaluation of Pacific Northwest National Laboratories (PNNL) performance during the fiscal year 2003 period.

Of note, I find that the work conducted by PNNL in support of my Office Programs to be uniformly outstanding. I look forward to continuing this level of work with PNNL on the crucial national security tasks in the coming year.

Enclosure: IN-1 FY03 Adjectival Evaluation of PNNL Performance

UNCLASSIFIED

Office of Intelligence FY03 Performance Evaluation of Battelle's  
Management and Operation of the Pacific Northwest National Laboratory  
(PNNL)

1. Quality of S&T Delivered: the measure of the ability of PNNL to apply sound science and technical expertise in direct support of both analytical and R&D efforts for the work supported by IN at PNNL, including IWFO programs/projects.

Response: IN finds the PNNL work in this area to be outstanding. In all areas of work for IN Programs and IWFO, PNNL has delivered the highest quality product on time and on budget. The technical and scientific content of these products is without peer.

2. Relevance to the IN Missions: the measure of the creativeness and impact of PNNL efforts for a) providing high-quality, quick response technical intelligence products supporting DOE/IN nonproliferation intelligence mission and related needs of other senior policy makers; and b) performing research and development for special technologies supporting the IC that provide the US government with leading-edge technologies and a distinct advantage in execution of its missions.

Response: IN finds the PNNL work in this area to be outstanding. PNNL has been extremely effective in meeting quick response needs of the Office of Intelligence. These products have been uniformly on target for our mission areas whether in analytical products or the creation of technological products.

3. Management Effectiveness: the measure of PNNL's performance in a) organizing, leading, implementing and completing IN analytical and R&D projects; and b) providing management leadership on operation of the Field Intelligence Element (FIE) and associated Sensitive Compartmented Information Facility (SCIF) within cost and time constraints.

Response: IN finds the PNNL work in this area to be outstanding. The operation and leadership demonstrated by PNNL has shown that it is an organization that not only meets, but significantly exceeds, the exacting management standards necessary to effectively support the sensitive and time urgent mission of the Office of Intelligence. The attention to detail, in all regards, demonstrated by PNNL are of the highest quality.

# Appendix V



## Department of Energy

Washington, DC 20585

November 20, 2003

MEMORANDUM FOR PAUL W. KRUGER, ASSOCIATE MANAGER  
FOR SCIENCE AND TECHNOLOGY  
RICHLAND OPERATIONS OFFICE

FROM:  STEPHEN W. DILLARD, DIRECTOR,  
OFFICE OF COUNTERINTELLIGENCE

SUBJECT: Performance Evaluation of the Pacific Northwest National Laboratory  
(PNNL) for Fiscal Year (FY) 2003; Counterintelligence Program

In response to your memorandum dated September 18, 2003, you requested a written year-end rating of Battelle's performance during FY 2003 regarding the science and technological excellence of certain PNNL programs and activities as they relate to (1) the quality of technical support; (2) relevance to the Counterintelligence (CI) mission, and (3) management effectiveness. Using the adjective ratings you identified in that letter, I can rate, Battelle's overall CI Program performance at PNNL as **outstanding**.

As was the case in prior evaluations of PNNL's CI Program, my evaluation is based on a review of the following information: the Quarterly Reports submitted by PNNL during FY 2003; the October 9, 2002, Report that detailed the results the June 3-14, 2002, inspection of PNNL's Counterintelligence Organization; on-site reviews conducted in FY 2003 by the Office of Counterintelligence (OCI) management; self-assessments prepared by PNNL's Senior Counterintelligence Officer (SCIO) that are included in PNNL's Quarterly Reports to my office and annually to Laboratory management; PNNL's response to surveys and special "taskings" requested from my office, and regular feed back from OCI Program Directors and other individuals interacting with PNNL staff assigned to CN matters on almost a daily basis.

PNNL executive management and staff engaged activities supporting DOE's CI Program are of the highest professional caliber within the DOE Complex. PNNL CI activities are comprehensive, balanced, and so well integrated that my office has recommended that the management practices be used as a model for other sites to follow. I continue to find PNNL CI Program employees courteous, timely and thoroughly responsive to all requests that are originated by my office. With respect to executive and program management in particular, PNNL CI elements have achieved strategic visions that are fully consistent with the fundamental goals and objectives established by my managers at the national level; at the same time, their strategies also promote scientific and technical excellence, adding significant value to PNNL's institutional mission as a National Laboratory. Below, I have highlighted some of PNNL's important accomplishments that support the **outstanding** rating.

- PNNL CI Program analytical resources were engaged in several special initiatives that helped DOE achieve goals to protect sensitive information and

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DOE-RL/RLCC



technologies from exploitation by hostile foreign intelligence services and/or terrorist organizations. By way of example, a comprehensive Hanford Site International Terrorism Threat Assessment, the first of its type from a local perspective, was completed during FY 2003 and complemented PNNL's 2002 Foreign Intelligence Threat Assessment. It is currently being considered by DOE / NNSA for use by other field sites.

- PNNL CI staff regularly conducted special reviews to determine risk and vulnerabilities relative to staff interactions involving foreign national visits and assignments, unsolicited or suspect electronic communications, personnel evaluations, and other contacts and project matters. To accomplish this purpose, PNNL CI staff, have identified a broad range of information sources that effectively address the multitude of CI issues involved in these reviews.
- PNNL CI Program staff conducted and documented several investigations and inquiries to resolve anomalous reports from PNNL staff and other sources related to incidents of CI concern. The PNNL CI Investigation's Program continues to be the most active in the DOE Complex. A number of those matters addressed some of DOE / NNSA's most complex CI issues, with subject matters of high national security significance, to include three matters of "high visibility". PNNL investigations are in compliance with rules and regulations established by Law and Executive Order, and its performance in this regard is considered to be "top quality" by DOE / NNSA.
- The PNNL CI Program organized and conducted multiple training and awareness presentations for PNNL science and technology staff on hostile foreign intelligence collection, international terrorism, economic espionage, foreign travel, cyber threat, and other "audience specific" issues related to foreign interactions of risk potential. PNNL's use of the DOE/NNSA Counterintelligence Training Academy as a resource in the development of these presentations was noteworthy to the Laboratory's clients. PNNL provided such training in various formats to some 12,610 staff, exceeding by far the employee population 70% benchmark established by OCI in its national performance measures.
- PNNL's CI Program, by working with the Operational Analysis Center (OAC) and other DOE Security and CI units, maintained their on-going efforts to develop a new model integrating CI cyber expertise into traditional CI intelligence, investigative and analytical functions. This effort established an effective CI cyber-relevant data collection and analysis process for CI threat review.
- The excellence of PNNL's CI workforce has resulted in their selection to participate on a number of nation-wide working groups and forums. PNNL's CI Program model and its identified best practices were also recognized by DOE/NNSA managers and exported to improve performance at other Counterintelligence sites in the complex, as well as internally within the Laboratory.
- PNNL's Disaster Recovery Program (DRP) successfully began the establishment of a near-real-time backup and failover capability for the entire DOE/NNSA CI

record systems and networked communications. This has resulted in special recognition and commendations for the IMAC-OAC, and DOE/NNSA's decision to establish the DRP at PNNL is indicative the trust PNNL's program has developed across the complex and the respect earned for PNNL's effective, efficient project and program management.

- The PNNL IMAC program conducted regular analysis of network traffic to identify foreign open-source collection efforts, intrusion attempts, and other malicious activities against the DOE/NNSA complex. Technically, the OAC has achieved unprecedented thresholds in data volume and management, storing hundreds of millions of records in readily accessible databases. The OAC has established an exceptional level of coordination and cooperation among DOE/NNSA sites that has enabled CI entities to effectively harness the individual sites' CI-cyber efforts to monitor, identify, neutralize, and otherwise deter malicious activities involving national DOE / NNSA assets. The OAC coordinates with local site CI authorities and other national CI and computer security programs to identify and characterize threats against the national interests. The OAC published in FY 2003 a number of outstanding Information Intelligent Reports (IIRs) for the Intelligence Community and collaborated with local and HQ elements of OCI to produce a variety of other special reports.

Based on all the information available to me, to include my own interaction and observation of the CI activities at this Laboratory, I am pleased to provide to PNNL this **outstanding** rating for the FY 2003.

Should you have any questions concerning this matter, please contact me at (202) 586-5901.

# Appendix VI



**Department of Energy**  
Washington, DC 20585

NOV 19 2003

Mr. Keith A. Klein  
Manager  
Richland Operations Office  
U.S. Department of Energy  
PO Box 550 (A7-50)  
Richland, WA 99352

Dear Mr. Klein:

The Office of Energy Efficiency and Renewable Energy (EERE) has completed its evaluation of the Battelle Memorial Institute's performance as the Management and Operating Contractor of the Pacific Northwest National Laboratory (PNNL) for the performance period beginning October 1, 2002 and ending September 30, 2003. You will find the Evaluation Report enclosed for your review.

The evaluation notes that PNNL received a rating of "Outstanding" in all four Performance Factors: Quality of Science and Technology; Relevance to Department of Energy Missions and National Needs; Effectiveness and Efficiency of Research Program Management; and, Success in constructing and Operating Research Facilities. EERE has identified opportunities in areas it believes are important to the Battelle Memorial Institute and EERE's future success:

1. There is a need to develop more structured commercialization plans, improve the utilization of Quality Control and Evaluation Plans, and actively collaborate with EERE in the performance goal setting process.
2. Ensure that all technical/cost/progress reports and plans are provided to all cognizant parties on a prescribed schedule and that technology initiatives, projects, and prototypes are mapped to date-sensitive critical milestones and that these milestones are rigorously maintained in FY 2004.
3. Increase the use of PNNL's exposure with the Big Three automakers in the area of light weight materials development and application.
4. Integrate code compliance software (REScheck) into code change proposal processes.
5. Critically examine, on a regular basis, the balance between research and demonstration within the joint laboratory/EERE environment and ensure structured PNNL technical review processes are linked to all research and demonstration efforts.

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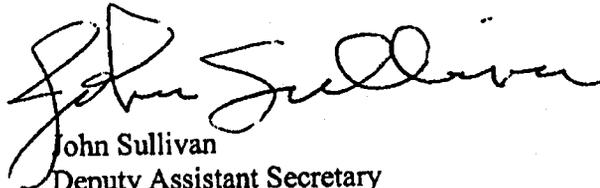
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If you have any questions concerning this evaluation, please do not hesitate to contact us or Marvin Gorelick by e-mail at [marvin.gorelick@ee.doe.gov](mailto:marvin.gorelick@ee.doe.gov) or by phone at 202 586 9436.

Sincerely,



Richard Moorer,  
Deputy Assistant Secretary  
Technology Development  
Energy Efficiency and Renewable Energy



John Sullivan  
Deputy Assistant Secretary  
Business Administration  
Energy Efficiency and Renewable Energy

Enclosure

**U.S. Department of Energy  
Office of Energy Efficiency and Renewable Energy**

**Performance Evaluation Report of the Battelle Memorial Institute  
For the Period**

**October 1, 2002 - September 30, 2003**

**For**

**Management and Operations of Science and Technology  
For Energy Efficiency and Renewable Energy  
At the Pacific Northwest National Laboratory**

**Contract No. DE-AC06-76RL01830**

**November 14, 2003**

## Executive Summary

The Office of Energy Efficiency and Renewable Energy (EERE) prepared this evaluation as its input to the U.S. Department of Energy's (DOE) award-fee evaluation of Battelle Memorial Institute's performance for the management and operation of the Pacific Northwest National Laboratory (PNNL). It assesses PNNL's performance of work for programs in DOE's Office of Energy Efficiency and Renewable Energy (EERE) from October 1, 2002 to September 30, 2003.

Each reporting EERE Program evaluated PNNL's performance using four performance measures. The "Total" rating represents a weighted average score computed using each Program's "FY 2003 Obligations at PNNL as of 8/31/2003" as the weighting factor. Six of the eleven EERE Programs, namely Building Technologies; Federal Energy Management Program (FEMP); FreedomCAR and Vehicle Technologies; Hydrogen, Fuel Cells, and Infrastructure; Industrial Technologies; and Weatherization and Intergovernmental submitted evaluations.

For PNNL, EERE arrived at an overall score of "Outstanding" for all four Performance Measures. The table shows the scores awarded by reporting Program.

PROGRAM OFFICE	FY 2003 OBLIGATIONS AT PNNL AS OF 8/31/2003	QUALITY OF SCIENCE AND TECHNOLOGY	RELEVANCE TO DOE MISSIONS AND NATIONAL NEEDS	EFFECTIVENESS AND EFFICIENCY OF RESEARCH PROGRAM MANAGEMENT	SUCCESS IN CONSTRUCTING AND OPERATING RESEARCH FACILITIES
Buildings	\$3,722,000	Outstanding	Excellent	Excellent	Not Rated
FEMP	\$2,668,194	Outstanding	Outstanding	Not Rated	Not Rated
Freedom Car & Vehicle Technologies	\$7,215,785	Outstanding	Outstanding	Outstanding	Outstanding
Hydrogen & Infrastructure	\$2,649,427	Excellent	Excellent	Excellent	Not Rated
Industrial Technology	\$2,803,104	Outstanding	Outstanding	Excellent	Not Rated
Weatherization & Intergovernmental	\$3,605,000	Outstanding	Outstanding	Outstanding	Not Rated
<b>TOTAL</b>	<b>\$22,663,510</b>	<b>Outstanding</b>	<b>Outstanding</b>	<b>Outstanding</b>	<b>Outstanding</b>

## Introduction

This evaluation has been prepared as part of the U.S. Department of Energy's (DOE) contractual obligation to assess Battelle Memorial Institute's performance for the management and operation of the Pacific Northwest National Laboratory (PNNL). Specifically, it assesses PNNL's support of DOE's Office of Energy Efficiency and Renewable Energy (EERE) Program Offices and its ability to assist these Program Offices in maintaining the overall EERE mission: to strengthen America's energy security, environmental quality, and economic vitality through public-private partnerships. This evaluation report, covering the period from October 1, 2002 through September 30, 2003, is comprised of four sections. The first section one highlights the given performance measures and factors provided to each DOE/EERE technical Program Office. The next section addresses the process followed to assign an adjectival rating by the evaluating Office. The third section presents the overall outcomes and scores resultant from the evaluation. The final section synthesizes key achievements and areas of concern.

## Performance Measures and Factors

EERE used four "Performance Measures" for evaluating the success of science and technology at PNNL. Under each performance measure, the evaluators received "factors" to consider when evaluating laboratory performance under the factor, as follows:

### **Performance Measure: Quality of Science and Technology**

#### **Factors:**

- Laboratory successes in achieving sustained progress and impact on the field.
- Laboratory contributions to the scientific and engineering community's knowledge base underpinning the technology program
- Recognition received by the laboratory from the scientific and technical communities.

### **Performance Measure: Relevance to Department of Energy Missions and National Needs**

#### **Factors:**

- Contributions to the annual priorities, the long-term outcome goals, and the intermediate objectives of EERE and its programs.
- Whether the research fits within and advances the missions of EERE, DOE and National programs.
- The value of successfully developing pre-commercial technology to EERE and DOE, other Federal agencies and the national economy.

### **Performance Measure: Effectiveness and Efficiency of Research Program Management**

#### **Factors:**

- Excellence in managing EERE R&D Programs.
- Demonstrate excellence in planning EERE R&D Programs.
- The effectiveness with which technical results are published, disseminated, and transferred to maximize the value of the research and development results and to gain appropriate recognition for DOE, EERE and the laboratory

### Performance Measure: Success in Constructing and Operating Research Facilities

#### Factors:

- Whether the construction and commissioning of new facilities proceeds on time and within budget.
- The cost effectiveness of operating, maintaining, and improving facilities.

### Evaluation Processes: Adjectival Ratings and Averaging

EERE Programs assigned an adjectival rating to each performance measure. Each adjectival rating translated into a numeric score, using the evaluator's Input Rating Scale, namely: 4 = Outstanding; 3 = Excellent; 2 = Good; 1 = Marginal; and 0 = Unsatisfactory. The description, aligned with each adjectival rating, is presented in the following table:

ADJECTIVAL RATING	NUMERIC SCORE	DESCRIPTION
Outstanding	4	Significantly exceeds the standards of performance, achieves noteworthy results, and accomplishes very difficult tasks in a timely manner.
Excellent	3	Exceeds expectations and standards of performance, accomplishes difficult tasks in a timely manner, and minor deficiencies are more than offset by better performance in other areas.
Good	2	Meets expectations and standards of performance, actions are carried out in an efficient and timely manner; deficiencies do not affect overall performance.
Marginal	1	Below the standards of performance, deficiencies cause serious delays and re-scheduling, schedules are adversely affected.
Unsatisfactory	0	Well below standards of performance, deficiencies cause serious delays and re-scheduling, corrective action requires high-level management attention.

After collecting the scores, EERE weighted them against specific program obligations for FY 2003 at PNNL as reported in the DOE Management Analysis Reporting System (MARS) report as of August 31, 2003.

PROGRAM OFFICE	FY 2003 OBLIGATIONS AS OF AUGUST 31, 2003
Buildings	\$3,722,000
FEMP	\$2,668,194
Freedom Car & Vehicle Technologies	\$7,215,785
Hydrogen & Infrastructure	\$2,649,427
Industrial Technology	\$2,803,104
Weatherization & Intergovernmental	\$3,605,000
<b>TOTAL</b>	<b>\$22,663,510</b>

EERE then computed a weighted average score for each performance measure, for example:

a	b	c	d	e
PROGRAM	ADJECTIVAL RATING	NUMERICAL SCORE	FY 2003 OBLIGATIONS	WEIGHTED SCORE (COLUMN C X COLUMN D)
A	Excellent	3.0	\$2,802,053	\$8,406,159
B	Outstanding	4.0	\$16,294,010	\$65,176,040
C	Outstanding	4.0	\$422,000	\$1,688,000
D	Outstanding	4.0	\$6,281,757	\$25,127,028
E	Excellent	3.0	\$1,202,000	\$3,606,000
SUM			\$27,001,820	\$104,003,227
Weighted Office Rating (Sum of column e/Sum of column d)				3.85

EERE then converted the weighted average scores back to an adjectival rating as presented below:

POINTS	EERE OVERALL CONTRACTOR RATING SCALE (ADJECTIVAL RATING)
>3.5	Outstanding
>2.6 - 3.5	Excellent
>1.6 - 2.6	Good
<1.6	Marginal

## Outcome by Performance Measure and Overall Scores

EERE rated Battelle Memorial Institute's performance for Fiscal Year 2003 as "Outstanding" for all

four Performance Measures. The following tables highlight the adjectival ratings issued by each of the Program Offices; further data is provided that translates the adjectival rating into a numeric score. Please note that each table presents this aforementioned data per Performance Measure.

PROGRAM OFFICE	FY 2003 OBLIGATIONS AT PNNL AS OF 8/31/03	QUALITY OF SCIENCE AND TECHNOLOGY	RELEVANCE TO DOE MISSIONS AND NATIONAL NEEDS	EFFECTIVENESS AND EFFICIENCY OF RESEARCH PROGRAM MANAGEMENT	SUCCESS IN CONSTRUCTING AND OPERATING RESEARCH FACILITIES
Buildings	\$3,722,000	Outstanding	Excellent	Excellent	Not Rated
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<b>TOTAL</b>	<b>\$22,663,510</b>	<b>Outstanding</b>	<b>Outstanding</b>	<b>Outstanding</b>	<b>Outstanding</b>

PERFORMANCE MEASURES BY OVERALL NUMERIC SCORE					
PROGRAM OFFICE	FY 2003 OBLIGATIONS AT PNNL AS OF 8/31/2003	QUALITY OF SCIENCE AND TECHNOLOGY	RELEVANCE TO DOE MISSIONS AND NATIONAL NEEDS	EFFECTIVENESS AND EFFICIENCY OF RESEARCH PROGRAM MANAGEMENT	SUCCESS IN CONSTRUCTING AND OPERATING RESEARCH FACILITIES
Buildings	\$3,722,000	4	3	3	Not Rated
FEMP	\$2,668,194	4	4	Not Rated	Not Rated
Freedom Car & Vehicle Technologies	\$7,215,785	4	4	4	4
Hydrogen & Infrastructure	\$2,649,427	3	3	3	Not Rated
Industrial Technology	\$2,803,104	4	4	3	Not Rated
Weatherization & Intergovernmental	\$3,605,000	4	4	4	Not Rated
<b>TOTAL</b>	<b>\$22,663,510</b>	<b>3.88</b>	<b>3.72</b>	<b>3.54</b>	<b>4.00</b>

The overall combined performance rating for PNNL for FY 2003 is "Outstanding".

## Selected Examples of Achievements and Deficiencies

### Performance Measure 1: Quality of Science and Technology

EERE, in the order of each PNNL Performance Measure, has highlighted selected major achievements recognized throughout FY 2003; it also addresses certain areas, within the PNNL R&D environment, where management attention needs to be focused

EERE rates PNNL as "Outstanding" for Quality of Science and Technology.

#### Significant Achievements

##### FreedomCAR and Vehicle Technologies

- PNNL has consistently maintained a record of innovation and discovery. In prior years the lab has won and been nominated for R&D 100 awards in the area of diesel aftertreatment and in 2003 it received the Federal Laboratory Consortium (FLC) Award for Excellence in Technology Transfer. This award was given for engine exhaust

aftertreatment system based on non-thermal plasma-assisted catalysis and included three funded projects in the field. The recipients of the technology transfer included Ford Motor Co, General Motors, DaimlerChrysler, Caterpillar, and Delphi.

- Development of lightweight metal matrix composites for advanced brake components (as noted in self-appraisal). Methods for producing very low cost aluminum metal matrix composites were demonstrated, and commercialization of the technology was initiated by industry participant Visteon. Several publications and invited presentations contributed to the technical communities' knowledge base development.

### **Building Technologies**

- PNNL, through the Building Energy-Efficiency Codes Program, does an outstanding job in assisting the advancement of the program goals of the Residential Building Energy-Efficiency Codes (RBEEC) activities, the DOE Energy Efficiency and Renewable Energy, Office of Building Technologies, nationally recognized energy code advancement program.
- The staffs of the Building Energy Codes Program (BECP) consistently meets project requirements and carry out requested RBEEC assignments with a sense of responsibility and with great competence, often with very short notice. They exhibit excellent "people skills" in working with DOE Headquarters personnel as well as the RBEEC members in addition to the building community and with the public interested in energy efficient and comfortable houses and building energy codes that impact those houses.
- Last year's assigned assistance in the preparation of the 2006 International Energy Conservation Code (IECC) code change proposal resulted in the successful approval by the International Code Council's of the most far-reaching change in the consensus code development process in decades. The PNNL/BECP team members skillfully followed DOE's RBEEC guidance in developing the many code related technical products for implementing research results to the residential building code arena, the building industry, and related communities. Products currently being developed include but are not limited to, web pages, reports, articles, and beyond-code documents and software.
- Significant achievement in determining indoor air quality in commercially manufactured housing units in support of the industrial housing partnership of the Building America program. Mr. Al Hodgson is conducting outstanding research determining indoor air pollutants as they occur in manufactured housing. He works closely with indoor air quality Building America program at the Florida Solar Center. His results are enabling manufacturers to eliminate indoor air pollutants from commonly use building materials in manufactured housing.
- PNNL does a very good job in assisting the Energy Policy Act Standards rulemaking requirements/program goals of the DOE Energy Efficiency and Renewable Energy, Office of Building Technologies, nationally recognized cost-shared program.
- Of particular note, this year has been the staff's knowledgeable expertise in assisting the new DOE American Society of Heating, Refrigeration, and Air Conditioning engineering (ASHRAE) Medium Priority Products Rulemaking Team come up to speed and to better

- understand the ASHRAE products and process.
- Developed incorporated and integrated Beyond Code decision making solutions into draft revisions of widely disseminated and used code related microcomputer software and energy code compliance products and materials.

#### **Weatherization and Intergovernmental**

- Consistently provided superb technical analysis and technical support directly related to Building Energy Codes, International, Inventions and Innovation, and National Industrial Competitiveness through Energy, Environment, and Economics (NICE3) mission accomplishment.

#### **Industrial Technologies**

- PNNL has continued to make outstanding contributions to the field of sensor development, on behalf of the Fluid Dynamics research program. The investigators have taken tomography and Doppler velocimetry to new levels of applicability in industry. Scientific organizations have recognized the importance of PNNL's contributions to these areas as well, and the investigators are nationally renowned for these achievements.

#### **FEMP**

- PNNL's work in the areas of the Best Practices Guide for Operations & Maintenance, Whole Building Diagnostician, and Sustainable Design Business Case were important contributions to the engineering, construction, and facilities management communities increased knowledge base in these areas.

#### **Hydrogen and Infrastructure**

- Cold start times of less than 80 seconds have been achieved for a microchannel steam reforming subsystem, which constitutes significant progress towards meeting FreedomCAR performance targets for on-board fuel reformers. The steam reformer PNNL design provides exceptionally low combustion-side pressure losses, critical to achieving rapid start and rapid transient response, essential for transportation applications.
- A differential temperature water gas shift reactor, which produces hydrogen by reacting carbon monoxide with water, has been developed at PNNL that is two to three times more compact than can be achieved using conventional, two-stage adiabatic designs. In the differential temperature design, an optimal temperature profile is imposed on the catalyst bed that provides the best combination of rapid kinetics at high temperature and favorable thermodynamics at low temperatures. The projected volume of a full-scale water gas shift reactor for a 50 kilowatt-electric Proton Exchange Membrane (PEM) fuel cell power system is less than 3 liters.

## **Notable Achievements:**

### **FreedomCAR and Vehicle Technologies**

- Continued work in the field of weld metal deformation and the use of miniature tensile specimens to measure local weld metal properties. This ongoing work, now focused on evaluation of aluminum extrusions for hydroforming, has resulted in 16 publications in the field of localized weld metal deformation, with three occurring during FY 2003.
- Significant advances were accomplished by PNNL staff in development of lightweight laminated side glass under a cooperative project with PNNL and PPG, and Visteon. The project is advancing the manufacturing technology to produce lightweight side glass for FreedomCAR vehicles using an innovative injection molding process for the polymer interlayer.

### **Building Technologies**

- Consistently very good to excellent response to all assignments.

### **Weatherization and Intergovernmental**

- Has become the preeminent source of technical and building science information based on building energy code requirements and their interpretation, and the source of impact analyses of upgrading building energy codes.
- Provides world-class technical assistance to communities and corporations on rebuilding energy efficient building infrastructure.

### **Industrial Technologies**

- Results of research are presented in open literature and meetings. PNNL has made good progress on superior aluminum extrusion in cooperation with Oak Ridge National Laboratory, taking advantage of the world-class facilities at both laboratories.

### **Hydrogen and Infrastructure**

- PNNL has partnered with Argonne National Laboratory (lead), Los Alamos National Laboratory, and Oak Ridge National Laboratory (ORNL), in addition to private industry, to develop an autothermal fuel processor that can meet fast start-up requirements for on-board applications. For this effort, PNNL developed a high temperature recuperator, which extracts heat from the reformate to preheat air and steam feeds into the reformer in an energy efficient manner. A microchannel mixer was also developed, which is used to uniformly mix air into the reformate during rapid start-up.

- A preferential oxidation reactor (PROX) subsystem has been developed at PNNL that incorporates microchannel technology to provide improved temperature control and a reduction in the number of required stages. The PROX subsystem is the final step in a fuel processor, which reduces the final concentration of carbon monoxide to less than 10 parts per million (ppm) at steady state and less than 100 ppm under transient conditions. With multiple air inlets, the microchannel PROX subsystem provides an excellent combination of high carbon monoxide conversion, low hydrogen combustion, and low reverse water gas shift involving carbon dioxide.

**Significant Deficiencies:** None

**Notable Deficiencies:** None

## **Performance Measure 2: Relevance to DOE Missions and National Needs**

EERE rates PNNL as "Outstanding" for Relevance to DOE Missions and National Needs.

### **Significant Achievements:**

#### **FreedomCAR and Vehicle Technologies**

- PNNL consistently meets or exceeds its annual performance goals. A significant example of this performance measure was illustrated in the sulfur trap cooperative research and development agreement (CRADA) with Caterpillar Corp. In this project, all milestone objectives set by the industry partner for FY 2003 were greatly exceeded ahead of schedule.

#### **Building Technologies**

- The approved 2006 IECC code change proposal was submitted on schedule, which marked the most extensive revision of the code in decades.
- The BECP continues to perform in an outstanding fashion in the building codes arena based on its' well-respected position and performance within the building energy code community.
- Sriram Somasundaram, Ron Jarnigan, David Winiarski, and supporting PNNL staff continue to perform in an exemplary fashion within the Energy Policy Act Standards program and the commercial equipment industry. Both Jarnigan and Winiarski are well respected within a large array of organizations such as American Society for Testing and Materials (ASTM), ASHRAE, Gas Appliance Manufacturers' Association (GAMA), American Refrigeration Institute, and numerous others. Their support has been instrumental in resolving definitional issues related to a new ASHRAE product class.

### **Weatherization and Intergovernmental**

- Consistently supports International, Inventions and Innovation, and NICE3 programs focus on EERE mission.

### **•Industrial Technologies**

- PNNL has consistently made Office of Industrial Technologies objectives to industry productivity their top priority. PNNL's work has contributed significantly to the EERE mission - for industrial energy efficiency. I believe that PNNL's work in sensors and diagnostics will influence other EERE program areas as well, such as hydrogen and biomass. PNNL's work has consistently been excellent in all contributions they have made.

### **FEMP**

- PNNL had a number of significant achievements in FY 2003, including their work developing and implementing ALERT protocols to enable Federal Agencies to improve their gas related efficiency, which is a high priority at DOE. PNNL staff also did outstanding work in the area of Utility Energy Service Contract analysis and deployment. The lab also plays a key role in our New Technology Demonstration program, which provides an important opportunity to transfer EERE technologies into the Federal Sector.

### **Hydrogen and Infrastructure**

- The PNNL effort maps directly to EERE priorities, goals and objectives, and to the Office of Hydrogen, Fuel Cells, and Infrastructure Technologies Multi-Year Program Plan. The effort has been reviewed and redirected, as needed each year to match the highest priority needs of the EERE, DOE, and National programs that are consistent with the PNNL knowledge base, staff, and experimental capabilities.

### **Notable Achievements:**

#### **FreedomCAR and Vehicle Technologies**

- Submission of Annual Operating Plan (AOP) containing work well aligned with the Automotive Lightweighting Materials (ALM) and its Big Three partners in FreedomCAR.
- Another notable accomplishment was the completion of the economic analysis of low-cost titanium powder processes, and the selection and processing of low-cost Industrial Technologies Program titanium powder for potential use in lightweighting of automotive powertrain components. This work is crucial to clarifying and shaping ALM and FreedomCAR plans for future work in titanium for automotive applications. Significant work remains in this area, but the potential benefit of a suitable titanium powder meeting

established programmatic goals is an important accomplishment.

#### **Building Technologies**

- There has been a marked improvement in PNNL's efforts to meet annual performance goals with quality products and within available resources.
- Successful development of pre-commercial technology regarding building codes.

#### **Weatherization and Intergovernmental**

- Improved REScheck and COMcheck tools, related code training materials, technical information, and train-the-trainer activities critical in exceeding by 50% the FY 2003 goal of updating the building energy codes knowledgebase of over 2,000 building design professionals, builders, and code officials.

#### **Industrial Technologies**

- The work is clearly aligned with mission of both EERE and ITP.

#### **Hydrogen and Infrastructure**

- Significant progress has been made at PNNL towards achieving FreedomCAR performance targets for on-board reformation of gasoline. The projected volume of a 50 kilowatt-electric microchannel fuel processing system is less than 1 cubic foot, based on performance testing of microchannel-based steam reformer, water gas shift, and preferential oxidation subsystems. The low-pressure loss design enables rapid start-up and rapid transient response. Extensive integration of reactors with highly effective heat exchangers and vaporizers allowed efficiency performance targets to be achieved.
- Microchannel components developed at PNNL have been provided to industrial fuel processor developers for testing and evaluation. Compact, efficient steam generators sufficient for a 50 kilowatt-electric autothermal fuel reforming system have been provided to McDermott and to the Gas Technology Institute. Heat exchangers and vaporizers have been provided to Innovatek for inclusion into an approximately five kilowatt-electric diesel fuel processing system.

**Significant Deficiencies:** None

**Notable Deficiencies:**

#### **Industrial Technologies**

A more structured commercialization plan is needed.

### **Performance Measure 3: Effectiveness and Efficiency of Research Program Management**

EERE rates PNNL as "Outstanding" for Effectiveness and Efficiency of Research Program Management.

#### **Significant Achievements:**

##### **FreedomCAR and Vehicle Technologies**

- PNNL has acted prudently in all aspects of financial management of its programs and has committed to ensuring the appropriate competencies of its personnel. This was evidenced in FY 2003 by a strategic senior hire in the program area with extensive experience in program and project management and whose prior experience was in the diesel engine industry. In addition, PNNL consolidated all its activities in a single coherent Annual Operating Plan in FY 2003 indicating a high degree of linkage to established DOE programmatic operating plans. Finally, PNNL coordinated in an exemplary manner with ORNL in combustion/catalysis research.
- Initial identification of possible topics for ALM in materials for fuel cell vehicles

##### **Building Technologies**

- The successful approval of the 2006 IECC code change proposal was a result of clearly identified DOE priorities, performance measures, and key milestones associated with the activity.
- The approval of the 2006 IECC code change proposal and the incorporation of Beyond Code decision making into the building efficiency of residential buildings.

##### **Weatherization and Intergovernmental**

- Transformed dissemination of building energy code compliance tools, analyses, and information from shipped and mailed paper and compact disc format to dissemination of web based downloadable products and web based tools. This significantly increased dissemination while reducing costs, thereby facilitating code adoption, implementation, and enforcement.
- Consistently provides comprehensive and verifiable analysis and information on the energy savings, pollution prevention, worker productivity, and technology successes and achievements of Inventions and Innovation and NICE3.

## **Notable Achievements:**

### **FreedomCAR and Vehicle Technologies**

- PNNL staff published extensively in numerous peer reviewed journals, trade journals, and conference proceedings. PNNL hosted the FY 2003 National Laboratory Catalysis Conference (NLCAT) conference and co-hosted several key workshops and conference sessions. Their publication rate and quality has been excellent.
- Development, submission, and defense of proposals on new projects for consideration by ALM. PNNL has managed a portfolio of technology R&D projects in an efficient manner. The laboratory has participated effectively in the R&D planning activities with ALM and its Big Three partners in FreedomCAR. The laboratory has developed 15 new project proposals for consideration, and has recently initiated roadmapping activities for a new program area in fuel cell vehicle materials. Through its work spearheading the 21<sup>st</sup> Century Truck Partnership Laboratory Council's activities, PNNL enabled excellent coordination among participating DOE laboratories.

### **Building Technologies**

- PNNL maintains low uncosted balances
- There has been a marked improvement demonstrated in this factor

### **Weatherization and Intergovernmental**

- Provided invaluable assistance to developing countries in creating their own energy strategies.

### **Industrial Technologies**

- The sensor and diagnostic program has been well managed, in so far as all milestones were addressed on schedule. To make the effort truly outstanding, PNNL will continue to work to work with industry to commercialize new discoveries, and will keep HQ program management informed of all efforts towards this goal. Therefore, the message is, HQ program management wants to see the PNNL technology commercialized in a rapid and efficient manner. Communication with ITP is excellent and informative; PNNL staff is very responsive and cooperative. PNNL has been effective in managing the project and publishing, transferring, and disseminating the R&D results.

### **Hydrogen and Infrastructure**

- PNNL has consistently demonstrated a proactive role in addressing DOE R&D priorities through their R&D management and planning. They are responsive to the goals and

priorities of the Program, and have strived to work collaboratively and have been responsible recipients of public R&D dollars through public dissemination of information.

- Two patent applications have been filed: G. A. Whyatt, E-14038 – Microchannel Mixing Device, and G. A. Whyatt, E-13887 – System for Rapid Cold Startup of Microchannel Steam Reformer.
- The following publications and presentations were made:
  - TeGrotenhuis KP Brooks, DL King, RS Wegeng, "Optimizing the Water Gas Shift Reaction in Microchannel Reactors by Trading Off Equilibrium and Reaction Kinetics through Temperature Management", and WE Fuel Cell Seminar, Nov 18-21, 2002, Palm Springs, CA.
  - TeGrotenhuis WE and VS Stenkamp, "Testing of a Microchannel Partial Condenser and Phase Separator in Reduced Gravity", First International Conference on Microchannels and Minichannels, April 24-25, 2003, Rochester, NY.
  - King DL KP Brooks, CM Fischer, LR Pederson, GC Rawlings, VS Stenkamp, WE TeGrotenhuis, RS Wegeng, and GA Whyatt, "Fuel Reformation: Catalyst Requirements in Microchannel Architectures," Microreactor Technology and Process Intensification, American Chemical Society Annual Meeting, September 8, 2003, New York, NY.
  - Brooks KP, JM Davis, CM Fischer, DL King, LR Pederson, VS Stenkamp, WE TeGrotenhuis, RS Wegeng, and GA Whyatt, "Fuel Reformation: Microchannel Reactor Design," Microreactor Technology and Process Intensification, American Chemical Society Annual Meeting, September 8, 2003, New York, NY.
  - TeGrotenhuis, WE, KP Brooks, JM Davis, CM Fischer, DL King, LR Pederson, VS Stenkamp, RS Wegeng, and GA Whyatt, "Progress in Developing a Microchannel-Based Fuel Processor for Automotive PEM Fuel Cell Power Systems," 7<sup>th</sup> International Microreaction Technology Conference, September 9-10, Lausanne, Switzerland.

**Significant Deficiencies:** None

**Notable Deficiencies:** None

#### **FreedomCAR and Vehicle Technologies**

- Notable deficiencies exist with the completion of some project milestone in a timely manner. The selection of milestones and establishing their schedule should be given additional attention by PNNL during the coming year.

#### **Performance Measure 4: Success in Constructing and Operating Research Facilities**

EERE rates PNNL as "Outstanding" for Success in Constructing and Operating Research Facilities.

## **Significant Achievements**

### **FreedomCAR and Vehicle Technologies**

- PNNL has completed the construction of the Emissions Characterization and Aerosol Laboratory in support (and partially funded by) the DOE/Office of FreedomCar and Vehicle Technologies Engine and Emission-control Technologies Program. This facility has advanced gas phase and particulate characterization capabilities coupled to diesel engine dynamometers (one chassis dyno with a VW Jetta TDI and an engine dyno with a Cummins 5.9 liter ISB). This unique facility allows for the realistic testing of diesel aftertreatment and particulate filtration systems and allows PNNL to validate micro and bench scale results under "real world" conditions.
- PNNL has also acquired a world-class particulate analysis system known as SPLAT-MS (Single Particle Laser Ablation Time-of-Flight Mass Spectroscopy). This sophisticated system can sample individual diesel particulates and identify size, mass, shape, adsorbed surface species and primary composition. This device supports all DOE/OFCVT programs dealing with particulates.

## **Notable Achievements:**

### **FreedomCAR and Vehicle Technologies**

- PNNL has successfully installed an SGI Linux Cluster parallel computing station dedicated to the computational fluid dynamics group. This powerful capability significantly enhances PNNL's modeling capabilities and directly supports activities within the Cross-Cut Lean Exhaust Emissions Reduction Simulations (CLEERS) program.

**Significant Deficiencies:** None

**Notable Deficiencies:** None

## **Guidance for the Next Performance Period**

**Performance Expectations for the National Laboratory for the Next Performance Period**

### **FreedomCAR and Vehicle Technologies**

- Maintain the high performance standards.
- Conclude current projects as planned and continue pushing new proposed projects.

### **Industrial Technologies**

- Continuation of very fine work.

### **Hydrogen and Infrastructure**

- Annual National Laboratory Review: One or more technical presentations will be made at the annual review meeting for the DOE Fuel Cells for Transportation/Fuels for Fuel Cells Program, to be held in May 2004.
- Monthly Reports: Monthly spending reports will be provided by the 15<sup>th</sup> of each month to the DOE Fuel Cell Program Manager.
- Annual Progress Report: A written progress report will be provided for input to the DOE Fuel Cells for Transportation/Fuels for Fuel Cells Program annual report, due in June 2004.
- Annual Operating Plan: The Annual Operating Plan for FY05 will be provided in draft form for review by the DOE Fuel Cells for Transportation/Fuels for Fuel Cells Program Manager in July 2004.
- Efforts to develop a compact, efficient fuel reformer for on-board applications will focus on the steam reforming subsystem and the water gas shift subsystem.
- For the steam reformer subsystem: Demonstrate cold startup of a prototype steam reformer subsystem on benchmark gasoline in 30 seconds or less. – December.
- Assess fuel costs associated with steam reformer subsystem rapid startup and transient response. – March.
- Show feasibility of meeting the 2005 FreedomCAR target for specific power of 700 We/kg for the steam reformer subsystem on benchmark gasoline, using lightweight materials and improved reactor productivity. – June.
- Complete assessment of the effect of sulfur concentration and form on steam reformer catalyst performance versus temperature. – September
- For the water gas shift subsystem:
  - Assess deactivation in Water/gas shift catalysts (WGS) catalysts obtained from commercial and other developers in packed bed and engineered structures versus temperature, space velocity, steam to carbon ratio, and presence of low concentrations of sulfur. – February
  - Complete fabrication of a 2 kilowatt electrical (kWe) differential temperature water-gas shift subsystem, modified to minimize the effects of flow irregularities. – April.
  - Show the feasibility of achieving greater than 90% Carbon monoxide conversion and greater than 99% hydrogen selectivity for simulated reformat at a volume hourly

space velocity greater than 30,000 in a WGS subsystem with microchannel temperature control - September.

## **Input on Concerns for Laboratory Management**

### **FreedomCAR and Vehicle Technologies**

- Continue trying to increase Lab's visibility with the Big Three automakers in order to become more 'mainstream' like ORNL in the lightweighting materials efforts.
- As noted above in Performance Measure 3, the selection of milestones and establishing their schedule should be given additional attention by PNNL during the coming year.

### **Building Technologies**

- Continue support for the 2006 IECC code change proposal and incorporation of Beyond Code technologies into the REScheck<sup>TM</sup> code compliance software and materials.
- Solidifying communications around the Building Technologies Program Multi-Year Program Plan (MYPP), its Annual Operating Plan (AOP) and Quality Control and Evaluation Plan could improve productivity.
- Actively participating in the goal setting process.
- Critically examining the balance between research and demonstration content of the laboratories activities could prove useful.
- Reinforcing an internal technical review process.

In response to the FY 2003 EERE Evaluation Request for Input letter sent on September 23, 2003, the following fiscal year 2003 performance evaluation input of the Contractor relates to their work in the area of Energy Efficiency and Renewable Energy. Program performance was evaluated using four performance measures: Quality of Science and Technology, Relevance to DOE Missions and National Needs, Effectiveness and Efficiency of Research Program Management, and Success in Constructing and Operating Research Facilities.

This feedback also summarizes discussions/interactions held with EERE management and staff, DOE-HQ, and with the Energy Science & Technology Directorate.

The Contractor's overall performance for the Office of Energy Efficiency and Renewable Energy is rated at Outstanding for FY 2003. The Contractor has maintained a record of innovation and discovery.

### **Quality of Science and Technology – Outstanding**

In FY 2003, the Laboratory received the Federal Laboratory Consortium (FLC) Award for Excellence in Technology Transfer, an award given for engine exhaust after-treatment system based on non-thermal plasma-assisted catalysis and included three funded projects in the field. The lab also does an outstanding job in assisting the advancement of the program goals of the Residential Building Energy-Efficiency Codes (RBEEC) activities, the DOE Energy Efficiency and Renewable Energy, Office of Building Technologies, nationally recognized energy code advancement program. In addition, the Laboratory achieved significant achievement in determining indoor air quality in commercially manufactured housing units in support of the industrial housing partnership of the Building America Program. Of particular note, this year, has been the staff's knowledgeable expertise in assisting the new DOE American Society of Heating, Refrigeration, and Air Conditioning Engineering (ASHRAE) Medium Priority Products Rulemaking Team come up to speed and better understand the ASHRAE products and process. The Laboratory consistently provided superb technical analysis and technical support directly related to Building Energy Codes, International Inventions and Innovation, and National Industrial Competitiveness through Energy, Environment, and Economics (NICE3) Mission accomplishments. The Laboratory has become the source of technical and building science information and the source of impact analyses of upgrading building energy codes. The lab has also continued to make outstanding contributions to the field of sensor development, on behalf of the Fluid Dynamics Research Program, as well. In the area of Hydrogen and Infrastructure, the Laboratory's steam reformer design work provides exceptionally low combustion-side pressure losses, critical to achieving rapid start and rapid transient response, essential for transportation applications. In addition, the Laboratory has developed a differential temperature water gas shift reactor that is two to three times more compact than conventional, two-stage adiabatic designs.

### **Relevance DOE Mission and National Needs – Outstanding**

The Contractor made significant achievements as it relates to DOE Mission and National Needs. The Laboratory consistently met or exceeded all of its annual performance goals in the area of FreedomCAR and Vehicle Technologies, specifically illustrated in the sulfur trap cooperative research and development agreement (CRADA) with Caterpillar Corp. All milestones set by the industry partner for FY 2003 were greatly exceeded ahead of schedule. In the area of Building Technologies, the approved 2006 IECC code change proposal was submitted on schedule, and this marked the most extensive revision of the code in decades. The Laboratory made the Office of Industrial Technologies Objectives to industry productivity a top priority. It is believed that Laboratory's work in sensors and diagnostics will influence other EERE Program areas as well (i.e. Hydrogen and Biomass). In FEMP, the lab had a number of significant achievements in FY 2003, including making developments to aid Federal Agencies in improving their gas related efficiency.

It is noted that in the Industrial Technologies Area, a more structured commercialization plan is needed.

### **Effectiveness and Efficiency of Research Program Management – Outstanding**

The Contractor continues to be efficient in all aspects of financial management of its programs and in ensuring personnel competencies. The Contractor staff were extensively published in numerous peer reviewed journals, trade journals, and conference proceedings. The lab maintains low uncosted balances and has seen a marked improvement demonstrated in its Building Technologies Program. Notable deficiencies existed with the completion of some FreedomCAR and Vehicle Technologies Project milestones in a timely manner and should be given additional attention during the upcoming year.

### **Success in Constructing and Operating Research Facilities - Outstanding**

The Laboratory successfully completed the construction of the Emissions Characterization and Aerosol Laboratory in support of the DOE/Office of FreedomCAR and Vehicle Technologies Engine and Emission-control Technologies Program. This facility allows for the realistic testing of diesel aftertreatment and particulate filtration systems and validation of micro and bench scale results under "real world" conditions. Also, the Laboratory has acquired a world class particulate analysis system known as SPLAT-MS (Single Particle Laser Ablation Time-of-Flight Mass Spectroscopy). This system can sample individual diesel particulates and their properties. In addition, the Laboratory has successfully installed an SGI Linux Cluster parallel computing station dedicated to the computational fluid dynamics group.

### **Areas of Concern:**

\*The lab is encouraged to continue trying to increase its visibility with the Big Three automakers in order to become more 'mainstream' like Oak Ridge National Laboratory (ORNL) in the lightweight materials efforts.

\*As noted previously, the selection of milestones and establishing their schedule should be given additional attention by the lab during the coming year.

\*More attention needs to be paid to critically examining the balance between research and demonstration content of the laboratory's activities.

\*The internal technical review process should be reinforced.

\*Improving the solidity of communications around the Building Technologies Program Multi-Year Program Plan (MYPP), its Annual Operating Plan (AOP), and Quality Control and Evaluation Plan could increase productivity.

\*The lab should more actively participate in the goal setting process.

\*Support should continue for the 2006 IECC Code change proposal and incorporation of Beyond Code Technologies into the REScheck™ code compliance software and materials.

# Appendix VII

## Summary of FE Program FY 2003 Evaluations for the Pacific Northwest National Laboratory

Program Area (% of PNNL Funding)	Quality of Technical Support	Relevance to Mission	Facility	Manage- ment Effective- ness	Program Office Total Score	Weighted Score
Solid State Electricity (\$450,000/5.4%)	4	4		4	4	.216
Carbon Sequestration (\$150,000/1.8%)	3	3	3	3	3	.054
Gas Hydrates (\$200,000/2.4%)	3	4	3	3	3.25	.078
NG Delivery Reliability(\$260,000/ 3.1%)	3	3		3	3	.093
Fuel Cells (7,300,000/87.3%)	4	4	4	3	4	3.273
<b>Overall FE Rating (8,360,000)</b>						<b>3.71</b>

This table was developed by the PNSO and is a roll up of the individual ratings provided by FE program areas. The overall rating is a weighted score based on the % of funding provided to the Contractor by FE.

**Angulo, R P Jr (Michael)**

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**From:** Glaser, Fred [FRED.GLASER@HQ.DOE.GOV]  
**Sent:** Wednesday, November 05, 2003 10:20 AM  
**To:** Kruger, Paul W  
**Cc:** Williams, Kimberly L  
**Subject:** FY03 Performance Evaluation of Battelle for Mgmt of PNNL



PNNL1.doc (39 KB) PNNL2.doc (41 KB) PNNL3.doc (38 KB) PNNL4.doc (40 KB)

Attached is the input from DOE's Office of Fossil Energy managers regarding Battelle's performance in managing and operating Pacific Northwest National Laboratory (PNNL) for FY2003. It only represents work performed for and funded by the Office of Fossil Energy. In requesting input for this evaluation, we only requested performance evaluations for R&D-type projects, and of those only the ones that were valued at \$150,000 or more in FY03. The evaluations that were received account for projects totaling \$1,060,000. The narrative comments that were received from the reviewers are also included. All evaluations received were rated excellent or outstanding. No attempt was made to summarize or modify any reviewer comments.

Several project evaluations are still outstanding, but to not further delay this response, I'm sending what I currently have received from our project managers. Should I receive additional reviews, I will forward them to you at that time.

Should you need any further information or clarification, please contact me at 301-903-2676.

<<PNNL1.doc>> <<PNNL2.doc>> <<PNNL3.doc>> <<PNNL4.doc>>

EVALUATION FORM FOR PROGRAMMATIC APPRAISALS

LABORATORY: PNNL  
 PROGRAM: FE (Solid State Electrolyte Systems)  
 B&R (s): AA151010  
 FY2003 Funding: \$450,000  
 EVALUATOR: Udaya Rao  
 DATE: 10/21/03

EVALUATION FACTORS

RATINGS\*

O	E	G	M	U
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1. Quality of Science & Technology: Reviewers will evaluate the overall quality of research performed. Depending on the nature of the program, reviewers will consider the following.

SCIENCE: Success in producing original, creative scientific output that advances fundamental science and opens important new areas of inquiry; success in achieving sustained progress and impact on the field; and recognition from the scientific community including awards, peer-reviewed publications, citations, and invited talks.

TECHNOLOGY: Whether there is a solid technical base for the work; the intrinsic technical innovativeness of the research; the importance of contributions made to the scientific and engineering knowledge base underpinning the technology program; and recognition from the technical community.

Comments:

The project has made outstanding progress in developing improved seals for high temperature applications in gas separation devices using inorganic membranes and solid oxide fuel cells. These devices require joining of a metal and a ceramic part resistant to oxidation at high temperatures. The chemical and physical characteristics of many of the ceramic and metal components used in these devices have presented a variety of challenges for the development of effective seals. Commonly used seals are not suitable for these applications due to their heat resistance limits (below 700 °F). The operating temperature of these membranes is typically between 1100 and 1800 °F. The novel sealing technique to join ceramic to practical supports such as stainless steel or a nickel based superalloy is the subject of a US patent application filed by PNNL inventors in April 2003.

\*Ratings: O=Outstanding; E=Excellent; G=Good; M=Marginal; U=Unsatisfactory

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\*Ratings: O=Outstanding; E=Excellent; G=Good; M=Marginal; U=Unsatisfactory

RATINGS\*

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2. Relevance to DOE Mission and National Needs: Reviewers will consider whether the research fits within the advances the missions of DOE; contributions to U.S. leadership in international scientific and technical communities; contributions to the goals and objectives of the strategic plans of DOE and other national programs; and the extent of productive interaction with other science and technology programs. Depending on the nature of the program, reviewers will consider the following.

SCIENCE: The program's track record of success in making scientific discoveries of technological importance to DOE missions and U.S. industry; the degree of industrial interest in follow-on development of current research results; and the effective use of national research facilities that serve the needs of a wide variety of scientific users from industry, academia, and government laboratories.

TECHNOLOGIES: The value of successfully developing pre-commercial technology, to DOE other federal agencies, and the national economy; the extent to which expected benefits justify the program's risks and costs; and, where appropriate, the degree of industrial interest, participation, and support.

Comments:

Dense ceramic membranes are attracting increasing attention because of their technological importance in high temperature gas separation needed for generating clean power from coal. The new sealing technique is a step forward in fully exploiting the unique properties of the advanced ceramic membranes since it addresses the engineering challenge of how to effectively incorporate these materials into practical devices at high temperatures.

\*Ratings: O=Outstanding; E=Excellent; G=Good; M=Marginal; U=Unsatisfactory

RATINGS\*

O E G M U

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3. Success in Constructing and Operating Research Facilities: Reviewers will consider whether the construction and commissioning of new facilities is on time and within budget; whether performance specification and objectives are achieved; the reliability and safety of operations; adherence to planned schedules; and the cost-effectiveness of maintenance and facility improvements.

Reviewers of user facilities will also consider whether the user access program is effective, efficient, and user-friendly; the quality of the proposal evaluation process; the strength and diversity of user participation; the productivity of the research supported, both in science and technology; and the level of satisfaction among user groups.

Comments:

This criterion is not applicable to the project.

\*Ratings: O=Outstanding; E=Excellent; G=Good; M=Marginal; U=Unsatisfactory

RATINGS\*  
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4. Effectiveness and Efficiency of Research Program Management: Reviewers will consider the quality of research plans; whether technical risks are adequately considered; whether use of personnel, facilities, and equipment is optimized; success in meeting budget projections and milestones; the effectiveness of decisionmaking in managing and redirecting projects; success in identifying and in avoiding or overcoming technical problems; the effectiveness with which technical results are communicated to maximize the value of the research results and to gain appropriate recognition for DOE and the Laboratory; effectiveness in technical know-how associated with research discoveries; and, the degree to which customer and stakeholder expectations are consistently met.

Comments:

The project has effectively coordinated needed research in the development of seals both for gas separation membranes and solid oxide fuel cells, taking into account synergies as well as varying needs for the two applications.

RATINGS\*

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Overall Evaluation: (Overall ratings of Outstanding, Marginal, or Unsatisfactory especially require a narrative explanation citing significant accomplishments or deficiencies to substantiate the rating.)

Summarize basis for this rating.

The project has made outstanding progress in developing the technology to effectively join the thin electrochemically active YSZ (yttria stabilized zirconia) membrane to the metallic body of a device such that the resulting seal is hermetic, rugged and stable under both thermal cycling and continuous high-temperature operation. The technique, called reactive air brazing (RAB) is similar to active metal brazing, except that the joining operation can be conducted in air, and the final joining will be resistant to oxidation at high temperature. The project has planned with foresight, aiming in the future to conduct series of RAB experiments to examine the effects of composition and processing condition on the strength, thermal cycling, and durability of the braze at high temperature.

Summarize Any Programmatic Issues and/or Recommendations:

\*Ratings: O=Outstanding; E=Excellent; G=Good; M=Marginal; U=Unsatisfactory

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\*Ratings: O=Outstanding; E=Excellent; G=Good; M=Marginal; U=Unsatisfactory

## EVALUATION FORM FOR PROGRAMMATIC APPRAISALS

LABORATORY: Pacific Northwest National Laboratory (PNNL) FWP-45502

PROGRAM: Carbon Sequestration  
 B&R (s): AA3010000  
 FY2003 Funding: \$150,000  
 DATE: October 21, 2003

EVALUATOR Dawn Chapman

EVALUATION FACTORS

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- Quality of Science & Technology: Reviewers will evaluate the overall quality of research performed. Depending on the nature of the program, reviewers will consider the following.

SCIENCE: Success in producing original, creative scientific output that advances fundamental science and opens important new areas of inquiry; success in achieving sustained progress and impact on the field; and recognition from the scientific community including awards, peer-reviewed publications, citations, and invited talks.

TECHNOLOGY: Whether there is a solid technical base for the work; the intrinsic technical innovativeness of the research; the importance of contributions made to the scientific and engineering knowledge base underpinning the technology program; and recognition from the technical community.

Comments:

The purpose of this project is to evaluate reservoir capacity for CO<sub>2</sub> storage and the rate of conversion of injected CO<sub>2</sub> carbonates for basalts. Success of this project will provide details about the characteristics of basalt formations and of the rate of CO<sub>2</sub> consumption by chemical reaction with selected basalt rocks under realistic conditions of pressure and temperature.

Although this project has only been active for 5 months, test plans have been thoroughly developed and all test equipment has been designed. Due to the very limited study of basalts for carbon sequestration, basic information on injectivity, storage capacity, and rate of conversion of CO<sub>2</sub> to solid carbonates is not available. Therefore, this research is fundamental for advancement of CO<sub>2</sub> sequestration in basalt formations. Preliminary experiments conducted at PNNL have confirmed that carbonate mineral formation occurs with basalts proving a solid technical base for the work.

\*Ratings:    O=Outstanding;    E=Excellent;    G=Good;    M=Marginal;    U=Unsatisfactory

RATINGS\*

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2. Relevance to DOE Mission and National Needs: Reviewers will consider whether the research fits within the advances the missions of DOE; contributions to U.S. leadership in international scientific and technical communities; contributions to the goals and objectives of the strategic plans of DOE and other national programs; and the extent of productive interaction with other science and technology programs. Depending on the nature of the program, reviewers will consider the following.

SCIENCE: The program's track record of success in making scientific discoveries of technological importance to DOE missions and U.S. industry; the degree of industrial interest in follow-on development of current research results; and the effective use of national research facilities that serve the needs of a wide variety of scientific users from industry, academia, and government laboratories.

TECHNOLOGIES: The value of successfully developing pre-commercial technology, to DOE other federal agencies, and the national economy; the extent to which expected benefits justify the program's risks and costs; and, where appropriate, the degree of industrial interest, participation, and support.

Comments:

This research effort will investigate the coincidence between major CO<sub>2</sub> emission sources and potential sequestration sites for a more cost effective approach to sequestration. This project attempts to address the mission need of the DOE that deals with the development of storage options (primarily geological) that are proven to be economically viable, safe, and environmentally acceptable for long-term sustainable greenhouse gas storage. The goal of this work is to better understand which primary minerals in the basalt react preferentially with dissolved CO<sub>2</sub> and to identify any surface armoring reactions that could slow the kinetics of the mineralization process.

\*Ratings: O=Outstanding; E=Excellent; G=Good; M=Marginal; U=Unsatisfactory

RATINGS\*

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3. Success in Constructing and Operating Research Facilities: Reviewers will consider whether the construction and commissioning of new facilities is on time and within budget; whether performance specification and objectives are achieved; the reliability and safety of operations; adherence to planned schedules; and the cost-effectiveness of maintenance and facility improvements.

Reviewers of user facilities will also consider whether the user access program is effective, efficient, and user-friendly; the quality of the proposal evaluation process; the strength and diversity of user participation; the productivity of the research supported, both in science and technology; and the level of satisfaction among user groups.

Comments:

This project performs research which meets scientific and technical objectives necessary for successful geological CO<sub>2</sub> sequestration. The main purpose of the project is to evaluate reservoir capacity for CO<sub>2</sub> storage and the rate of conversion of injected CO<sub>2</sub> carbonates for basalts. After 5 months, technical progress includes the completion of the testing plan for reservoir capacity, completion of the testing plan for mineralization kinetics, and test equipment design and setup. The technical team has completed all planned milestones to date, and closely followed planned schedules.

\*Ratings: O=Outstanding; E=Excellent; G=Good; M=Marginal; U=Unsatisfactory

RATINGS\*

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4. Effectiveness and Efficiency of Research Program Management: Reviewers will consider the quality of research plans; whether technical risks are adequately considered; whether use of personnel, facilities, and equipment is optimized; success in meeting budget projections and milestones; the effectiveness of decisionmaking in managing and redirecting projects; success in identifying and in avoiding or overcoming technical problems; the effectiveness with which technical results are communicated to maximize the value of the research results and to gain appropriate recognition for DOE and the Laboratory; effectiveness in technical know-how associated with research discoveries; and, the degree to which customer and stakeholder expectations are consistently met.

Comments:

The project results are intended to improve the knowledge and usefulness of basalt formation in CO<sub>2</sub> sequestration. All established milestones to date for the project have been satisfied on schedule and within budget. Future milestones have been developed focusing on needed research that will set a basis for geological sequestration in basalt formations. All technical progress has been thoroughly communicated and all DOE requests and expectations have been met in a timely manner.

\*Ratings:    O=Outstanding;    E=Excellent;    G=Good;    M=Marginal;    U=Unsatisfactory

RATINGS*				
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Overall Evaluation: (Overall ratings of Outstanding, Marginal, or Unsatisfactory especially require a narrative explanation citing significant accomplishments or deficiencies to substantiate the rating.)

Summarize basis for this rating.

The purpose of this project is to evaluate reservoir capacity for CO<sub>2</sub> storage and the rate of conversion of injected CO<sub>2</sub> carbonates for basalts. This research is fundamental for advancement of CO<sub>2</sub> sequestration in basalt formations. Success of this project will provide a better estimate of the characteristics of basalt formations and of the rate of CO<sub>2</sub> consumption by chemical reaction with selected basalt rocks under realistic conditions of pressure and temperature. This project attempts to address the mission need of the DOE that deals with the development of storage options (primarily geological) that are proven to be economically viable, safe, and environmentally acceptable for long-term sustainable greenhouse gas storage.

Although this project has only been active for 5 months, technical progress includes the completion of the testing plan for reservoir capacity, completion of the testing plan for mineralization kinetics, and test equipment design and setup. The technical team has completed all planned milestones to date, and closely followed planned schedules. Future milestones have been developed focusing on needed research that will set a basis for geological sequestration in basalt formations. All technical progress has been thoroughly communicated and all DOE requests and expectations have been met in a timely manner.

Summarize Any Programmatic Issues and/or Recommendations:

\*Ratings: O=Outstanding; E=Excellent; G=Good; M=Marginal; U=Unsatisfactory

EVALUATION FORM FOR PROGRAMMATIC APPRAISALS

LABORATORY: \_\_\_\_\_ PNL \_\_\_\_\_

PROGRAM: \_\_\_\_\_ Gas Hydrates \_\_\_\_\_

B&R (s): \_\_\_\_\_ AB05650000 \_\_\_\_\_

FY2003 Funding: \_\_\_\_\_

EVALUATOR \_\_\_\_\_ T. H. Mroz \_\_\_\_\_

DATE: \_\_\_\_\_ 10-27-03 \_\_\_\_\_

EVALUATION FACTORS

RATINGS\*

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1. Quality of Science & Technology: Reviewers will evaluate the overall quality of research performed. Depending on the nature of the program, reviewers will consider the following.

SCIENCE: Success in producing original, creative scientific output that advances fundamental science and opens important new areas of inquiry; success in achieving sustained progress and impact on the field; and recognition from the scientific community including awards, peer-reviewed publications, citations, and invited talks.

TECHNOLOGY: Whether there is a solid technical base for the work; the intrinsic technical innovativeness of the research; the importance of contributions made to the scientific and engineering knowledge base underpinning the technology program; and recognition from the technical community.

Comments:

The program at PNL has provided tools and capabilities that industry has applied to evaluation of current DOE funded research in the characterization of natural gas hydrate reservoirs. The IR camera system has been deployed on several operations including: Maurer – Anadarko's Hot Ice Well on Alaska's North Slope, and ODP Leg 204. The instrumentation has also been requested for deployment as part of the ChevronTexaco JIP cruise next spring in the Gulf of Mexico to test to sites for gas hydrates.

\*Ratings: O=Outstanding; E=Excellent; G=Good; M=Marginal; U=Unsatisfactory

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\*Ratings: O=Outstanding; E=Excellent; G=Good; M=Marginal; U=Unsatisfactory

RATINGS\*

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2. Relevance to DOE Mission and National Needs: Reviewers will consider whether the research fits within the advances the missions of DOE; contributions to U.S. leadership in international scientific and technical communities; contributions to the goals and objectives of the strategic plans of DOE and other national programs; and the extent of productive interaction with other science and technology programs. Depending on the nature of the program, reviewers will consider the following.

SCIENCE: The program's track record of success in making scientific discoveries of technological importance to DOE missions and U.S. industry; the degree of industrial interest in follow-on development of current research results; and the effective use of national research facilities that serve the needs of a wide variety of scientific users from industry, academia, and government laboratories.

TECHNOLOGIES: The value of successfully developing pre-commercial technology, to DOE other federal agencies, and the national economy; the extent to which expected benefits justify the program's risks and costs; and, where appropriate, the degree of industrial interest, participation, and support.

Comments: The technology has become an integral part of the evaluation instrumentation developed to assess natural gas hydrate cores as soon as they come out of the well. It is expected that industry can utilize the equipment to identify the hydrate bearing sections of core and sample the core quickly and efficiently to obtain the best samples for analysis.

\*Ratings: O=Outstanding; E=Excellent; G=Good; M=Marginal; U=Unsatisfactory

RATINGS\*

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3. Success in Constructing and Operating Research Facilities: Reviewers will consider whether the construction and commissioning of new facilities is on time and within budget; whether performance specification and objectives are achieved; the reliability and safety of operations; adherence to planned schedules; and the cost-effectiveness of maintenance and facility improvements.

Reviewers of user facilities will also consider whether the user access program is effective, efficient, and user-friendly; the quality of the proposal evaluation process; the strength and diversity of user participation; the productivity of the research supported, both in science and technology; and the level of satisfaction among user groups.

Comments: The instrumentation was fabricated using a commercial camera, but designed for use in specific small space available on drill rigs and shipboard. The system allows the scientists to quickly evaluate core inside the tube to determine where hydrates are and sample it immediately.

\*Ratings: O=Outstanding; E=Excellent; G=Good; M=Marginal; U=Unsatisfactory

RATINGS\*

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4. Effectiveness and Efficiency of Research Program Management: Reviewers will consider the quality of research plans; whether technical risks are adequately considered; whether use of personnel, facilities, and equipment is optimized; success in meeting budget projections and milestones; the effectiveness of decision making in managing and redirecting projects; success in identifying and in avoiding or overcoming technical problems; the effectiveness with which technical results are communicated to maximize the value of the research results and to gain appropriate recognition for DOE and the Laboratory; effectiveness in technical know-how associated with research discoveries; and, the degree to which customer and stakeholder expectations are consistently met.

Comments: The PNL lab effort has accomplished these factors very well in developing the IR scanner for field use.

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\*Ratings:    O=Outstanding;    E=Excellent;    G=Good;    M=Marginal;    U=Unsatisfactory

RATINGS\*

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Overall Evaluation: (Overall ratings of Outstanding, Marginal, or Unsatisfactory especially require a narrative explanation citing significant accomplishments or deficiencies to substantiate the rating.)

Summarize basis for this rating.

The effort has developed a tool that is being actively used on DOE contractor projects related to the characterization of natural gas hydrates. It is providing a resource for industry to use in the field to obtain high quality samples of hydrated sediments for analysis. The results are being used to model the occurrences of gas hydrates for both potential production and safety seafloor issues. It has been a very successful effort to this point.

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Summarize Any Programmatic Issues and/or Recommendations:

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\*Ratings:    O=Outstanding;    E=Excellent;    G=Good;    M=Marginal;    U=Unsatisfactory

EVALUATION FORM FOR PROGRAMMATIC APPRAISALS

LABORATORY: PNNL

PROGRAM: NG Delivery Reliability

B&R (s): AB0545000

FY2003 Funding: \$260,000

EVALUATOR Ron Harp

DATE: Oct. 22, 2003

EVALUATION FACTORS

RATINGS\*

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1. Quality of Science & Technology: Reviewers will evaluate the overall quality of research performed. Depending on the nature of the program, reviewers will consider the following.

SCIENCE: Success in producing original, creative scientific output that advances fundamental science and opens important new areas of inquiry; success in achieving sustained progress and impact on the field; and recognition from the scientific community including awards, peer-reviewed publications, citations, and invited talks.

TECHNOLOGY: Whether there is a solid technical base for the work; the intrinsic technical innovativeness of the research; the importance of contributions made to the scientific and engineering knowledge base underpinning the technology program; and recognition from the technical community.

Comments:

The research is fundamental in nature supporting sensor development for pipeline integrity assessment. The work being performed will add to the knowledge base of Electro-Mechanical Acoustic Transducer (EMAT) sensors for pipeline inspection.

\*Ratings: O=Outstanding; E=Excellent; G=Good; M=Marginal; U=Unsatisfactory

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2. Relevance to DOE Mission and National Needs: Reviewers will consider whether the research fits within the advances the missions of DOE; contributions to U.S. leadership in international scientific and technical communities; contributions to the goals and objectives of the strategic plans of DOE and other national programs; and the extent of productive interaction with other science and technology programs. Depending on the nature of the program, reviewers will consider the following.

SCIENCE: The program's track record of success in making scientific discoveries of technological importance to DOE missions and U.S. industry; the degree of industrial interest in follow-on development of current research results; and the effective use of national research facilities that serve the needs of a wide variety of scientific users from industry, academia, and government laboratories.

TECHNOLOGIES: The value of successfully developing pre-commercial technology, to DOE other federal agencies, and the national economy; the extent to which expected benefits justify the program's risks and costs; and, where appropriate, the degree of industrial interest, participation, and support.

Comments:

Successful sensor development and deployment on an inspection platform will provide valuable data allowing pipeline operators to detect assess the impacts of defects in pipelines. Maintaining and improving the integrity of the nation's pipeline transmission and distribution network is one of the primary objectives of the Delivery Reliability program. The types of defects that the sensor will detect and characterize include: pipe wall loss due to corrosion or otherwise, cracks due to over pressurization, stress corrosion cracking (SCC), or Hydrogen Induced Cracking (HIC), and dents with or without gouges and cracks. The Electro-Mechanical Acoustic Transducer (EMAT) sensor being developed is of particular interest for natural gas pipelines because it does not need a liquid coplant to induce the acoustic wave into the pipe. Successful development of an EMAT sensor will another tool for the integrity assessment of the nation's pipeline network.

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3. Success in Constructing and Operating Research Facilities: Reviewers will consider whether the construction and commissioning of new facilities is on time and within budget; whether performance specification and objectives are achieved; the reliability and safety of operations; adherence to planned schedules; and the cost-effectiveness of maintenance and facility improvements.

Reviewers of user facilities will also consider whether the user access program is effective, efficient, and user-friendly; the quality of the proposal evaluation process; the strength and diversity of user participation; the productivity of the research supported, both in science and technology; and the level of satisfaction among user groups.

Comments:

This criterion is not applicable to the work performed. The work was laboratory scale and no new facilities were required.

\*Ratings: O=Outstanding; E=Excellent; G=Good; M=Marginal; U=Unsatisfactory

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4. Effectiveness and Efficiency of Research Program Management: Reviewers will consider the quality of research plans; whether technical risks are adequately considered; whether use of personnel, facilities, and equipment is optimized; success in meeting budget projections and milestones; the effectiveness of decisionmaking in managing and redirecting projects; success in identifying and in avoiding or overcoming technical problems; the effectiveness with which technical results are communicated to maximize the value of the research results and to gain appropriate recognition for DOE and the Laboratory; effectiveness in technical know-how associated with research discoveries; and, the degree to which customer and stakeholder expectations are consistently met.

Comments:

The research management plan and technology status assessment were complete of high quality and submitted on time. The quarterly progress reports were sufficiently detailed and submitted on time. Project milestones were successfully accomplished on schedule. This stakeholder's expectations were consistently met or exceeded.

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\*Ratings:      O=Outstanding;      E=Excellent;      G=Good;      M=Marginal;      U=Unsatisfactory

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Overall Evaluation: (Overall ratings of Outstanding, Marginal, or Unsatisfactory especially require a narrative explanation citing significant accomplishments or deficiencies to substantiate the rating.)

Summarize basis for this rating.

Generally the work performed was excellent. The work was relevant to the goals and objectives of the Delivery Reliability program. The work will expand the knowledge base of EMATs sensors and provide a sound foundation for the development of inspection tools/platforms utilizing EMAT sensors for pipeline inspection.

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Summarize Any Programmatic Issues and/or Recommendations:

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\*Ratings: O=Outstanding; E=Excellent; G=Good; M=Marginal; U=Unsatisfactory

**EVALUATION FORM FOR PROGRAMMATIC APPRAISALS**

LABORATORY: Pacific Northwest National Lab PROGRAM: Fuel Cells (SECA, Advanced Electrochemistry)

B&R (s): AA2530 and AA2525

FY2003 Funding: \$7.3M

EVALUATOR Wayne Surdoval

DATE: 11/7/03

EVALUATION FACTORS

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- Quality of Science & Technology: Reviewers will evaluate the overall quality of research performed. Depending on the nature of the program, reviewers will consider the following.

SCIENCE: Success in producing original, creative scientific output that advances fundamental science and opens important new areas of inquiry; success in achieving sustained progress and impact on the field; and recognition from the scientific community including awards, peer-reviewed publications, citations, and invited talks.

TECHNOLOGY: Whether there is a solid technical base for the work; the intrinsic technical innovativeness of the research; the importance of contributions made to the scientific and engineering knowledge base underpinning the technology program; and recognition from the technical community.

Comments:

PNNL has clearly advanced the state of the art in all key aspects of Solid Oxide Fuel Cell Development. PNNL has established itself as the most advanced Solid Oxide Fuel Cell center in the World and has become the center of SOFC R&D activities and a focus point for US Industry, other National Laboratories and Universities. The PNNL activities range from applied work prioritized in the SECA Program and fundamental research in conjunction with the HITECH center located at Montana State University. The SOFC problems PNNL addresses are the most difficult problems and require new ideas and high quality work. PNNL has met this standard with groundbreaking achievements in cathodes, seals and contaminant tolerant anodes. This has included novel PNNL ideas and insightful work with published works in the literature. As the Industrial focal point this work is quickly fed to the US sponsored fuel cell developers, frequently in an expedited manner following patent disclosure. The HITECH facility is in its infancy; however PNNL leadership has ensured that activities have been initiated promptly.

\*Ratings: O=Outstanding; E=Excellent; G=Good; M=Marginal; U=Unsatisfactory

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\*Ratings: O=Outstanding; E=Excellent; G=Good; M=Marginal; U=Unsatisfactory

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2. Relevance to DOE Mission and National Needs: Reviewers will consider whether the research fits within the advances the missions of DOE; contributions to U.S. leadership in international scientific and technical communities; contributions to the goals and objectives of the strategic plans of DOE and other national programs; and the extent of productive interaction with other science and technology programs. Depending on the nature of the program, reviewers will consider the following.

SCIENCE: The program's track record of success in making scientific discoveries of technological importance to DOE missions and U.S. industry; the degree of industrial interest in follow-on development of current research results; and the effective use of national research facilities that serve the needs of a wide variety of scientific users from industry, academia, and government laboratories.

TECHNOLOGIES: The value of successfully developing pre-commercial technology, to DOE other federal agencies, and the national economy; the extent to which expected benefits justify the program's risks and costs; and, where appropriate, the degree of industrial interest, participation, and support.

Comments:

PNNL works with close direction from the Office of Fossil Energy's SECA Management Team which includes PNNL input. The work is in direct alignment with the SECA Program objectives and priorities, which are reformulated on approximately a six-month basis. The HITEC Program likewise implements specific Office of Fossil Energy objectives as outlined in the DOE Strategic Plan. PNNL has performed outstanding work in this regard. The value of this work to the national interests clearly outlined in the SECA Program Plan and supporting documentation.

\*Ratings: O=Outstanding; E=Excellent; G=Good; M=Marginal; U=Unsatisfactory

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3. Success in Constructing and Operating Research Facilities: Reviewers will consider whether the construction and commissioning of new facilities is on time and within budget; whether performance specification and objectives are achieved; the reliability and safety of operations; adherence to planned schedules; and the cost-effectiveness of maintenance and facility improvements.

Reviewers of user facilities will also consider whether the user access program is effective, efficient, and user-friendly; the quality of the proposal evaluation process; the strength and diversity of user participation; the productivity of the research supported, both in science and technology; and the level of satisfaction among user groups.

Comments:

The majority of the work under evaluation does not involve the construction or operation of new facilities. The operation of existing facilities has been without incident and the few capital investments in equipment have been well justified and promptly procured and put into operation.

\*Ratings: O=Outstanding; E=Excellent; G=Good; M=Marginal; U=Unsatisfactory

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4. Effectiveness and Efficiency of Research Program Management: Reviewers will consider the quality of research plans; whether technical risks are adequately considered; whether use of personnel, facilities, and equipment is optimized; success in meeting budget projections and milestones; the effectiveness of decision making in managing and redirecting projects; success in identifying and in avoiding or overcoming technical problems; the effectiveness with which technical results are communicated to maximize the value of the research results and to gain appropriate recognition for DOE and the Laboratory; effectiveness in technical know-how associated with research discoveries; and, the degree to which customer and stakeholder expectations are consistently met.

Comments:

SECA and HITEC Program Management is performed by DOE personnel in the Office of Fossil Energy and the National Energy Technology Laboratory with PNNL in an advisory role. The advisory function is active and performed well by PNNL. Internal PNNL activities in support of these programs is performed in an excellent manner. Milestones are provided and typically met. Communication of results are an emphasized aspect of the SECA and HITEC Programs and PNNL performs this function aggressively as a priority and has established the Lab as a center of SOFC collaboration and activity. Internal planning is done in concert with DOE Program Management with PNNL demonstrating flexibility in addressing emerging issues and needs.

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\*Ratings:    O=Outstanding;    E=Excellent;    G=Good;    M=Marginal;    U=Unsatisfactory

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Overall Evaluation: (Overall ratings of Outstanding, Marginal, or Unsatisfactory especially require a narrative explanation citing significant accomplishments or deficiencies to substantiate the rating.)

Summarize basis for this rating.

PNNL has performed outstanding work technically and in support of SECA and HITEC program management including aggressive communication of results. PNNL has pushed technical advances in SOFC seals, cathodes, failure analysis, stack design and contaminant tolerance of anodes that provides increased confidence the Programs will meet their objectives within the budget and time specified by the Office of Fossil Energy. Many of these advances have been transferred into industrial practice or planning. Promising new ideas or insights for existing concepts are part of current work plans in interconnects and understanding the basic mechanisms of SOFC performance and degradation that is essential to Program success. PNNL has performed other Program support functions with equal ability such as conference support and Program outreach.

Summarize Any Programmatic Issues and/or Recommendations:

None

\*Ratings: O=Outstanding; E=Excellent; G=Good; M=Marginal; U=Unsatisfactory

In response to the FY 2003 Fossil Energy (FE) Evaluation Request for Input letter sent on September 23, 2003, the following fiscal year 2003 performance evaluation input of the Contractor relates to their work in the area of Fossil Energy. Program performance was evaluated using four performance measures: Quality of Science and Technology, Relevance to DOE Missions and National Needs, Effectiveness and Efficiency of Research Program Management, and Success in Constructing and Operating Research Facilities.

Also attached is a summary which outlines the evaluation input sent from the Office of Fossil Energy. For record purposes, the actual PDF file sent from the Office of Fossil Energy is also attached. The information, in whole, summarizes discussions/interactions held with FE management and staff, DOE-HQ, and with the Energy Science & Technology Directorate.

The Contractor's overall performance for the Office of Fossil Energy is rated at ???? for FY 2003.

FE rated the laboratory's performance based on five projects: Fuel Cells (SECA, Advanced Electrochemistry); FE (Solid State Electrolyte Systems); Carbon Sequestration; Gas Hydrates; and NG Delivery Reliability.

\*\*Note: If a project doesn't have a rating recorded in the certain area, that signifies that that particular section isn't applicable to that project.

#### **Quality of Science and Technology – 3.4**

In the area of Quality of Science and Technology, FE rated the laboratory's performance in those projects at the following levels:

Fuel Cells – Outstanding  
FE – Outstanding  
Carbon Sequestration - Excellent  
Gas Hydrates – Excellent  
NG Delivery Reliability – Excellent

#### **Relevance to DOE Mission and National Needs – 3.6**

In the area of Relevance to DOE Mission and National Needs, FE rated the laboratory's performance in the five projects at the following levels:

Fuel Cells – Outstanding  
FE – Outstanding  
Carbon Sequestration – Excellent

Gas Hydrates – Outstanding  
NG Delivery Reliability – Excellent

### **Success in Constructing and Operating Research Facilities – 3.33**

In the area of Success in Constructing and Operating Research Facilities, FE rated the laboratory's performance in the five projects at the following levels:

Fuel Cells – Outstanding  
Carbon Sequestration – Excellent  
Gas Hydrate - Excellent

### **Effectiveness and Efficiency of Research Program Management – 3.2**

In the area of Effectiveness and Efficiency of Research Program Management, FE rated the laboratory's performance in the five projects at the following levels.

Fuel Cells – Excellent  
FE – Outstanding  
Carbon Sequestration – Excellent  
Gas Hydrates – Excellent  
NG Delivery Reliability - Excellent

### **Overall Evaluation – 3.4**

In the overall section, the lab was rated at the following levels for each of the five projects:

Fuel Cells – Outstanding  
FE – Outstanding  
Carbon Sequestration – Excellent  
Gas Hydrates – Excellent  
NG Delivery Reliability - Excellent

### **Noteworthy Accomplishments:**

For the five projects, FE noted the following accomplishments for the Laboratory:

Fuel Cells

PNNL has pushed technical advances in SOFC seals, cathodes, failure analysis, stack design and contaminant tolerance of anodes that provides increased confidence the Programs will meet their objectives within the budget and time specified by the Office of Fossil Energy. Many of these advances have been transferred into industrial practice or planning.

FE

The project has made outstanding progress in developing the technology to effectively join the thin electrochemically active YSZ (yttria stabilized zirconia) membrane to the metallic body of a device such that the resulting seal is hermetic, rugged and stable under both thermal cycling and continuous high-temperature operation.

Carbon Sequestration  
None mentioned

Gas Hydrates  
The effort has developed a tool that is providing a resource for industry to use in the field to obtain high quality samples of hydrated sediments for analysis.

NG Delivery Reliability  
None mentioned

**Areas of Concern:**  
None mentioned

Quality of Science & Technology:

Fuel Cells (SECA, Advanced Electrochemistry) - Outstanding

PNNL has advanced the state of the art in all key aspects of Solid Oxide Fuel Cell Development. PNNL has established itself as the most advanced Solid Oxide Fuel Cell center in the World and has become the center of SOFC R&D activities and a focus point for US Industry, other National Laboratories and Universities.

FE (Solid State Electrolyte Systems) – Outstanding

The project has made outstanding progress in developing improved seals for high temperature applications in gas separation devices using inorganic membranes and solid oxide fuel cells. The novel sealing technique to join ceramic to practical supports such as stainless steel or a nickel based superalloy is the subject of a US patent application filed by PNNL inventors in April 2003.

Carbon Sequestration – Excellent

Although this project has only been active for 5 months, test plans have been thoroughly developed and all test equipment has been designed. This research is fundamental for advancement of CO<sub>2</sub> sequestration in basalt formations.

Gas Hydrates - Excellent

The program at PNL has provided tools and capabilities that industry has applied to evaluation of current DOE funded research in the characterization of natural gas hydrate reservoirs. PNNL developed instrumentation has also been requested for deployment as part of the ChevronTexaco JIP cruise next spring in the Gulf of Mexico to test to sites for gas hydrates.

NG Delivery Reliability - Excellent

The work being performed will add to the knowledge base of Electro-Mechanical Acoustic Transducer (EMAT) sensors for pipeline inspection.

Relevance to DOE Mission and National Needs:

Fuel Cells (SECA, Advanced Electrochemistry) - Outstanding

In response to the FY 2003 Fossil Energy (FE) Evaluation Request for Input letter sent on September 23, 2003, the following fiscal year 2003 performance evaluation input of the Contractor relates to their work in the area of Fossil Energy. Program performance was evaluated using four performance measures: Quality of Science and Technology, Relevance to DOE Missions and National Needs, Effectiveness and Efficiency of Research Program Management, and Success in Constructing and Operating Research Facilities.

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FE rated the laboratory's performance based on five projects: Fuel Cells (SECA, Advanced Electrochemistry); FE (Solid State Electrolyte Systems); Carbon Sequestration; Gas Hydrates; and NG Delivery Reliability.

\*\*Note: If a project doesn't have a rating recorded in the certain area, that signifies that that particular section isn't applicable to that project.

#### **Quality of Science and Technology – 3.4**

In the area of Quality of Science and Technology, FE rated the laboratory's performance in those projects at the following levels:

Fuel Cells – Outstanding  
FE – Outstanding  
Carbon Sequestration - Excellent  
Gas Hydrates – Excellent  
NG Delivery Reliability – Excellent

#### **Relevance to DOE Mission and National Needs – 3.6**

In the area of Relevance to DOE Mission and National Needs, FE rated the laboratory's performance in the five projects at the following levels:

Fuel Cells – Outstanding  
FE – Outstanding  
Carbon Sequestration – Excellent

Gas Hydrates – Outstanding  
NG Delivery Reliability – Excellent

### **Success in Constructing and Operating Research Facilities – 3.33**

In the area of Success in Constructing and Operating Research Facilities, FE rated the laboratory's performance in the five projects at the following levels:

Fuel Cells – Outstanding  
Carbon Sequestration – Excellent  
Gas Hydrate - Excellent

### **Effectiveness and Efficiency of Research Program Management – 3.2**

In the area of Effectiveness and Efficiency of Research Program Management, FE rated the laboratory's performance in the five projects at the following levels.

Fuel Cells – Excellent  
FE – Outstanding  
Carbon Sequestration – Excellent  
Gas Hydrates – Excellent  
NG Delivery Reliability - Excellent

### **Overall Evaluation – 3.4**

In the overall section, the lab was rated at the following levels for each of the five projects:

Fuel Cells – Outstanding  
FE – Outstanding  
Carbon Sequestration – Excellent  
Gas Hydrates – Excellent  
NG Delivery Reliability - Excellent

### **Noteworthy Accomplishments:**

For the five projects, FE noted the following accomplishments for the Laboratory:

Fuel Cells

PNNL has pushed technical advances in SOFC seals, cathodes, failure analysis, stack design and contaminant tolerance of anodes that provides increased confidence the Programs will meet their objectives within the budget and time specified by the Office of Fossil Energy. Many of these advances have been transferred into industrial practice or planning.

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The project has made outstanding progress in developing the technology to effectively join the thin electrochemically active YSZ (yttria stabilized zirconia) membrane to the metallic body of a device such that the resulting seal is hermetic, rugged and stable under both thermal cycling and continuous high-temperature operation.

Carbon Sequestration

None mentioned

Gas Hydrates

The effort has developed a tool that is providing a resource for industry to use in the field to obtain high quality samples of hydrated sediments for analysis.

NG Delivery Reliability

None mentioned

**Areas of Concern:**

None mentioned