

B.O.S.C.

BOARD OF SCIENTIFIC COUNSELORS

Chair

Gary S. Saylor, Ph.D.
University of Tennessee

Melvin E. Andersen, Ph.D., CIH,
DABT, FATS
*The Hamner Institute for Health
Sciences*

Kenneth L. Demerjian, Ph.D.
State University of New York

Clifford S. Duke, Ph.D.
The Ecological Society of America

Henry Falk, M.D., M.P.H.
*Centers for Disease Control and
Prevention*

John P. Giesy, Ph.D.
University of Saskatchewan

Charles N. Haas, Ph.D.
Drexel University

Dennis Paustenbach, Ph.D., CIH,
DABT
ChemRisk, Inc.

Martin Philbert, Ph.D.
University of Michigan

P. Barry Ryan, Ph.D.
Emory University

Katherine von Stackelberg, D.Sc.
Harvard School of Public Health

Carol H. Weiss, Ph.D.
Harvard University

January 20, 2009

Mr. Lek Kadeli
Acting Assistant Administrator
Office of Research and Development
U.S. Environmental Protection Agency
Washington, DC 20460

Dear Mr. Kadeli:

On behalf of the Board of Scientific Counselors (BOSC) I am pleased to provide you a report of the mid-cycle review that the BOSC was charged to conduct for the Office of Research and Development's (ORD) Land Research Program at the U.S. Environmental Protection Agency (EPA). The BOSC conducted a full program review of the Land Research Program in December 2005. Five members of that original six-member subcommittee participated in the current mid-cycle review, which culminated in a 1-day face-to face review meeting on May 8, 2008, in Gulf Breeze Florida.

The purpose of the review was to evaluate progress that the Land Research Program has made since the 2005 program review and to assess the responsiveness of the Program to advice, comments, and recommendations provided by the BOSC as a product of that review. In that regard, the BOSC is pleased to find that the Program exceeds our expectations.

The review report has been fully vetted and approved by the BOSC Executive Committee. The report is responsive to the ORD charge. We anticipate that this mid-cycle review will assist ORD in evaluating the strength and relevance of the Land Research Program and will aid in making any mid-course adjustments to the Program. We will be happy to provide additional information concerning the format of the review process or answer any questions you may have.

Sincerely,



Gary S Saylor, Chair
Board of Scientific Counselors



B.O.S.C.

BOARD OF SCIENTIFIC COUNSELORS

Chair
Gary S. Sayler, Ph.D.
University of Tennessee

Melvin E. Andersen, Ph.D., CIH,
DABT, FATS
*The Hamner Institute for Health
Sciences*

Kenneth L. Demerjian, Ph.D.
State University of New York

Clifford S. Duke, Ph.D.
The Ecological Society of America

Henry Falk, M.D., M.P.H.
*Centers for Disease Control and
Prevention*

John P. Giesy, Ph.D.
University of Saskatchewan

Charles N. Haas, Ph.D.
Drexel University

Dennis Paustenbach, Ph.D., CIH,
DABT
ChemRisk, Inc.

Martin Philbert, Ph.D.
University of Michigan

P. Barry Ryan, Ph.D.
Emory University

Katherine von Stackelberg, D.Sc.
Harvard School of Public Health

Carol H. Weiss, Ph.D.
Harvard University

**MID-CYCLE REVIEW OF THE OFFICE OF
RESEARCH AND DEVELOPMENT'S
LAND RESEARCH
AT THE
U.S. ENVIRONMENTAL PROTECTION AGENCY**

**BOSC LAND RESEARCH
MID-CYCLE SUBCOMMITTEE**

Dr. Charlie Menzie (Chair), Menzie-Cura and Associates, Inc.
Dr. James R. Clark (Vice Chair), Exxon-Mobil Research and
Engineering Company
Dr. Charles N. Haas, Drexel University
Dr. Lynne Haber, Toxicology Excellence for Risk Assessment
Dr. Robert Siegrist, Colorado School of Mines
Mr. Tim Thompson, Science, Engineering and the Environment, LLC

EPA CONTACT

Heather Drumm, Designated Federal Officer
U.S. Environmental Protection Agency

December 2008

BOSC LAND RESEARCH PROGRAM MID-CYCLE REVIEW REPORT

This report was written by the Land Research Mid-Cycle Subcommittee of the Board of Scientific Counselors, a public advisory committee chartered under the Federal Advisory Committee Act (FACA) that provides external advice, information, and recommendations to the Office of Research and Development (ORD). This report has not been reviewed for approval by the U.S. Environmental Protection Agency (EPA), and therefore, the report's contents and recommendations do not necessarily represent the views and policies of the EPA, or other agencies of the federal government. Further, the content of this report does not represent information approved or disseminated by EPA, and, consequently, it is not subject to EPA's Data Quality Guidelines. Mention of trade names or commercial products does not constitute a recommendation for use. Reports of the Board of Scientific Counselors are posted on the Internet at <http://www.epa.gov/osp/bosc>.

TABLE OF CONTENTS

I. SUMMARY1

II. INTRODUCTION3

III. CHARGE QUESTION # 14

IV. CHARGE QUESTION # 211

V. CHARGE QUESTION # 312

VI. CHARGE QUESTION # 413

VII. APPENDICES15

Appendix A: Subcommittee Charge15

Appendix B: BOSC Land Research Mid-Cycle Subcommittee18

Appendix C: List of Acronyms19

I. SUMMARY

This report presents the results of the Mid-Cycle Review for the U.S. Environmental Protection Agency's (EPA) Office of Research and Development (ORD) Land Restoration and Preservation Research Program. The review was structured around the following four charge questions (the full charge is provided in Appendix A):

1. How responsive has the Land Research Program been to the recommendations from the 2005 BOSC program review?
2. How clear is the rationale for the revised Land Multi-Year Plan (MYP), and are the revisions consistent with the advice given by the Board of Scientific Counselors (BOSC)?
3. In response to the 2005 BOSC program review, the Land Research Program made a significant shift into the emerging research area of nanomaterial fate, transport, prevention, and mitigation topics. How can Long-Term Goal (LTG) 2 be more effectively restructured to reflect materials management research, as well as the growth in nanomaterials research?
4. Please rate the progress made by the Land Research Program in moving the Program forward in response to the BOSC program review of 2005 by assigning a qualitative score, i.e., exceptional, Exceeds Expectations, Meets Expectations, or Not Satisfactory.

With respect to Charge Question 1, the BOSC Subcommittee (the Subcommittee) found the Program to be responsive to the 2005 BOSC Land Program Review. There were a few aspects of the 2005 review that were not addressed. One relates to the BOSC recommendation on considering uncertainty. This recommendation was interpreted by the Program to be related to more formal assessments of uncertainty that would be handled under another program. The Subcommittee was referring, however, to the need to provide users with insights into the uncertainties inherent in the use of specific tools and methods. The Land Research Program includes a component that relates to collaboration in the United States and internationally. The Subcommittee also recommended an increase in collaboration within the United States and internationally. Although there is evident collaboration within the United States, there was less evident collaboration at the international level.

With respect to the second charge question, the Subcommittee found the Program to be responsive. The Subcommittee commended the Program for its comprehensive and logical response.

Charge Question 3 focused on the structure of LTG 2. The current goal is stated as: "Clients request and apply ORD research products and services needed to manage material streams, address emerging material streams, and conserve resources." The Subcommittee suggested the goal could be rephrased in one of two ways:

- ✧ "Clients request and apply ORD research products and services needed to manage and address existing and emerging material streams and associated wastes."

BOSC LAND RESEARCH PROGRAM MID-CYCLE REVIEW REPORT

- ✧ “Provide clients with requested ORD research products and services needed to manage and address existing and emerging material streams and associated wastes.”

There was concern that this phrasing might lose the current resource conservation aspects of LTG 2. It also was recognized, however, that these were shrinking in importance. There was some discussion that the Program could develop a third LTG that focused on nanotechnology, but the Subcommittee members thought that it would be better to keep the focus on emerging issues as an overall LTG. Nanotechnology would be just one of these emerging issues.

The Subcommittee members agreed that the Program **Exceeds Expectations** according to the adjective defined in the guidance provided to the Subcommittee. In arriving at this rating, the Program was considered in two ways: (1) what the Program did in response to the prior BOSC review comments, and (2) the progress of the Program relative to the Land MYP. The Subcommittee members were impressed with the Program’s response. With regard to performance in meeting planned steps and publications, the Subcommittee thought that the Program exceeds expectations.

The Subcommittee recognized that efforts were made to extend the life of certain aspects of the Program and leverage through collaborative efforts with the National Institutes of Health (NIH), the Department of Defense’s Strategic Environmental Research and Development Program and the Environmental Security Technology Certification Program, and private and nongovernmental organizations. Within the limitations on resources, the Subcommittee recommends that emphasis be given to collaborative efforts within the United States and internationally.

Because the program is progressing well, there is no need for a response to this mid-cycle review.

II. INTRODUCTION

The U.S. Environmental Protection Agency's (EPA) Office of Research and Development (ORD) enlists its Board of Scientific Counselors (BOSC) to conduct independent expert reviews of ORD's environmental research programs every 4 to 5 years. Mid-cycle reviews, scheduled midway through the review cycle, are a critical step in the process. Narrower in focus than the in-depth technical evaluation that constitutes a full program review, the objectives of a mid-cycle review are to gauge the program's progress and to offer advice and feedback with respect to future directions and performance and accountability.

At a public meeting in December 2005, a nine-member BOSC Subcommittee completed a full program review of the Land Research Program, culminating in a BOSC report submitted to ORD in July 2006. Since that time, the Program has progressed to define further the scope of its long-term goals (LTGs) and to implement research activities in the midst of changing Agency resources and priorities. To assess progress in advancing the Program in line with BOSC comments, ORD requested that the BOSC conduct a mid-cycle review to assess the Program's activities and plans in light of changes in Agency and land research priorities.

The BOSC Land Mid-Cycle Subcommittee members are a subset of the Subcommittee that conducted the 2005 program review; five of the six Mid-Cycle Subcommittee members participated in that program review. Following two conference calls to discuss the review materials provided to the Land Research Mid-Cycle Subcommittee, a public meeting was held on May 8, 2008, in Pensacola Beach, Florida. The purpose of the review was to provide general feedback on ORD's efforts to date, and to provide advice and feedback on issues related to the future directions of the Land Research Program and measures of success. This was accomplished through a set of specific charge questions used to guide the BOSC Subcommittee through its review of the materials prepared for this process. The full charge is presented in Appendix A.

The Subcommittee was provided guidance on how to describe the responsiveness and progress of the Land Research Program (per Charge Question 4). Specifically, the Subcommittee was informed that the rating should be in the form of the adjectives used for this process (see Appendix A, Section 3.0 for definitions)—Exceptional, Exceed Expectations, Meets Expectations, and Not Satisfactory. This uniform rating system is intended to promote consistency among BOSC program and mid-cycle reviews and generate a clear understanding of the Subcommittee's assessment of ORD progress. The adjectives are used as part of a narrative summary of the review, so that the context of the rating and the rationale for selecting a particular rating will be transparent. For mid-cycle reviews, the rating is based on the quality, speed, and success of the program's actions in addressing previous BOSC recommendations.

III. CHARGE QUESTION # 1:

How responsive has the Land Research Program been to recommendations from its 2005 program review?

The Subcommittee concluded that the Land Research Program has been very responsive to the 2005 BOSC Program review. In reaching this conclusion, the Subcommittee considered how the Land Research Program responded to each element of the 2005 review (see Tables 1 and 2).

Examples of comments from Subcommittee members include:

- ✧ The Land Research Program has been generally responsive to the recommendations made in the 2005 BOSC Program Review; however, as discussed further in this review, there are some areas where clarifications are needed and where additional emphasis is appropriate.
- ✧ Overall, this is a good document and much improved over the 2003, and 2005 Multi-year Plans (MYPs) in terms of clearly articulating the goals and metrics for EPA ORD. This MYP is well-crafted and articulates ORD’s research goals for meeting the critical needs of the Regions and Superfund Program.
- ✧ The 2005 Program Review noted a lack of emphasis in the materials management program on emerging problems. In the Agency response, ORD indicated that this program would significantly be redirected to nanomaterial fate, transport, and life cycle issues. The progress report presented to the Mid-Cycle Subcommittee provided evidence of this change, along with a set of Annual Performance Goals (APGs) consistent with this redirection.

Table 1. Responsiveness to Overarching Program Review Recommendations

TOPIC	2005 RECOMMENDATION	RESPONSIVENESS
The Land MYP as an Organizing Roadmap and Framework	Areas where the Land MYP could be improved include:	Responsive. Reorganization made the report more readable. Additional information on goals was helpful as was the inclusion of science questions, research themes, and performance measures.
	a) How the Land MYP could communicate information more clearly	
	b) How future conditions can be better anticipated	Responsive in that the current approach was explained at greater depth. This clarified the program.

BOSC LAND RESEARCH PROGRAM MID-CYCLE REVIEW REPORT

TOPIC	2005 RECOMMENDATION	RESPONSIVENESS
	c) How collaborative efforts can be pursued with greater effectiveness	Responsive in that the current approach was explained at greater depth. In addition, the formation of the Interagency Collaboration on Environmental Remediation Research (ICERR) Workgroup represents a good effort to address the need for collaboration.
	d) How certain historical program needs are addressed as programs are sunset or terminated.	Addressed later.
The Land MYP as a Communication Tool	Improve the readability of the report by highlighting the essential features of the Land MYP and by minimizing jargon and acronyms. Consider rephrasing the two LTGs to reflect technical or scientific themes inherent in ORD efforts to enhance the success of Office of Solid Waste and Emergency Response (OSWER) programs in Land Preservation and Restoration.	Responsive. Reorganization made the report more readable. Supporting and background material have been moved to appendices. Additional information on goals was helpful as was inclusion of science questions, research themes, and performance measures.
Emerging Issues	Consider including periodic forecasting of emerging problems that could be examined in a preliminary way to judge their import.	Responsive. The Subcommittee recognizes that EPA's budget is constrained and that the Agency must stretch to meet the needs of its clients. This includes redirection of funds. The Land Program demonstrated an ability to respond to an emerging issue—addressing potential materials management issues associated with nanotechnology. This was accomplished by redirecting funds.
Collaboration and Leveraging	Consider opportunities for collaboration and leveraging at the national and international levels.	Responsive. Answered earlier.
	Enhance the use of Web-based support systems for facilitating multi-facility research efforts.	Responsive and involved an explanation on how this is currently happening.

BOSC LAND RESEARCH PROGRAM MID-CYCLE REVIEW REPORT

TOPIC	2005 RECOMMENDATION	RESPONSIVENESS
	Look for opportunities to collaborate with EPA research efforts in homeland security and in risk communication.	Responsive and involved an explanation on how this is currently happening.
Development of New Scientists	The MYP should address the current and future processes for replacing retiring expertise and for developing new scientists with emphasis on emerging areas. The Program should increase support of university-based research to involve these stakeholders and train future generations of environmental researchers.	Explanation was provided that this was not the purpose of the Land Research MYP. A brief explanation was given on how this does occur within the Agency. Reference to how this is accomplished would be useful in future reviews.
Possible Research Gaps Left by Sun-Setting or Terminating Programs	If there are recognized gaps associated with sun-setting or terminating programs, these could be prioritized for collaborative research efforts.	Responsive. Again, the Subcommittee recognizes the budget constraints and declining budget within which the Agency needs to operate. The MYP reflects proactive steps to address how to meet some of the needs through collaboration with other government agencies such as the National Institute of Environmental Health Sciences (NIEHS) and Environmental Security Technology Certification Program (ESTCP).
Balancing Use of Performance metrics as Research Drivers	The Subcommittee acknowledges the interplay of forces regarding performance metrics, endorses their continued use, but suggests that the need for balance be borne in mind.	Responsive and in agreement.
Defining Outcomes	Consider how the linkages could be made more clear or enhanced in the Land MYP.	Responsive; however, the added material (the list in Section 3) could have been developed a little further to provide a more complete description. The material in the notebook was very helpful.

TOPIC	2005 RECOMMENDATION	RESPONSIVENESS
Characterization of Uncertainty	Consider how to characterize and communicate uncertainties inherent in assessment methods and models. Explore collaborations with ORD efforts that focus on the analysis and communication of uncertainty. Integrate this information into Agency guidance and rules.	An explanation was provided that this was not part of the Land Research MYP but part of another program's mission. The Subcommittee has responded in this Mid-Cycle Review that our comment was misinterpreted.

Table 2. Responsiveness to Specific Subcommittee Recommendations Associated With 2005 Charge Questions

<p><i>Is the Land Research Program relevant to and consistent with Agency goals, customer needs, and is it sufficiently flexible?</i></p>	
<p>The Subcommittee stated that the Land Research Program is relevant to ORD's research needs and is consistent with the EPA's Strategic Plan. ORD's Land Research Program is actively pursuing research in response to interactions with the primary customers in the EPA program offices and regions. There were recommendations as provided below.</p>	
2005 RECOMMENDATION	RESPONSIVENESS
State the goals and objectives of the Program in terms of their short-term or long-term nature.	Responsive.
Articulate the benefits of the Land Research Program within the Land MYP by mapping the goals and activities within the Land MYP to the customer's performance measures.	Explanation provided.
Clarify within the Land MYP who is meant by stakeholders and clients.	Explanation provided.
Identify gaps not being covered by existing projects and the intersections among the projects. Such a gap analysis will position the Program to respond rapidly to circumstances where additional resources or leveraging opportunities present themselves.	Responsive, inclusion of the matrix helped indicate how the MYP, when integrated with other efforts, addressed key research areas.
Emphasize to a greater degree within the Land MYP how and by what means the outputs and products generated from the Land Research Program will be transferred to the field. This includes placing greater emphasis on transferring technologies to the private sector so that they can come into more common use and have greater impact.	Explanation given that this may be beyond the MYP. Some examples of where this has occurred were presented.

How is quality ensured in the awarding of research funds and in the quality of research products?

The Subcommittee stated that the Land Research Program continues to generate high-quality products and outputs. Quality is assured, in part, by identifying projects most useful to the clients; such prioritization in the Program is achieved through various means, including the involvement of senior management and liaisons from client offices to ORD.

2005 RECOMMENDATION	RESPONSIVENESS
Provide greater description of how criteria were used to prioritize needs and projects for both LTGs, but specifically for LTG 2.	Explanation provided. Text added.
Incorporate input from outside groups (other government agencies, academia, industry, and other stakeholders), especially for future Land MYPs and insure that all valid scientific advice is heard and considered apart from policy issues.	Explanation was given that there already was considerable peer review.
Articulate the mechanisms for ensuring periodic quality reviews during the conduct of projects. Such periodic (e.g., quarterly or annual) review and feedback are important for both ensuring that research is on track technically, and for feedback from the customer. Where relevant, it may be appropriate to include the “customer” (e.g., regional staff, state agencies) in the process of obtaining periodic feedback.	Explanation provided.

Is the Land Research Program design logical and appropriate?

The Subcommittee finds that the Land Research Program has a logical and comprehensive design for producing knowledge, know-how and decision-support tools to address and mitigate known current problems (e.g., remediation of underground storage tanks (USTs), remediation of dense non-aqueous phase liquids (DNAPLs) in ground water, risk and remediation of contaminated sediment sites) and contribute to the LTGs of the Land MYP. Several recommendations were offered.

2005 RECOMMENDATION	RESPONSIVENESS
State the program goals more clearly in terms of their scientific research focus. The goals could be recast in terms of the two major environmental challenges with problems and the scientific advancements needed to aid their resolution then described as sub-goals. Projects and outputs could be organized by major problems (e.g., assessment and cleanup of DNAPLs in ground water, design and operation of landfill bioreactors) along with the planned workflow.	Responsive as described earlier. The Subcommittee liked the way the research focus was framed.
Review potential needs related to current issues that cross-cut multiple programs (e.g., biosolids and animal waste application to land, mining, and megasites, oil and gas operations, infectious disease agents, beneficial reuse of waste materials, uncertainty in risk assessments and communication of risk results).	Explanation was provided on how this is done.
Clarify in the Land MYP the sequence of research questions along a timeline and the activities that fallout from it.	Responsive. This has been rewritten and the overall approach is more understandable.

BOSC LAND RESEARCH PROGRAM MID-CYCLE REVIEW REPORT

<p>Identify, to the extent they exist, the opportunities for staff scientists or engineers to initiate ideas, for example through a seed funding program.</p>	<p>Explanation provided.</p>
<p><i>Is the Land Research Program making timely progress in addressing key scientific questions and LTGs?</i> The Subcommittee noted that timely progress is being made on LTG 1. Some aspects of LTG 2, however, seem to lag. Some recommendations were made.</p>	
<p style="text-align: center;">2005 RECOMMENDATION</p>	<p style="text-align: center;">RESPONSIVENESS</p>
<p>Consider leveraging and collaborating so as to insure timely progress for LTG 2.</p>	<p>Responsive. The Subcommittee recognizes the constraints that come with a declining budget.</p>
<p>Improve the process for updating IRIS values for chemicals currently in the database and for developing values for potentially important chemicals not in the IRIS database. The Subcommittee recognizes that this is only partially within the domain of the Land Research Program.</p>	<p>Explanation given that this is not within the purview of the Land Program.</p>
<p>Articulate how planned and future research programs support decision making on sustainability issues and on life cycle assessment determinations related to solid and hazardous waste management.</p>	<p>Explanation given. There is now a shift within this LTG away from hazardous waste management and toward emerging materials such as nanotechnology. The shift of resources reflects the need to work within a constrained budget.</p>
<p>Update key technology documents related to landfill design. ORD could collaborate with the geosynthetic industry to help in funding such work.</p>	<p>Examples provided.</p>
<p>Identify within the Land MYP the mechanisms for tracking progress for specific projects with respect to the LTGs.</p>	<p>Explanation given.</p>
<p><i>Is ORD playing a leadership role in land research and effectively collaborating with the larger research community?</i> The Subcommittee noted that ORD and the research efforts that currently comprise the Land Research Program have historically provided excellent leadership to the EPA, the states, and to the regulated community on identifying and addressing environmental problems. The Subcommittee believes it is vital that ORD continue its environmental leadership role to ensure environmental regulations are based on sound science and risk-based understanding. Recommendations were offered.</p>	
<p style="text-align: center;">2005 RECOMMENDATION</p>	<p style="text-align: center;">RESPONSIVENESS</p>
<p>Identify a process for acquiring or developing key leaders for those programs where clear leadership may be lacking. Such leadership should be reflected in personnel, as well as programs. Particular emphasis should be given to leadership in emerging fields.</p>	<p>Responsive. Explanations were provided on what has been done and on a new effort to ensure the development of senior scientists.</p>

BOSC LAND RESEARCH PROGRAM MID-CYCLE REVIEW REPORT

<p>Describe or develop mechanisms for identifying mature research fields, emerging issues, and/or ensuring that the ORD-planned research is not duplicating efforts being conducted by other government or state agencies, or by private industry. This could be guided by external peer review by experts drawn from universities, nongovernmental organizations (NGOs), state agencies, and private industries.</p>	<p>Responsive but the Subcommittee noted that this is an ongoing issue. There is a concern over duplication. This was discussed further at the face-to-face meeting, to the Subcommittee's satisfaction.</p>
<p>Enhance ORD's position as a global leader by encouraging continued participation in international panels and meetings.</p>	<p>The Program agreed but also identified the need for more active collaboration on specific topics.</p>
<p>Insure that funding is directed toward areas where large gains in understanding can be made through research. This involves favoring research areas that are new or emerging over mature areas of research. The Subcommittee recognizes the balance that must be struck between new research and technical assistance.</p>	<p>Responsive. This is reflected in the shift of emphasis within LTG 2.</p>

IV. CHARGE QUESTION # 2:

How clear is the rationale for the revised Land MYP, and are the revisions consistent with the advice given by the BOSC?

The Subcommittee concluded that the revised Land Research MYP provided a clear rationale and that the revisions were consistent with the BOSC advice and recommendations. The Subcommittee noted that LTG 2 likely will need to be revised over time. The Subcommittee members did not have any additional comments regarding Charge Question 2.

The final MYP addresses the recommendations made during the 2005 BOSC program review (see Tables 1 and 2). The Subcommittee noted that in response to BOSC recommendations and scientific developments, the Land Research Program initiated a significant new research program on the emerging issue of nanotechnology. The Subcommittee commended the Program on its flexibility in identifying and moving forward on this issue, along with identifying new funding sources in this area.

V. CHARGE QUESTION # 3:

How can LTG 2 be more effectively restructured to reflect materials management research, as well as the growth in nanomaterials research?

The Subcommittee interpreted this question as requesting suggestions on how to frame LTG 2. The current goal is stated as: “Clients request and apply ORD research products and services needed to manage material streams, address emerging material streams, and conserve resources.” Subcommittee members suggested that LTG 2 could be phrased in one of two ways:

- ✧ “Clients request and apply ORD research products and services needed to manage and address existing and emerging material streams and associated wastes.”
- ✧ “Provide clients with requested ORD research products and services needed to manage and address existing and emerging material streams and associated wastes.”

There was concern that this phrasing might lose the current resource conservation aspects of LTG 2. It also was recognized, however, that these were shrinking in importance within the Land Research Program. There was some discussion that a third LTG might be developed that focused on nanotechnology, but the Subcommittee members thought that it would be better to keep the focus on emerging issues as an overall LTG. Nanotechnology is just one of these emerging issues.

VI. CHARGE QUESTION # 4:

Please rate the progress made by the Land Research Program in moving the Program forward in response to the BOSC review of 2005 by assigning a qualitative score, i.e., exceptional, exceeds expectations, meets expectations, or not satisfactory?

After conducting the review, the Subcommittee assigned an overall rating of **Exceeds Expectations** for the Land Research Program. In assigning this rating, the Subcommittee recognized that some aspects of the Program were stronger than others but that on the whole the Program had achieved this rating. The assignment is based on the quality of work, speed of delivery, and the success of the Program's actions in addressing the previous BOSC recommendations. In arriving at the rating, there was much discussion about how to evaluate the Program and to what aspect(s) the rating applied. The Subcommittee recognized that the rating applied to how well the Program was being moved forward in response to the 2005 BOSC program review. The Subcommittee was reminded that the review needed to go beyond the MYP and assess the whole Program.

The following statements reflect views of the Subcommittee members that led to the assignment of the rating:

- ✧ This Program "Meets Expectations Plus" because it was responsive in almost every aspect but not completely in all cases. In examining the LTGs, the Program exceeds expectations; it has met its LTGs and exceeds in some respects.
- ✧ The Program has met 100 percent of its proposed outputs during 2006 and 2007. The Program accomplished all that it stated it would, and a rating should reflect the Program's outputs, such as publication record. The Program's speed is good, and the Program was restructured successfully based on the previous recommendations.
- ✧ The Program was restructured within 2 years, which is very quick turnaround for a federal agency.
- ✧ There was good evidence of collaboration within the United States, however international collaboration and leveraging would benefit from greater emphasis.
- ✧ One area of improvement is in providing and disseminating the work done under LTG 1, and ensuring those work products are completed in a timely manner. The research topics currently being addressed in LTG 1 are responsive to the needs of the Regions and the Superfund Program, but the Agency might consider ways to streamline and speed up the time to product, and improve the way those tools are communicated to the user community.

BOSC LAND RESEARCH PROGRAM MID-CYCLE REVIEW REPORT

- ✧ The Program created a nanotechnology focus area from nothing, identified key issues, and collaborated effectively. For this element, the Program exceeded expectations. It is impressive that the Program is saving hundreds of thousands of dollars; not many programs can make that claim. The Program's oil-spills work efforts are on track; the Program needs to shift resources and respond to recommendations and budget constraints. The rating for the Program appears to be Meets Expectations or Exceeds Expectations.
- ✧ The shift in resources to nanotechnology could mean that potentially important aspects of the Program may be neglected. The shift to nanotechnology is positive, but it may have consequences for other research areas or new initiatives. Lower priority areas have been effective in leveraging resources. The Program would benefit if it developed a plan on how it will address other emerging issues in the future if resources are limited.

VII. APPENDICES

Appendix A: Subcommittee Charge

**LAND RESEARCH PROGRAM MID-CYCLE SUBCOMMITTEE
CHARGE
May 8, 2008
Pensacola, FL**

1.0 Objectives. The objectives of this mid-cycle review are:

- Primarily to evaluate the progress made by the Office of Research and Development's (ORD's) Land Research Program relative to the commitments it made following its last review (December 13-15, 2005), and
- Secondly, to obtain advice and feedback on issues related to the future directions of the research program and measures of success.

2.0 Background Information. Independent expert review is used extensively in industry, federal agencies, Congressional committees, and academia. The National Academy of Science has recommended this approach for evaluating federal research programs.¹

For the Agency's environmental research programs, periodic independent reviews are conducted at intervals of four or five years to characterize research progress, to identify when clients are applying research to strengthen environmental decisions, and to evaluate client feedback about the research. Mid-cycle evaluations are an important part of this program review process. Scheduled midway through the review cycle, these independent assessments give ORD an opportunity to gauge the program's progress relative to the commitments it made following its last review.

For the upcoming mid-cycle review, the Land Research Program is preparing a progress report that will provide the context for our discussions during the meeting. The report outlines the changes implemented by the program in response to the major recommendations from its 2005 review. The Multi-Year Plan for Land Research was completed in July, 2007 (Link) and it will be provided to the Subcommittee for their review. These and other documents are pertinent for the Subcommittee to be able to address the draft charge questions.

This review is not intended to be the in-depth technical evaluation of a full program review. Presentation time will be minimized in favor of discussion.

¹ Evaluating Federal Research under the Government Performance and Results Act (National Research Council, 1999).

3.0 Draft Charge Questions for ORD's Land Research Program. ORD is interested in receiving feedback concerning the following questions:

1. How responsive has the Land Research Program been to the recommendations from the 2005 BOSC program review?
2. How clear is the rationale for the revised Land Multi-Year Plan, and are the revisions consistent with the advice given by the BOSC?
3. In response to the 2005 BOSC review, the Land Research Program made a significant shift into the emerging research area of nanomaterial fate, transport, prevention, and mitigation topics. How can Long Term Goal 2 be more effectively restructured to reflect materials management research, as well as the growth in nanomaterials research?
4. Please rate the progress made by the Land Research Program in moving the program forward in response to the BOSC review of 2005 by assigning a qualitative score, i.e., exceptional, exceeds expectations, meets expectations, or not satisfactory.

The score should be in the form of one of the adjectives defined below. This uniform rating system is intended to promote consistency among BOSC program reviews. The adjectives should be used as part of a narrative summary of the review, so that the context of the rating and the rationale for selecting a particular rating will be transparent. For mid-cycle reviews, the rating should be based on the quality, speed, and success of the program's actions in addressing previous BOSC recommendations. The adjectives to describe progress are:

- o **Exceptional:** indicates that the program is meeting all and exceeding some of its goals, both in the quality of the science being produced and the speed at which research result tools and methods are being produced. An exceptional rating also indicates that the program is addressing the right questions to achieve its goals. The review should be specific as to which aspects of the program's performance have been exceptional.
- o **Exceeds Expectations:** indicates that the program is meeting all of its goals. It addresses the appropriate scientific questions to meet its goals, and the science is competent or better. It exceeds expectations for either the high quality of the science or for the speed at which work products are being produced and milestones met.
- o **Meets Expectations:** indicates that the program is meeting most of its goals. Programs that meet expectations live up to them in terms of addressing the appropriate scientific questions to meet their goals, and work products are being produced and milestones are being reached in a timely manner. The quality of the science being done is competent or better.
- o **Not Satisfactory:** indicates that the program is failing to meet a substantial fraction of its goals, or if meeting them, that the achievement of milestones is significantly

delayed, or that the questions being addressed are inappropriate or insufficient to meet the intended purpose. Questionable science is also a reason for rating a program as unsatisfactory for a particular long-term goal. The review should be specific as to which aspects of a program's performance have been inadequate.

4.0 Potential Subcommittee Approach for Mid-Cycle Review

- Hold one (1) administrative call in the month preceding the face-to-face meeting.
 - allows the subcommittee Chair to make review and writing assignments
- Hold two (2) teleconference calls prior to the face-to-face meeting.
 - ▶ allows the ORD to present background and other relevant materials to the subcommittee
 - ▶ allows the subcommittee to ask clarifying questions
- EPA shall distribute background materials and documents requested by the Subcommittee in advance of the teleconference calls.
- Hold a one-day face-to-face meeting for the mid-cycle review.
 - ▶ The meeting will include brief ORD presentations on program progress and discussions with members of the Land Mid-Cycle Subcommittee.
 - ▶ The meeting will conclude with the presentation of a draft letter report that addresses all of the charge questions.
- If needed, hold one (1) teleconference call within one month following the face-to-face meeting to finalize the draft letter report.

Appendix B: BOSC Land Research Mid-Cycle Subcommittee

Chair:

Charles A. Menzie, Ph.D.

Principal Scientist
EcoSciences Practice
Exponent, Inc.
1900 Diagonal Road
Alexandria, VA 22314

Vice Chair:

James R. Clark, Ph.D.

Exxon Mobil Research and Engineering
Company
Environmental, Safety, Civil, & Marine
Division
3225 Gallows Road, Room 3A009
Fairfax, VA 22037

Members:

Charles N. Haas, Ph.D.

Betz Chair Professor of Environmental
Engineering
Department of Civil, Architectural and
Environmental Engineering
Drexel University
Philadelphia, PA 19104

Lynne Haber, Ph.D.

Toxicology Excellence for Risk Assessment
(TERA)
2300 Montana Avenue, Suite 409
Cincinnati, OH 45211

Robert Siegrist, Ph.D.

Colorado School of Mines
Environmental Science and Engineering
204 Coolbaugh Hall
Golden, CO 80401-1887

Tim Thompson

Science, Engineering and the Environment,
LLC
4401 Latona Avenue, NE
Seattle, WA 98105

Designated Federal Officer:

Heather Drumm
U.S. Environmental Protection Agency
Office of Research and Development
(8104R)
1200 Pennsylvania Avenue, NW
Washington, DC 20460

Appendix C: List of Acronyms

APG	Annual Performance Goal
BOSC	Board of Scientific Counselors
DNAPL	Dense Non-aqueous Phase Liquid
EPA	Environmental Protection Agency
ESTCP	Environmental Security Technology Certification Program
FACA	Federal Advisory Committee Act
LTG	Long-Term Goal
MYP	Multi-Year Plan
NGO	Non-governmental Organization
NIEHS	National Institute of Environmental Health Sciences
NIH	National Institutes of Health
OMB	Office of Management and Budget
ORD	Office of Research and Development
OSWER	Office of Solid Waste and Emergency Response
PART	Program Assessment Rating Tool
UST	Underground Storage Tank