



Testimony of

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on

NEON Warning Signs: Examining the Management of the
National Ecological Observatory Network

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Madam Chairwoman, Mr. Chairman and Members of the Committee, thank you for this opportunity to discuss NSF's oversight of the National Ecological Observatory Network project.

The National Science Foundation (NSF) supports fundamental research at the frontiers of knowledge across all fields of science and engineering. NSF serves the national interest as stated by NSF's mission to promote the progress of science; to advance the national health, prosperity and welfare; to secure the national defense; and for other purposes; and we do so through our investment in a portfolio of more than 42,000 active awards. As part of our mission, NSF funds major research facilities such as the National Ecological Observatory Network (NEON).

NEON is a one-of-a-kind continental-scale research instrument consisting of a geographically-distributed complex cyber-enabled network of sensors and biological instruments that will, among other advances, use airborne remote sensing data to improve our fundamental understanding of biology, emerging disease, water use, invasive species, and agricultural,

forestry, and urban land-use. NEON was chosen as a major facility project based on its potential to transform environmental science.

Construction of NEON was funded through NSF's Major Research Equipment and Facilities Construction (MREFC) account at an amount of \$433 million. NEON civil construction has been completed in 48 of 82 site locations and expenditures to date are approximately \$285 million.

NEON Incorporated, which is responsible for the NEON project, is a private, non-profit corporation to whom NSF has provided federal financial assistance for the design, construction and early operations of the NEON network. Support for NEON began in 2007 with construction of the NEON project initiated in 2011, and early operations of the network began in 2014. NSF support for NEON construction and its operation is provided under a cooperative agreement, a federal financial assistance instrument. NEON is an ambitious, ground-breaking project that is challenging to construct because it is distributed, standardized across diverse locations, and includes multiple sensors and instrumentation. NSF recognizes these complexities and the challenges that NEON Inc. has had in staying on schedule and on budget throughout construction.

NSF began to have concerns with the project as early as January 2013. We noticed increased schedule slippages associated with production and procurement as well as the plan for the cyberinfrastructure, lack of data product development, delayed engineering designs for sensor assemblies, and lack of integration across teams. NSF followed up immediately with NEON Inc. to ask for corrective actions over the ensuing months and to provide clarity on requirements. We have had constant, close engagement with NEON Inc. throughout this process.

The project was re-planned in August 2014, and all information presented by NEON, Inc. at that time indicated that the scope could still be completed within the approved budget. However, at the start of this year schedule slippage began occurring at an even more rapid pace which prompted NSF to further increase its oversight of the project.

In late 2014, NSF also implemented a tightly coordinated oversight team for the NEON project using an agency-wide approach known as the Integrated Project Team (IPT). This team includes, among others, the Large Facilities Office (LFO), which tracks the progress of all MREFC projects through monthly reporting and ensures compliance with NSF-wide large facility processes and procedures; the Division of Acquisition and Cooperative Support (DACS), which authorizes the award of funds and ensures compliance with the terms of the cooperative agreement; and the NEON Program staff in the Biological Sciences Directorate, which is responsible for the scientific and technical oversight of the project and tracks progress against the deliverables in the Cooperative Agreement.

During a visit to NEON headquarters in Boulder during February 2015, I confirmed for myself firsthand some of the long-standing issues with management and project execution I mentioned earlier.

After that visit NSF continued to monitor schedule and costs and when the necessary improvements were not evident, called an emergency meeting in April 2015 to discuss corrective actions.

A warning letter was issued by DACS in May 2015 regarding the projects lack of compliance with NSF reporting and project management requirements and BIO issued a companion letter indicating that it would be working with NEON Inc. on the ground in partnership with LFO and DACS to assist NEON Inc. in rectifying the issues.

A series of site visits coupled with a DACS cost sufficiency review held in mid-June 2015 enabled NSF to finally obtain an estimate of the potential cost overruns and the extent of the projected schedule slip. These cost estimates finally revealed the full extent of the problem and the need for NSF to take immediate action. In short, the project was on a course to be approximately \$80 million over budget and delayed by as much as 18 months.

NSF takes its responsibility for stewardship of taxpayer resources extremely seriously, and strong oversight of our large facilities is a top priority. That is why since FY 2009 projects funded through the MREFC account have been subject to NSF's "no cost overrun" policy. This policy requires any project funded through that account to maintain its cost and schedule profile with the budget approved by the National Science Board and appropriated by Congress. If it is found that a project is potentially headed for cost-overruns, the Foundation has two choices: de-scope the project or cancel it. In order for NSF to decide the proper course of action, an analysis of potential de-scoping options is required so that the project will be delivered within budget and schedule while still meeting the project's original scientific objectives. NSF requires this for all large facilities projects as the first line of defense in keeping the project within budget. In order for NSF to approve the project to move forward, the facility must still be capable of providing transformational science after the de-scoping has been implemented. Prior to 2015 the last initial de-scoping analysis for NEON was performed in October 2009.

BIO convened a meeting to perform an update of this de-scoping analysis for NEON at NSF headquarters July 14-17, 2015. A newly-formed panel of experts was assembled which included members of the NSF staff from the NEON Program, NEON Inc. project staff, members of the NEON Board of Directors and Science Technology Education Committee (STEAC), and domain scientific experts from the community involved in the original design. The panel came up with a plan to reduce NEON Inc. corporate and project management costs, accelerate transition to operations, and reduce the scope of the following items: construction and deployment of portable towers (also known as "relocatables") and urban sites; instrumentation sensor systems that could be replaced with new technologies during operations; some derived data products that could eventually be up-graded during operations; and the Stream Ecology Observatory Network (STREON) experiments.

The plan developed at this meeting focused on those scope changes that would still allow the NEON facility to deliver a continental-scale instrument and accomplish the major planned science goals.

Following that meeting, DACS issued a letter to NEON Inc. which provided formal notification of the steps to be taken to manage scope and a detailed series of benchmarks and deadlines that must be met for the project to move forward.

Further, NSF ensured that key stakeholders were informed as soon as the scope management plan was implemented:

- Hill notification and briefings
- OSTP and OMB notification
- Internal NSF briefings
- Presentations at major scientific conferences in August of this year

The scientific community has accepted the necessity of these scope changes and expressed continued enthusiasm and support for the project. Indeed, the Ecological Society of America past and present presidents recently published a letter expressing their enthusiastic support of the ongoing project.

The Foundation has carefully examined and strengthened its oversight of NEON in light of these events and has put in place changes to help ensure proper stewardship.

- Inside NSF, management of NEON has been transferred to the Division of Biological Infrastructure and additional project management oversight has been provided.
- In response to a letter from me requiring that action be taken to rectify deficiencies in the leadership of the project, the NEON Board of Directors has removed the CEO of NEON Inc. and has assured the NSF that the acting CEO has the experience and credibility to get the project back on track.
- Progress of NEON Inc. towards meeting the scope management deliverables is being monitored through rolling internal reviews coordinated by the Integrated Project Team with a deadline of December 1st for sufficiency based on NSF requirements.
- NSF Biological Directorate's Advisory Committee is forming an independent subcommittee of distinguished scientists, including members of the National Academy of Sciences, to conduct an external review of the science impacts of a de-scoped project.
- The National Science Board has set up a Task Force on NEON Performance and Plans for continuous monitoring of overall progress.

By December 1, NSF will have enough information to be able to make a determination as to whether or not NEON Inc. has made sufficient improvement to successfully complete construction of the NEON project. NSF is considering how it will undertake external review of the information received, including an independent review of the revised total project cost and schedule.

If it is determined that NEON Inc. is not capable of completing construction, NSF will take the necessary actions to pursue alternative management options.

The NSF Inspector General issued an Alert Memorandum on August 31, 2015 containing recommendations for increased oversight of NEON. Although we may differ on some of the

details and reasoning, NSF agrees with the intent and has accepted all of the recommendations. In fact, we have already implemented three well in advance of the Alert Memo:

- NSF is now conducting monthly expenditure review, and has strictly limited the amounts of funding made available to NEON Inc.
- NSF is working with NEON Inc. in an assistive mode, with coordination and tracking of the deliverables required to evaluate project sufficiency moving forward through NSF's Integrated Project Team
- The monthly Earned Value Management (EVM) reporting has been strengthened

The fourth recommendation (undertaking an independent cost assessment) is now planned, assuming NEON Inc. is able to meet the compliance benchmarks for sufficiency in December 2015. Performing an independent cost assessment is only prudent given NEON's past history and is an ideal way for NSF to further test its strengthened oversight mechanisms. If NSF does not deem the cost estimate sufficient by its own standards, there is no need to proceed with the independent assessment and other appropriate actions will be taken by the Agency.

Madam Chairwoman and Mr. Chairman, NSF's management of these large facilities is of critical importance to the Foundation. In the case of NEON, we have greatly increased our oversight of the project, and are following up on our findings with specific and appropriate actions. Although we remain poised to take additional actions as needed, we are hopeful that NEON will be able to fulfill its goal of providing the nation a continental-scale research platform that has the potential to support research that can transform environmental science.

It is only with the strong support of the Inspector General and Congress that complete oversight of taxpayer resources can be ultimately achieved, and we are appreciative of those efforts. The Foundation looks forward to continue working with the Committee and with our Office of Inspector General as we actively monitor this program in order to best serve science and technology in the national interest.

Thank you again for the opportunity to testify. I would be pleased to answer your questions.

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Jim Olds is currently Assistant Director for Biological Sciences at the National Science Foundation. Dr. Olds is concurrently the Shelley Krasnow University Professor of molecular neuroscience. He is also editor-in-chief of *The Biological Bulletin* published by the Marine Biological Laboratory in Woods Hole.

Prior to his appointment at NSF, Dr. Olds spent 16 years as Chief Academic Unit Officer and Director of George Mason's Krasnow Institute for Advanced Study. Dr. Olds has served on numerous private and public boards and has played a central role in scientific public policy development at all levels, ranging from the White House to advising heads of ministries internationally. He spent eight years as chair of Sandia National Laboratory's External Cognitive Science Board. In the non-profit world, Dr. Olds was treasurer of Americans for Medical Progress. He has also served as a Virginia State Commissioner, appointed by Virginia Governors of both political parties.

Prior to taking the leadership role at Krasnow, Dr. Olds led one of the oldest and most prestigious scientific societies, The American Association of Anatomists as CEO. Olds received his undergraduate degree in chemistry from Amherst College and his doctorate in neuroscience from the University of Michigan in Ann Arbor. His postdoctoral research at the National Institutes of Health led to fundamental advances in understanding the molecular basis of learning and memory, for which he was awarded the NIH Merit Award in 1993.