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A Proposal to Enhance Research, Education, Communications and Outreach

Proposal to Programs in Research and Scholarly Excellence

From the Natural Resource Ecology Laboratory

July 9, 1999

enhanced by a PRSE award. We have a history, a desire, and a goal to be recognized as world renowned in the quality of our ecosystem science. We also want to assure that information based on our research is available and useful to managers and policy makers for solving present and future environmental problems. In the past 10 years we have worked towards accomplishing our newer goals of education and outreach, to assure that we contribute to the missions of the College of Natural Resources and the University. We are proposing four avenues to further enhance NREL as a PRSE for the long term, particularly in meeting our research, education and outreach goals. Specifically, we propose to utilize WWW and computing facilities to:

1. train students and researchers on the use of state-of-the-art analytical equipment;
- 2 improve access to NREL publications and data by scientists, students, and the public;
3. improve communications to alumni and friends of NREL as a basis for fund-raising.

These objectives are viewed as high priorities by the scientists and staff at NREL because under Cost Accounting Standards we are extremely limited in our ability to meet these objectives. All three have in common, and are dependent on, the additional final request to

4. improve the security of the NREL computer servers.

1. Training Students and Researchers on the Use of Analytical Equipment

The NREL Analytical Facility (NREL-AF), managed by Mr. Dan Reuss, is the core of NREL's field and laboratory research. The facility is a recognized area of excellence and includes the Colorado Laboratory for Environmental Mass Spectrometry (CLEMS) and the CHN carbon/nitrogen analysis facility, both campus-wide resources originally funded by VPRIT, CNR, and NSF.

Mr. Reuss provides hands-on training for CSU students, scientists, and staff as well as non-CSU users, on expensive, complex, cutting edge equipment including Elemental Analyzers, Isotope Ratio Mass Spectrometers, Automated Wet Chemistry Systems, and Infrared Gas Analyzers. In the past three years, 72 graduate students across 7 colleges, 13 departments, and 5 other universities, as well as 27 undergraduate students, have been individually trained by Mr. Reuss



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have also been used in CSU courses EY592 and EY571. This
ment which is currently paid from the NREL RSP budget.

We request 2 months salary for Mr. Reuss to develop a short-course on operating procedures for this equipment. The course will consist of a series of modules, each covering one of the instruments. Complex instruments will require several modules, covering different configurations. Standard operating procedure manuals will be prepared and distributed as handouts, posted on the WWW, and compiled into general lab protocol manuals. Where appropriate, these modules will be video taped. In future years the course will be taught by graduate students, providing them with valuable teaching experience. Modules for the campus-wide facilities will be open to all potential users. Modules pertaining to the NREL analytical laboratory will be open to the campus community on a space available basis.

This approach will maximize the operation of the analytical facilities for NREL and the campus, and minimize the amount of Mr. Reuss' time spent in routine training, thereby allowing him to focus on management of the laboratory and on providing scientific research support.

2. Improve Access to NREL Publications and Data by Scientists, Students, and the Public.

NREL has long been recognized for its collaborative and increasingly globalized scientific efforts in environmental problem solving, thereby being one of the leaders in meeting the 21st Century Scientific Challenges set by R. Colwell, Director, National Science Foundation, and by B. Alberts, President, National Academy of Sciences. Requests have increased for lists of publications by author, subject, ecosystem, etc., that were published in journals and the grey literature (NRC Committee Reports, USDA task force reports, etc.). For example, recent interest in carbon and carbon sequestration in soils has resulted in requests for lists of all publications by all NREL scientists studying carbon in soils. This information is difficult to obtain, especially for years prior to 1990 and for publications that are in the grey literature. We have a considerable number of recent publications on the NREL World-Wide-Web (WWW), but would like to include older publications and ensure that these and future publications can be easily searched by key word. This would increase efficiency for NREL and the public, students, and collaborators in Colorado and elsewhere.

The WWW is recognized as one of the most cost effective ways to share University knowledge with the scientific community, the public, and local, state, and national policy makers. As a web-based product, it can easily be linked to College and University Web applications, thereby increasing the public's perception of the accessibility of University research. This would also provide an infrastructure to handle College-level publications. Current and pending research



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via this delivery system in much the same way that journals
nature publications.

There is an increasing demand from natural resource managers for the ecosystem models that NREL is best known for (CENTURY, SAVANNA, SCOP). Scientific visibility of NREL and the University can be enhanced by the development of on-line overview documents for these models, and by increasing public access to NREL publications that define the scope of the Laboratory's ecological leadership.

We request funding to build an on-line, fully indexed bibliography of NREL scientific articles, proceedings and technical reports. We want to digitize publications that are most frequently sought after, that are not copyright protected, and make them available via the Web. Funds are also requested for development of on-line overview documents for the models listed above. To do this, NREL must have fast and secure communications for transfer of data, analyses, reports, and publications. We estimate that these tasks will require 6 months of a programmer's time and 6 months of a clerical publication specialist's time.

3. Improve Communications to Alumni and Friends of NREL as a Basis for Fund- Raising

In March 1999, the External Advisory Committee reviewed NREL and addressed NREL's financial future under Cost Accounting Standards. They recommended that NREL immediately begin a fund-raising effort. They suggested that NREL suspend publication of the present newsletter because of costs to NREL and, instead, when funds become available, (a) build a database on alumni and friends and (b) offer communication and build connections through the WWW and with a high impact brochure and quarterly newsletter. These developments will provide the necessary foundation for an annual fund-raising campaign. The database will be built by searching records to obtain names of undergraduates, graduates, staff and scientists who have studied or worked at NREL. PRSE funds would be used to research and build the database, to publish a brochure, and to design and publish the shorter newsletter. Once we have connected to our 'alumni' and friends, we will work with Vince McElligott, CNR Director of Development, to start an annual fund-raising campaign and other fund-raising events. Our goal is to establish an endowment base of \$250,000.

4. Improve the Security of the NREL Servers

The dramatic increase in world-wide internet use has seen a corresponding increase of scanning by hackers attempting to exploit system vulnerabilities. NREL systems are scanned regularly, sometimes several times per week. There have been several cases of systems breach that, while not compromising data, resulted in significant repair efforts by NREL systems staff. This, and the



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types of systems up to date with security patches, represent a
terms of time and money to research projects at the NREL.

Along with the increasing need for a secure data infrastructure, there is a growing reliance on accessing NREL computing resources from outside the NREL network. Work done by NREL scientists while located at field sites around the world, and while meeting with off-campus colleagues and potential donors, is greatly facilitated by full access to internal computing resources and WWW-served information. In addition, a shortage of available office space due to the addition of staff for recently funded grants makes telecommuting an important resource and further increases our need for secure remote access.

NREL pays for and maintains its own computer support and systems and has no funds allocated for securing the internet infrastructure and providing secure remote access. Therefore, we request funds to install and configure a network security system comprised of two subsystems: a "firewall" - software that filters and monitors network traffic to and from the NREL network; and a "virtual private network" gateway - software that provides secure, encrypted access from anywhere on the internet to authenticated users.

NREL sees these four requests as addressing priority needs. Besides improvements and benefits discussed above, NREL will benefit through savings in staff time and more efficient performance on research grants. This award will benefit Colorado State University, the College of Natural Resources, and the NREL by improving the visibility and efficiency of the Laboratory.