

MSU INVESTMENT PROPOSAL FOR INSTITUTIONAL PRIORITIES

PROPOSAL OVERVIEW

Title	Proposal for Environmental Analytical Chemist, LRES Environmental Analysis Laboratory	Request Date	December 16, 2011
Department	LRES	Email	jbrookshire@montana.edu, stephanie.ewing@montana.edu
Requestor	Jack Brookshire and Stephanie Ewing	Phone	994-3973, 994-5247

STRATEGIC ALIGNMENT

Core Themes and Objectives (check all that apply)

Educate Students

- Our graduates will have achieved mastery in their major disciplines
- Our graduates will become active citizens and leaders
- Our graduates will have a multicultural and global perspective
- Our graduates will understand the ways that knowledge & art are created and applied in a variety of disciplines
- Our graduates are prepared for careers in their field
- We will provide increased access to our educational programs
- Communities and external stake holders benefit from broadly defined education partnerships with MSU

Create Knowledge and Art

- Students, faculty, and staff will create knowledge and art that is communicated widely

Serve Communities

- We help meet a fundamental need of the citizens of Montana by providing degree programs for our students
- We help meet the educational needs of the citizens of Montana by providing a wide range of educational opportunities to a variety of students
- Our students, faculty, staff, and administrators reach out to engage and serve communities
- Our students, faculty, staff, and administrator reach in to build the university community

Integrate Learning, Discovery, and Engagement

- Each graduate will have had experiences that integrate learning, discovery and engagement
- Outreach activities will educate students and address the needs of the communities we serve
- Students, faculty, and staff will create knowledge and art that addresses societal needs
- MSU is a community that will be characterized by synergy within and across disciplines, roles and functions.

Stewardship

- The public trusts the institution to operate openly and use resources wisely
- The faculty and staff are well-qualified and supported
- MSU will support Native American students, programs, and communities
- MSU will be an inclusive community, supporting and encouraging diversity
- Our publicly provided resources are used efficiently and effectively
- Natural resources are used efficiently and sustainably
- MSU nurtures a culture of resource conservation and ecological literacy among students, faculty and staff
- Our physical infrastructure (e.g., building, equipment, open spaces) will be well-maintained and useful

INSITUTIONAL BENEFIT

Campuses

Bozeman Billings Havre Great Falls FSTS Extension MAES

Cross Depts

Please List: _LRES, Engineering, Earth Science, Ecology, Chemistry

TIMEFRAME

Proposed Dates

Start: April 1, 2012 End:

COST AND REQUIREMENTS

Funding Type	One-Time (\$)	Multi-Year (\$)			Base (\$)	FTE
		Year 1	Year 2	Year 3		
Personnel (w/benefits)		\$40,000	\$40,000	\$40,000	\$10,000	0.15 instructional
Materials & Supplies						
Travel						
Contracted Services						
Capital						
Other Operations						
TOTAL		\$40,000	\$40,000	\$40,000	\$10,000	

Please comment, if necessary, regarding cost and requirements.

Budget

Total expense: \$125,000 per year, five year initial commitment

Research Scientist salary: \$68,000 annually including benefits (assuming \$50k base annually)

Maintenance & consumables: \$20,000 per year

Undergraduate student stipends: \$12,000 per year

Graduate Research Assistant: \$25,000 per year

Facility revenue: \$20,000 per year in first three years

Facility contribution for invested PIs (\$3,000/y * 5 PIs = \$15,000)

Grad student training (\$200/module * 20 student-modules per year = \$4,000)

Instrument time (hourly) and standards (by volume) (\$1,000)

Proposed funding sources in first three years (\$105,000 annually)

LRES annual match \$65,000 (IDCs \$40,000; RA position \$25,000)

Institutional grant \$40,000

Facility revenue \$20,000

Proposed funding sources after three years (\$105,000 annually)

LRES annual match \$55,000 (IDCs \$30,000; RA position \$25,000)

Institutional grant \$10,000

Facility revenue \$60,000

Additional potential contributors:

Dean, College of Agriculture

VP and Director of Extension – Water Quality Program

Potential faculty collaborators in LRES:

Dore*, Engel*, Foreman*, Inskeep*, Jones*, Marshall, Maxwell, McDermott*, Miller*, Poole*, Priscu, Ward, Zabinski* (*specific support indicated)

Additional potential faculty contributors/affiliates in Earth Science, Ecology, Engineering:

Cross, Skidmore, Stein, Macur, Gerlach

PROPOSAL SCOPE

Describe the Proposal

Proposal for Environmental Analytical Chemist, LRES Environmental Analysis Laboratory

Scientific understanding of Earth systems requires careful chemical analysis and interpretation of environmental samples. Increased public and political recognition of environmental change and its role in society has generated increased attention and scrutiny on the environmental sciences. Over the past several years, Montana State University has seen substantial growth in research, education, and outreach relating to environmental analysis as evidenced by increased institutional investment in faculty lines and graduate recruitment in the fields of biogeochemistry, microbial ecology, ecosystem science and related disciplines. Critical to sustaining MSU investments in environmental research and education is the support and maintenance of facilities necessary to answer fundamental and applied questions relating to the environment that are important to society.

Here, we propose to fund a PhD level Environmental Analytical Chemist position in the environmental analysis laboratory on the 8th floor of Leon Johnson Hall. This facility currently houses a unique suite of equipment for analysis of water samples and aqueous soil extracts, including a dissolved organic carbon and nitrogen analyzer, inductively coupled plasma mass spectrometer, ion chromatograph, automated colorimetric analyzer for inorganic nitrogen and phosphorus, water stable isotope analyzer, and peripheral equipment including balances, a water purification system, and a centrifuge. Several of these instruments represent the only analytical capacity for certain samples on campus, if not regionally. The facility currently serves graduate students of faculty in LRES, Earth Sciences, Ecology, and Engineering. We propose that the facility should also provide sample analysis for the MSU Extension Water Quality program.

The problem we address here is that the facility currently lacks a dedicated professional to oversee and manage operations, maintain equipment, and train students on laboratory instruments. LRES faculty closely associated with the shared facilities field regular and frequent requests for sample analysis from faculty and students across campus. In the absence of cohesive operational and training capacity, accommodating multiple users while maintaining quality control and laboratory stewardship has become increasingly untenable. Support of this facility and associated personnel represents a critical and urgent need in the environmental sciences and student education at MSU.

We propose to fund an Environmental Analytical Chemist position to improve student training, data analysis capability and quality, and data assessment at the graduate and undergraduate levels. The individual would be jointly supervised by laboratory directors Brookshire and Ewing as part of their oversight of the facility. This individual would educate graduate students in effective analysis of environmental samples through a graduate class (3 credits) or targeted training modules (3x1 credit each), and provide analytical support for graduate students of PIs invested in the facility, and for undergraduate class projects with an analytical component (e.g., Capstone, Stream Restoration Ecology). The facility would also provide support for two undergraduate assistants with potential for research credit on a case-by-case basis, and foster additional targeted undergraduate research projects through the Undergraduate Scholars Program.

PROPOSAL SCOPE

Describe the broader impacts and benefits of this proposal

This position will provide training and analytical support to graduate students and undergraduates currently lacking analytical skills to effectively participate in research or evaluate environmental data. Students will emerge much better equipped to tackle analytical and data interpretation challenges pervasive in regulatory and land management careers in the environmental sciences. We envision that this hire will be involved in the education and hands-on training of to 10-20 students per year. LRES currently has 50 graduate and 130 undergraduate students many of whom are involved in research relating to environmental analysis. Combined with other interested departments we foresee strong student engagement and class enrollment.

Detailed benefits to programmatic goals:

- Provide centralized access and availability to analytical facilities commonly used in the life and environmental sciences, and process samples for internal (MSU) research and education programs.
- Improve our curriculum through development of a course titled *Environmental Methods and Analysis* with focus on application of analytical tools in the environmental sciences, routine and advanced analytical methods, data analysis, data interpretation, quality control and quality assurance.
- Improve graduate and undergraduate student training opportunities where equipment within the laboratory can be utilized for research programs with appropriate supervision and quality control. The Environmental Analytical Chemist and appropriate staff will work with graduate students on independent projects, preferably structured for credit (i.e. 500 level, 1-3 credits).

Strategic alignment: Educate students; integrate learning, discovery, and engagement

Specific goals for educating students:

Many of our students are targeting jobs with land management and regulating agencies in the environmental sector. Their ability to perform well in these positions will depend on critical skills developed through the expertise that this individual would bring to the analytical facility:

- Quantitative analytical ability;
- Critical assessment of data;
- Solid understanding of analytical uncertainty

We address these educational goals at both the graduate and undergraduate levels. Our proposed graduate level class and specific instrument training modules will significantly improve graduate student education in the environmental sciences. At the undergraduate level, several existing core classes have projects with an analytical component that would receive priority in the facility sample queue (e.g., Capstone, Stream Restoration Ecology). In addition, the facility would foster undergraduate education through explicit provision of undergraduate stipends (see budget), and participation in the Undergraduate Scholars Program. Our affiliation with the MSU Extension Water Quality program will provide excellent opportunity for independent undergraduate projects in the arena of community based water quality monitoring, well testing, and outreach for water quality awareness.

Outreach

The university has the opportunity to raise the level of scientific awareness and understanding on the part of the general population through both education and outreach. This proposal will contribute to effective education of the land managers and regulators who will serve to protect the land resources of the great state of Montana and the nation. A dedicated component of the facility will provide analytical capability for MSU Extension's Water Quality program, including the Well Educated program - an outreach effort encouraging well owners to test their drinking water supply - and community monitoring efforts in coordination with watershed groups and county extension personnel statewide.

ADDITIONAL INFORMATION

Implementation Plan *(Please describe with timelines)*

We anticipate hiring an individual in late summer or fall, 2012. This individual will be jointly employed by the laboratory directors (Brookshire and Ewing). A facility website will be established in fall 2012. PI investments in the facility will renew every six months starting January 2013. The graduate class or modules will be offered initially in fall 2013 and annually thereafter. Invested PIs will meet at the start of each six-month period to evaluate sample throughput and prioritization for the following six-month period. Initially only samples of invested PIs, undergraduate class projects, and MSU Extension Water Quality projects would be analyzed. As possible, additional sample analysis will be accommodated for a broader group of faculty affiliates.

Assessment Plan *(Please describe with indicators)*

We anticipate that this support will lead to grant winning success for invested PIs in collaboration with the Environmental Analytical Chemist, contributing to increasing grant support for the position, buy-in by additional PIs for use of the facility, and collaborative sample analysis on a per-sample fee basis. Success would be rated by the degree to which the individual and collaborating PIs are able to participate in funding the position through collaborative grants after three years. Our specific minimum goal will be to reduce the initial combined IDC and Institutional support by achieving \$60,000 in revenue annually after three years (compared to \$20,000 initially). We will record the number of trainings and the number of students trained, as well as the outreach events and potential populations to be served. These trainings and events will be evaluated, as will the lab tech (through annual evaluations). For the grad course, we will conduct student evaluations and peer evaluation methods as normally implemented in LRES.

If assessed objectives are not met in the timeframe outlined, what is the plan to sunset this proposal?

Institutional support will be ended and alternate avenues of staffing and operating the laboratory will be sought.

SIGNATURES

Department Head <i>(please print)</i>	Signature <i>(required)</i>	Date
Tracy M. Sterling	<i>Tracy M. Sterling</i>	Dec 20, 2011
Dept Head Priority <i>(please circle one)</i> : Very High <u>High</u> Medium Low Very Low #3		
Dean/Director <i>(please print)</i>	Signature <i>(required)</i>	Date
JEFF JACOBSEN	<i>Jeff Jacobsen</i>	12/30/2011
Dean/Director Priority <i>(please circle one)</i> : Very High <u>High</u> Medium Low Very Low 6DF8		
Executive/VP <i>(please print)</i>	Signatures <i>(required)</i>	Date
Executive/VP Priority <i>(please circle one)</i> : Very High High Medium Low Very Low		