

Economic Development Incentive Grant

2014-15 Annual Report

Directions

Please submit the annual report as a **Word document via email** to Tawseef Talukdar at ttalukdar@uwsa.edu (no hard copies please). The annual report is due by **Friday, July 17, 2015 at noon**. The following information must be provided:

Institution Name(s): UW-Eau Claire	Project Title: The Responsible Mining Initiative: Building an Educated STEM Workforce for the Natural Resource Industry
Principal Investigator: Kent M. Syverson	Person submitting Report: Kent M. Syverson
Email: syverskm@uwec.edu	Contact Phone #: 715-836-3676
Grant Award Amount: \$451,317	Report Date: July 17, 2015
Grant Funding Spent (to date): \$280,537	Date project began: November 14, 2013
	Date project ends (projected): June 30, 2016

I. Status Report

Discuss project activities in relation to meeting the proposal's expected outcomes for FY15. Please include any activities related to sustainability if appropriate at this time.

The Responsible Mining Initiative (**RMI**), housed in the UW-Eau Claire Dept. of Geology, has three distinct, integrated outcomes to expand professional opportunities and improve workforce quality. First, summer short courses will allow Wisconsin high school teachers to explore career opportunities and develop interest in the mining and environmental industries. Second, curriculum development activities will lay the groundwork for a rigorous, interdisciplinary program focusing on economic geology, hydrogeology and restoration ecology. Third, the Initiative will develop a vibrant paid internship program directly benefiting both students and industry. Our goal is to prepare graduates for work in the mining industry, the environmental consulting industry, and in regulatory agencies such as the DNR.

Much progress has been made since the grant was received in November 2013 and since the last annual report dated July 16, 2014. This annual report will address each outcome separately. Most efforts to date have been in the area of internship development and outreach to high school teachers, so these outcomes will be discussed with more detail than the other outcomes. Efforts to develop the interdisciplinary Responsible Mining program have been hampered by UW System budget cuts, and this will be discussed as well.

Outcome #1. Outreach activities for Wisconsin high school teachers and students

In order for Wisconsin residents to fill jobs in the natural resources industry, they need to know about the job opportunities and how to prepare themselves for employment. For this reason, outreach to the public is a critical component of the Responsible Mining Initiative. Initially, we proposed offering workshops for high school students and teachers. However, we decided that investing in teachers was a more sustainable way to reach high school students. Thus, the Initiative has provided high-quality short courses for Wisconsin high

school teachers. This will help them build student interest in career opportunities in the mining and environmental industries.

The first high school teacher workshop was held in August 2014 in Eau Claire. Two more teacher workshops are being offered this summer – one in June (already completed) and another workshop in August (see App. A for the flyer). Faculty members Scott Clark and Lori Snyder have been paid this summer to develop the curriculum and offer the weeklong workshops.

Thus far the number of teacher participants has been rather low (Table 1). This is discussed in Part II of this report.

Table 1. RMI teacher workshop participants, 2014-2015.

Workshop date	Number of participants
August 2014	4
June 2015	3
August 2015	4 (5 likely)

Our outreach approach has focused on educating area science teachers about mining's role in Wisconsin's past, present, and future, and helping the teachers incorporate that information into their course curricula. The goals of these workshops are to give educators a solid understanding of the geologic formation and the location of economic rock and mineral resources in Wisconsin; their importance to society and the regional economy; and, the potential environmental impacts of their exploitation. To achieve the stated goals, the workshop provides teachers with basic information about Wisconsin's geologic history, and focuses on the types and locations of mineral deposits that are found within Wisconsin. Learning occurs via a hands-on approach, with field trips scheduled on every day of the workshop. Teachers receive a workshop packet and external drive with materials for them to use in their own classrooms.

Outcome #2. Laying the groundwork for a rigorous educational program in responsible mining

The ultimate goal of the Responsible Mining Initiative is to lay the groundwork for a new, rigorous program focusing on economic geology, hydrogeology, restoration ecology, public policy, and scientific communication. The university agreed to find the space for, and to hire, three new faculty members to support this Initiative – a contaminant hydrogeologist, a low-temperature geochemist, and a restoration ecologist (in Biology). This year the budgetary situation in the UW System has worsened, and this poses major challenges for developing the Responsible Mining program.

However, foundational work has been underway to accomplish this goal. Notable activities advancing educational program development include:

- **Our new tenure-track economic geologist, Dr. Robert Lodge, joined us in fall 2014.** This greatly expanded departmental expertise in metallic mining. Dr. Lodge taught his first Economic Minerals class in the fall, which included an underground mine tour in UP Michigan. Dr. Lodge has initiated research on the Flambeau Mine volcanogenic massive sulfide deposit in Ladysmith, and in doing so has built relationships with the Wisconsin Geological and Natural History Survey.
- **The new economic geology/hydrogeology lab has been constructed and will be ready for use in fall 2015.**
 - The space in Phillips 219 has ample space for rock cores and hydrogeology equipment.

- Dr. Robert Lodge has been assembling representative rock cores to facilitate the study of ore bodies and fluid-rock alteration products.
- **Curriculum conversations within the Dept. of Geology are ongoing.** The Department has met several times to discuss curriculum.
 - A day-long Geology curriculum retreat was held in August 2014 to discuss modifications to our curriculum necessary to prepare for the Responsible Mining program (to be initiated once the program is staffed).
 - Results of the discussions
 - More environmental classes are necessary to support the responsible mining program. This was the justification for hiring additional staff to expand course offerings.
 - Split Engineering Geology and Geophysics (Geol 445, 5 cr) into two different courses.
 - Applied Geophysics (Geol 461, 4 cr, fall semester in alternating years)
 - Engineering Geology (Geol 350, 3 cr, spring semester in alternating years)
 - These courses have been officially and have been approved for inclusion in the 2015-16 course catalog.
 - The necessary Restoration Ecology course in Biology has not yet been developed and lacks a faculty member to teach it in the Dept. of Biology.

These changes develop the infrastructure to offer more environmental classes to more students – a critical part of the “Responsibility” portion of the Responsible Mining Initiative. In the RMI grant, UW-Eau Claire pledged to hire a contaminant hydrogeologist and geochemist in Geology and restoration ecologist in Biology to staff the additional environmental classes. *With this staffing, we will be able to offer the necessary upper-division classes **each semester** to move students toward timely graduation in a Responsible Mining program.*

The current budgetary crisis in the UW System is adversely impacting our ability to create a Responsible Mining program at UW-Eau Claire. First, our tenured hydrogeology associate professor, Dr. Katherine Grote, resigned to take a tenured position at Missouri University of Science and Technology, in Rolla, MO. This leaves a major hole in our program from a teaching and collaborative research standpoint. She also received a 22% pay increase, which illustrates the threat of losing other Geology faculty members if compensation does not improve soon.

In addition, the university is using virtually all open positions to deal with the \$250 million budget cut to the university. Thankfully, UWEC administration permitted us to hire a one-year Instructional Academic Staff member, Dr. Steven Sellwood, to cover some of Dr. Grote’s hydrogeology classes this coming year. The budgetary climate makes it very difficult to hire the additional staff necessary to create a Responsible Mining program. This is unfortunate because the RMI has strong positive momentum at this point, and a delay in creating the Responsible Mining program might jeopardize some of the industry partnerships we have created.

Additional staff members are necessary to create a viable Responsible Mining academic program.

Outcome #3. Developing a vibrant paid internship program

Four UW-Eau Claire Geology faculty members have been working to develop paid internships for our students in different sectors: Kent M. Syverson (KMS, industrial sand mining industry), J. Brian Mahoney (JBM, metallic mining/petroleum/environmental), Robert W.D. Lodge (RWDL, metallic mining), and Katherine R. Grote (KRG, hydrogeology/environmental consulting/DNR). Syverson, Mahoney, and Grote each had one month of salary last summer to build relationships with industry. During summer 2015, Syverson, Mahoney, and Lodge have one month of salary to build relationships with industry (see App. B).

Faculty members have been e-mailing industry contacts, meeting with potential industrial partners around the state (and elsewhere), sponsoring conferences and theme sessions at professional conferences, and attending conferences to build industry relationships.

The most high profile activity of the past year was co-organizing a Society for Mining, Metallurgy, and Exploration (**SME**, Wisconsin and Twin Cities Chapters) in Eau Claire. Syverson and Mahoney served on the organizing committee for this September 2014 conference. Syverson gave a 20-minute overview of the Responsible Mining Initiative during the luncheon for ~230 attendees. A vendor booth was rented to publicize the Responsible Mining Initiative and distribute copies of the newly developed RMI brochure (see App. C, online at http://www.uwec.edu/Geology/upload/RMI-at-UW-Eau-Claire_final.pdf). In addition, Syverson and Mahoney co-led a one-day field trip to sand mines in western Wisconsin attended by 90+ participants. Many valuable contacts were made at this meeting.

Other conferences include:

- Hosted the Friends of WISA [Wisconsin Industrial Sand Association] at the student center on the UWEC campus, October 2014. More than 100 people from industry attended. (KMS, JBM, and UWEC RMI interns and scholarship recipients)
- Frac Sand Logistics & Market Forecast Summit USA 2014, Houston, TX, October 2014 (KMS)
- Prospectors and Developers Association of Canada (PDAC) meeting of international metallic mining companies, Toronto, ON, March 2015 (JBM & RWDL)
- Wisconsin Ground Water Association (meeting dominated by environmental consulting companies, hydrogeologists, and DNR officials), Waukesha, WI, March 2015 (KRG)
- Northwestern Ontario Prospectors Association (NWOPA) annual meeting April 2015 (RWDL)
- North-Central Geological Society of America meeting, Madison, WI, May 2015 (KMS, JBM, and UWEC student researchers). Syverson co-organized an all-day session about frac sand mining and environmental issues. Session included talks by Syverson and Mahoney, as well as representatives of Unimin Corp., Fairmount Santrol, Barr Engineering, Badger Mining Corp., Kraemer Mining & Materials, SEH Inc., Air Control Techniques, the U.S. Geological Survey, the Wisconsin Geological Survey, the WDNR, and the Minnesota Dept. of Health. Talks consistently had 75 attendees, and feedback was very positive. A well attended reception was also held for UWEC geology alumni and industry partners (see photos on page 18 in App. H).

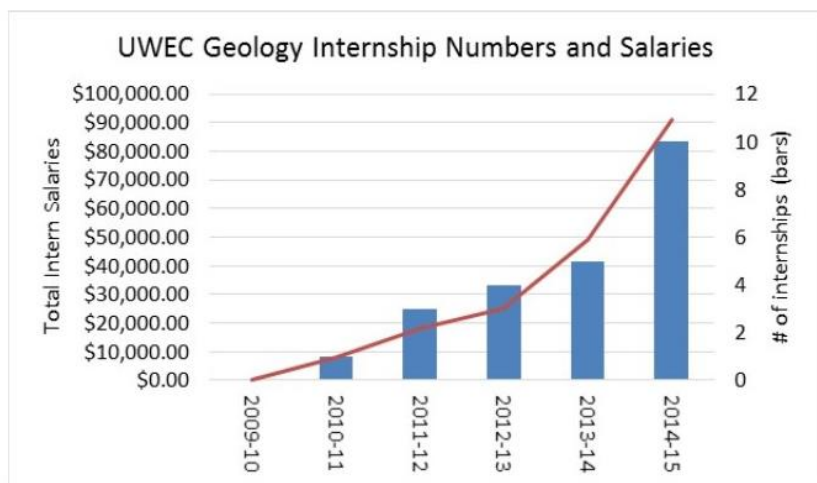
These efforts have been very fruitful. Last year three Memoranda of Understanding (**MOUs**) were signed, exceeding our goal of two for the first year. The Initiative's internship goal for Year #2 was to have at least five MOUs signed. This goal was met by having *five* MOUs approved with four different companies. UW-Eau Claire Geology students have been given preference in the hiring process for four internships. MOUs have been signed with the following companies:

- Fairmount Santrol*
- Maptek Inc.
- Smart Sand Inc. *
- Unimin Corporation (n=2) *

* Company gives hiring preference to UW-Eau Claire Geology majors

Another MOU draft with SEH Inc. (Chippewa Falls) is being evaluated by lawyers and seems likely to be approved. If so, this would be the sixth signed MOU and the first MOU with an environmental consulting firm.

Efforts to develop internships have been a resounding success, as shown by the increase in paid internships (Fig. 1). In summer 2013, four UWEC Geology students had paid internships. This increased to five in 2014



The RMI has increased internship opportunities starting in the 2013-14 academic year. Ten paid internships during summer 2015 include the following companies/agencies:

- Barr Engineering (env)
- Fairmount Santrol (mining)
- North Dakota Dept. of Health-Groundwater Quality Division (env)
- Smart Sand Inc. (n=2, mining)
- SEH Inc. (env)
- Teck Resources (mining)
- Unimin Corp. (n=3, two in mining, one in env. affairs)

Figure 1. Internship numbers and salaries have increased markedly since the start of the Responsible Mining Initiative in fall 2013.

and ten in summer 2015 (Table 2) – a 150% increase from the year 2013. These internships are with industrial sand companies (n=6), environmental consulting firms (n=2), a regulatory agency (n=1), and a metallic mining company (n=1). These internships provide valuable work experience for our students and will give them an advantage when seeking employment after graduation.

In addition, the internships well paid (\$6000-\$13,000/summer). The ten interns during summer 2015 will earn nearly \$91,000 in salary money, which will help students avoid excessive debt.

Table 2. Student internships for UW-Eau Claire Geology students, summers 2014 and 2015.

Company Name	Internship Location	Company type	Internship type	Year	Intern's hometown
Smart Sand Inc.	Oakdale, WI	Non-met mining	Geol	2014¹	Kimberly, WI
Unimin Corp.	Tunnel City, WI	Non-met mining	Geol	2014	Altoona, WI
Unimin Corp.	Mankato, MN	Non-met mining	Environ	2014	Hudson, WI
Freeport McMoRan Copper and Gold	New Mexico	Metallic mining	Geol	2014	Roscoe, IL
Smart Sand Inc.	Oakdale, WI	Non-met mining	Geol	2015	Kimberly, WI ²
Smart Sand Inc.	Oakdale, WI	Non-met mining	Geol	2015	Eagan, MN
Unimin Corp.	Tunnel City, WI	Non-met mining	Geol	2015	Altoona, WI ²
Unimin Corp.	Mankato, MN	Non-met mining	Environ	2015	Prairie du Sac, WI
Unimin Corp.	Tunnel City, WI	Non-met mining	Geol	2015	Green Bay, WI
Fairmount Santrol	Menomonie, WI	Non-met mining	Geol	2015	Sheldon, WI
Teck Resources	Alaska	Metallic mining	Geol	2015	Altoona, WI
SEH Inc.	Chippewa Falls, WI	Env consulting	Environ	2015	Chippewa Falls
Barr Engineering	Minneapolis, MN	Env consulting	Environ	2015	Green Bay, WI
North Dakota Dept. of Health-Ground Water Division	North Dakota	Env regulation	Environ	2015	Appleton, WI

¹Entries with a year in bold blue font represent UW-Eau Claire students who were given preference in the hiring process because of the Responsible Mining Initiative.

²Hired for a second year by the same company—evidence of company satisfaction with the interns.

The internships also brought good publicity to the UW-Eau Claire Dept. of Geology and the university as a whole. Two newspaper articles about interns were published in Wisconsin newspapers (App. D). In addition, the UWEC Chancellor James Schmidt, UW President Ray Cross, and UW Regent John Behling visited intern Nick Matula at Smart Sand Inc. (July 2014, App. E). They not only spoke with the intern, but also Blugold Geology alumni Todd Lindblad (x13) and Tony Linhart (x14) who are working salaried jobs with Smart Sand.

Donations to the Geology program

Relationship-building with industry has facilitated unprecedented major donations to the Department of Geology (Fig. 2). During the 2014-15 academic year, \$52,830 was donated to Geology (versus \$18,490 during the 2012-13 academic year—a 186% increase). This money has been used to fund scholarships, student grants, and purchase equipment.

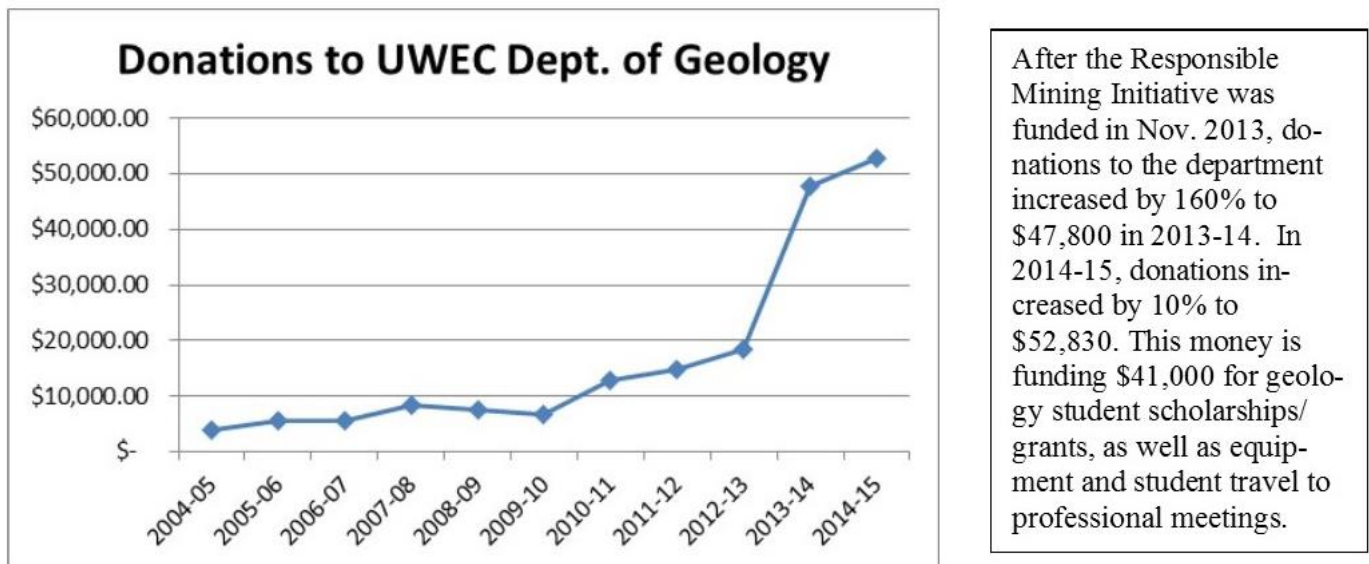


Figure 2. Donations started to increase in 2010-11 as the mining industry gained momentum in the State of Wisconsin. The Responsible Mining Initiative has made a major impact on donations to the department (see 2013-14 and 2014-15 data points) and opportunities available to UW-Eau Claire students.

Scholarships and grants

One of the most noticeable impacts of the RMI for students has been the growth in Geology scholarships and grants. At the spring 2015 Geology banquet, industry officials awarded \$41,000 in scholarships and grants to Geology majors (see photos in App. H). This is an increase from \$2500 in the spring 2013 (prior to the RMI) and has reduced student reliance on loans. Scholarships/grants include:

- **Unimin Corporation is committing \$25,000 in cash annually to support UW-Eau Claire Geology students** (see App. G). This is in addition to the two internships mentioned above, and the first two \$25,000 installments have been received. This spring the money was used to fund the following initiatives:
 - **Unimin Freshman Geology Scholarships** are merit-based, annual \$1000 scholarships. For the 2015-16 academic year, *seven* scholarships were awarded to students from Wisconsin (Stevens Point, Sparta, Holmen, and Oak Creek) and Minnesota (Albertville, Ramsey, and Rochester). The freshman scholarships *clearly* had a positive impact on our recruiting this year. Several students receiving scholarship offers returned to campus for a second visit, and all students who

returned for a visit accepted our offers. One awardee is a first-generation U.S. citizen who is also an honors student! The average ACT composite score is 27 (top 15% nationally), so this strengthens our program. (5000/yr, but we had an \$2000 not awarded the previous year)

- **Unimin Sophomore Geology Scholarships** are merit-based, \$2500 scholarships for four geology majors who will be taking Mineralogy-Petrology in the following fall semester. The four recipients for 2015-16 are from Chippewa Falls, Green Bay, Spring Valley (App. D3), and Max, MN. (\$10,000/yr)
- **Unimin Field Geology II Grants.** Unimin has agreed to sponsor our Field Geology II (Geol 471) course held in Whitehall, Montana (see story and photos in App. G). This year the sponsorship provided each field camp participant (fourteen students) with a \$700 grant from Unimin Corp. (\$10,000/yr)
- **Wisconsin Industrial Sand Association (WISA), \$5000.** For the second year, WISA has donated money used to award three \$1650 WISA Geology Scholarships for the upcoming academic year (2015-16). Scholarship recipients are from Madison, Menomonee Falls, and Mukwonago. See App. H.
- **Fairmount Santrol is committing \$6,000 in cash annually to support three UW-Eau Claire Geology scholarships** (see App. H). This new commitment is in addition to the internship mentioned above. The first recipients of the Fairmount Santrol Responsible Mining Scholarship are from Chippewa Falls, Green Bay, and Springfield, IL.

Equipment

- **Badger Mining Corp., \$5000.** This is Badger Mining's second major donation to the department for equipment. The new donation will be used to help upgrade computers in our computer laboratory. The computers are critical for our Hydrogeology I and II, Geochemistry, and Economic Minerals classes.

Return on investment

The University of Wisconsin System's investment in the UW-Eau Claire Dept. of Geology (\$451,317) has achieved a high return on investment during the first two years. Using baseline amounts for donations and internship salaries in 2013, an additional \$153,425 has been brought into the university to support UWEC students and the Responsible Mining Initiative (Table 3). ***This represents a 34% return on the original UW System investment during the first two years of the Responsible Mining Initiative.***

Table 3. Increase in donations and internship salaries since 2013 (the year prior to the Responsible Mining Initiative)

	2013	2014	2015	Totals	Amt in excess of 2013
Donations	\$18,490	\$47,845	\$52,830	\$119,165	
Donations in excess of 2013	\$0	\$29,355	\$34,340		\$63,695
Internship salaries	\$25,070	\$49,000	\$90,870	\$164,940	
Internship salaries in excess of 2013	\$0	\$23,930	\$65,800		\$89,730
Totals				\$284,105	\$153,425

II. Updated Goals/Performance Metrics and Assessment Plans

Use the attached Excel spreadsheet and this document to report the current status of project goals/performance metrics, anticipated completion date(s), actual completion date(s), and assessment plans. If there were any changes in the project activities, outcomes or evaluation, they should be identified in this section. Discuss any key findings and how the institution used collected data to improve the project in FY15.

The updated performance metrics and assessment plans are provided in Appendix I. No major changes have been made to the assessment plans.

As mentioned in the previous section, five internship MOUs have been signed with industrial partners. This met our target for Year 2 of the grant (Required Performance Outcomes tab in App. I). One other MOU is in the advanced stages of negotiation, and it seems likely that a sixth MOU might be in place within the next two months. More work will be required to maintain and expand these relationships.

Actual outcomes for 2013-14 and 2014-15 are reported in the General Performance Outcomes tab in Appendix I. Assessment data was collected at the end of summer 2014. During the next month the second set of assessment data will be collected. Exit interviews will be conducted with the Responsible Mining Initiative interns and their employers. In addition, feedback will be solicited from teachers participating in the second Responsible Mining workshop. These data are being used to improve future internships and workshops.

Industry internship supervisors provided formal and informal feedback following summer 2014. Feedback was very positive. Comments were used to design a one-hour “Internship 101” class for 2015 interns to stress expectations, professionalism, and issues regarding proprietary information. The best evidence of company satisfaction is this: two of the four RMI interns from summer 2014 were rehired by the same companies for summer 2015 (Table 2). Faculty supervisors of the 2015 internships will visit the internship sites in late July and early August to make sure things are going well.

The positive response to the teacher workshops has been gratifying (App. J). Based on input from 2014, we discovered that the workshop overlapped with a CESA workshop for science teachers. Some teachers also suggested that offering optional graduate-level credits would be attractive for teachers. Thus, the dates for the 2015 workshops were coordinated closely with CESA 10 to prevent competing events, and arrangements were made with the Registrar’s Office to offer a 600-level credit if participants desired. Even with these changes, enrollment for 2015 still has been rather low (Table 1).

The low number of teacher participants has been disappointing. Based on the low enrollments, we have been thinking about the following:

- Have changes in teacher licensing in Wisconsin reduced the demand for workshops such as ours?
- The greatest interest has been on the workshop segment involving frac sand mining.
 - We suspect that a shorter workshop focusing only on frac sand mining and associated environmental issues might generate higher enrollment numbers.
 - Next summer we will offer two 2-day teacher workshops focusing on frac sand. If those workshops are poorly attended, then it would seem that the teacher demand is not present.

One of the goals of the grant is to increase the number of students in the Responsible Mining, Hydrogeology, General Geology, and other emphases. Although the Responsible Mining program is not yet in place, evidence suggests Initiative successes are enhancing the recruitment of high-quality geology majors directly out of high school. The number of declared incoming freshman is at its highest point in departmental history (15, Fig. 3). Not only is the number of enrolled majors high, but they are also of high quality. This incoming class has *three* Honors students, a new record. (Last year we enrolled our first incoming freshman Honors student.)

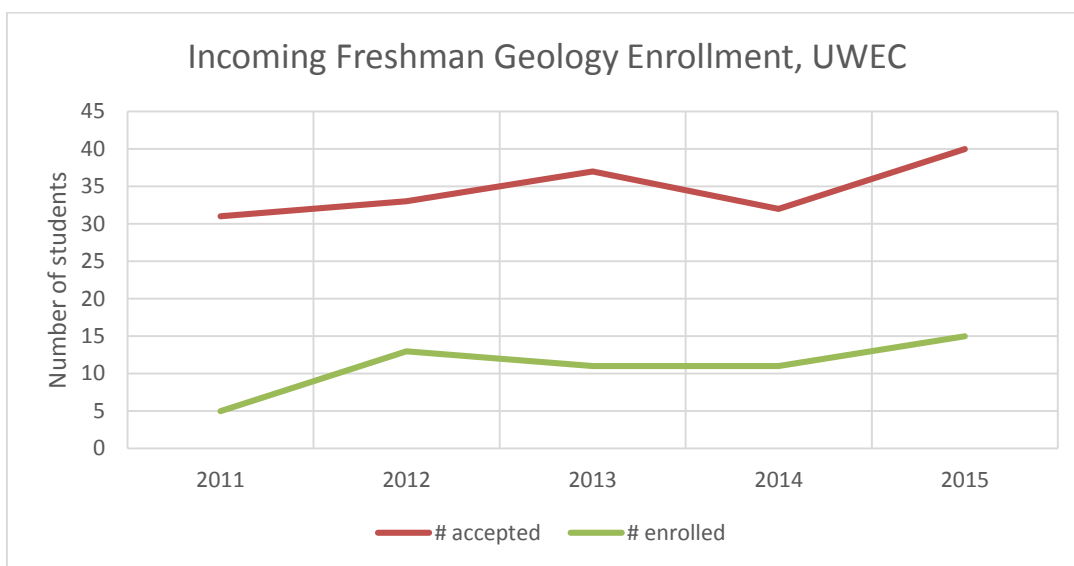


Figure 3. The numbers of Geology freshman accepted (40) and enrolled for fall semester (15) are at an all-time high. The scholarships for incoming freshman and interest in the paid internship opportunities have enhanced our ability to recruit high-quality students from high schools in the Midwest.

The \$1000 Unimin Freshman Geology Scholarships seem to be partially responsible for the increased number of incoming majors and higher student quality. We were pleased when several students receiving scholarship offers returned to campus for a second visit, and all students who returned for a visit accepted our offers. The Unimin Freshman Geology Scholars are in the top 15% nationally based on ACT composite scores, and three of them are Honors students. At least one of these Honors students was leaning toward an expensive private school until he returned to the UWEC campus for a second time. This was the first year the freshman scholarships could be used for recruiting, and the results are encouraging.

The paid internships also have been used as a recruiting tool. Prospective students (and parents as well!) are impressed by the paid internship opportunities where UWEC Geology majors are given preference. They also are impressed by the salaries students can earn while gaining practical work experience. Internship position descriptions (App. K) are given to prospective students when they visit the department, and these potential opportunities appear to be enhancing student yield as well.

III. Project/Program Budget and Expenditures

Please provide a report of project/program expenditures detailed by category and source of funds.

Detailed expenditures are supplied in Tables 4 (Year 1) and 5 (Year 2). Because money was received rather late in the first year, little spending occurred during that first year. Spending increased the second year as we attended conferences to set up internships and remodeled the new Economic Geology/Hydrogeology lab.

The Economic Geology/Hydrogeology lab space just became available for occupancy. More money will be spent to purchase and install a video data projector and make the room ready for students. However, the room is now ready to install analytical computers, accept cores and microscopes, etc. For this reason, UW System granted us an extension to spend the rest of the grant money (App. F).

Total spending for Year 2 was \$235,776 for a two-year total of \$280,537. (See App. L for the detailed grant budget.) At the end of the grant period, \$170,780 was remaining to spend. Of this, \$22,703 will be spent on

salaries on August 1. Analytical computers (\$8800) and field geology computers (\$31,250) will be purchased prior to the start of the school year. Economic sample suites and cores sets (\$17,500) and hydrogeology equipment (\$15,000) will be obtained as well. Additional travel, teacher workshops, and other Initiative outreach activities to students and industry (including website development) will spend the remaining balance.

Table 4. Year 1 spending (compared to original Responsible Mining Initiative proposal budget supplied in Appendix L).

Outcome	Distribution	Amount Requested	Amount Spent 2013-14	Comments
1. Outreach Activities	HS teacher short course	10,250	0	Short course is in August, so entire amount will be spent by the end of summer 2014.
	Outreach coordination (1 mo FTE)	9,494	0	Short course is in August, so entire amount will be spent by the end of summer 2014.
2. Program Development	Laboratory construction	85,000	0	Space was identified in June 2014, so Facilities Management is now preparing construction plans. Construction (and spending) will begin in fall 2014 once the plans are finalized.
	Lab development (0.5 mo FTE)	11,364	3,962	Entire amount will be spent by the end of summer 2014.
	Equipment and supplies	0	27,659	An old microscope stepper stage died, so a new stepper stage, software, and some microscopes were purchased during Year #1, instead of Year #2 as originally planned.
3. Internship Development	Internship development (metallic, sand, environment) (2.5 mo FTE)	30,566	9,142	Entire amount will be spent by the end of summer 2014.
	Internship Development Travel	15,000	3,998	More travel has been conducted this summer to establish internships and will be billed this summer.
	<i>Year 1 subtotal</i>	<i>161,674</i>	<i>44,761</i>	

Table 5. Year 2 spending (compared to original Responsible Mining Initiative proposal budget supplied in Appendix L).

<i>Outcome</i>	<i>Distribution</i>	<i>Amount Requested</i>	<i>Amount Spent 2014-15</i>	<i>Comments</i>
1. Outreach Activities	HS teacher short course	10,250	1,676	Expenses from 2015 short courses will post in FY 2016.
	STEM student short course	2,960	0	Decided to focus on teacher workshops.
	Outreach coordination (1 mo FTE)	9,494	9,494	Some of this is from summer 2014. All salary money for teacher workshops will be spent by the end of summer 2015.
2. Program Development	Econ. Geology/ Hydrogeology	109,350	8,795	Microscopes purchased ahead of schedule in Year #1. Lane storage cabinets purchased. P219 lab space is now ready for purchase of computers.
	Laboratory Equipment		898	Most of the equipment will be purchased after 6/30/15 because the lab is now ready.
	Econ. Geology/ Hydrogeology	0	73,596	The remodel expenses (\$85,000) were requested in Year 1 but spent in Year 2. Construction is nearly completed and will be ready for use during fall 2015. Some expenses yet to post.
	Lab development (1.0 mo FTE)	10,971	5,840	Another \$5,840 will be paid August to complete the payments.
3. Internship Development	Internship development (metallic, sand, environ.)(1.0 AY + 2.15 mo FTE)	129,118	118,600	Includes some salary+fringe from summer 2014. Another \$22,703 in salaries + fringe benefits will be paid on August 1.
	SME industry conference seminar	2,500	1,546	Rented a booth to promote RMI at SME meeting in Eau Claire, and sponsored NC GSA reception
	Internship Development Travel	15,000	15,331	More travel has been conducted this summer to establish internships and will be billed in fiscal year 2016.
	<i>Year 2 subtotal</i>	<i>289,643</i>	<i>235,776</i>	
	<i>TOTAL REQUEST</i>	<i>451,317</i>		

IV. Changes

Describe any additional changes (staff, program direction, etc).

Last year's report mentioned UWEC administration's tentative approval to search for a tenure-track contaminant hydrogeologist in 2014-15 and a Restoration Ecologist in Biology during the 2015-16 academic year. These new positions were to be the foundation for the expanded environmental course offerings necessary to offer the Responsible Mining program. The state budget situation has completely altered this timeline.

Budget cuts have forced the elimination of 130 positions at UW-Eau Claire for the 2015-16 academic year. In such an environment, virtually all tenure-track searches were cancelled, and Geology was not given permission to search for a contaminant hydrogeologist. Not only that, but our tenured physical hydrogeologist resigned to take a higher-paid, tenured position at Missouri University of Science and Technology. Both of these developments are major setbacks and delay the initiation of a Responsible Mining program.

New staff members are needed to launch the Responsible Mining program. UWEC administration has allowed us to fill the vacant hydrogeology position with a one-year instructional academic staff member for 2015-16 in recognition of the critical importance of hydrogeology in our curriculum. This coming year permission will be sought to hire a tenure-track physical hydrogeologist. Next year we will seek to hire a contaminant hydrogeologist and a restoration ecologist. However, the budgetary environment makes these searches very difficult during the 2015-16 and 2016-17 academic years.

This delay threatens the sustainability of some industry partnerships. Unimin Corp., our biggest donor, is extremely interested in the development of the Responsible Mining academic program. Company officials asked me about program development in June, and I had to be honest with them about the financial realities during the next one to two years. Coincidentally, today I received an unsolicited e-mail message from Unimin Corp. as this report was being finalized (App. M). Unimin's representative is asking if the university intends to support the Responsible Mining academic program. It would be *extremely frustrating* if paid internships and scholarship donations were lost because budget cuts delayed the Responsible Mining program. However, thus far companies seem to be very pleased with what the Responsible Mining Initiative has accomplished.

Geology has already lost one faculty member to a higher-paid job at a different institution. This could be the start of more departures if salary issues are not addressed. Geology has many faculty members who are not only excellent teachers, but they also have the skill sets necessary to move into other positions in academia or industry. Hopefully the state will start to provide financial support to the University, *but this issue is reaching a critical level.*

Otherwise, we have no changes in the program timeline to report.

Conclusions

The Responsible Mining Initiative has brought in an additional \$153,425 to support UWEC students through scholarships, grants, equipment upgrades, and paid internships. *This amount represents a 34% return on the original UW System investment (\$451,317).*

The scholarships and paid internships are recruiting more, and higher-quality, students to our program, and this will increase the number of STEM graduates in the State of Wisconsin. Scholarships are reducing student dependence on student loans. In addition, the internships are also building bridges between the university and industry. Such connections are extremely valuable for the future employment of our graduates, but also for political reasons. Teacher workshops also are building valuable connections to improve the future recruitment of high school students.

The state budget cuts pose many challenges to the continued success of the Responsible Mining Initiative. Loss of faculty and delays in hiring new tenure-track faculty have delayed the launch of a Responsible Mining program and also threaten the sustainability of industry partnerships (see App. M for questions being raised by Unimin Corp. about university/state commitments to the program).

The next few years will be used to cement the gains that have been made, seek additional industry partners, and hire the additional staff members necessary for a new, robust academic program in Responsible Mining. The new hires will be critical for the sustainability of the Responsible Mining Initiative.

Digital Appendices

Appendix A. Brochure for the summer teacher workshops, summer 2015.

Appendix B. EXCEL database tracking internship-building efforts with industry

Appendix C. Responsible Mining Initiative brochure (produced for Eau Claire SME meeting co-organized by Mahoney and Syverson)

Appendix D. Examples of newspaper publicity about the Responsible Mining Initiative.

Unimin Corp. intern at Mankato – Ryan Conway

Unimin Corp. intern at Tunnel City – Justin Poirier

Unimin Corp. Sophomore Geology Scholarship – Sarah Sortedahl

Appendix E. Photograph of the Chancellor, the UW System President, and UW Regent during a visit to Smart Sand Inc., worksite for intern Nick Matula.

Appendix F. Letter from Dr. David Brukardt of UW System providing a one-year extension for spending RMI grant monies.

Appendix G. Press release about the long-term Unimin Corporation donation in support of the Responsible Mining Initiative. Unimin's lobbyist brought this press release to more than thirty legislators' offices during budget deliberations at the State Capitol.

Appendix H. The 2015 Geology alumni newsletter with many articles about the Responsible Mining Initiative.

Appendix I. Updated Goals/Performance Metrics and Assessment Plans (spreadsheet)

Appendix J. Typed comments from participants in two RMI teacher workshops (Aug. 2014 and June 2015).

Appendix K. Position descriptions for internships granting UW-Eau Claire Geology majors preference in the hiring process.

Fairmount Santrol internship (Menomonie, industrial sand mining)

Smart Sand Inc. internship (Tomah, industrial sand mining).

Unimin Corporation internship (Tunnel City, industrial sand mining).

Unimin Corporation internship (Mankato, MN, environmental affairs in industrial sand mining)

Appendix L. Original budget table from the Responsible Mining Initiative funding proposal submitted in October 2013.

Appendix M. Unsolicited message from Unimin Corp. asking about the university's commitment to creating a Responsible Mining academic program. This represents a threat to the sustainability of industry partnerships resulting from the Responsible Mining Initiative.