Background: REMRSEC and Diversity
In 2007, CSM instituted an initiative to diversify the campus community, not only to address the national concern focused on broadening participation in Science, Technology, Engineering, and Mathematics (STEM) fields, but also to improve educational outcomes for students. Included are four strategic priorities:

- Focusing on campus climate to foster diversity of thought, opinion, and perspectives representing the world into which students graduate
- Broadening and deepening of faculty diversity
- Increasing female enrollment
- Increasing enrollment of underrepresented minorities (URM)

REMRSEC Diversity Strategic Plan: Current Status and Progress
REMRSEC is committed to supporting these initiatives at CSM and has created its own diversity focus within the Center. A team of faculty, staff, and students has implemented a diversity plan for the Center and meets regularly to discuss progress and action items. The strategic plan focuses on the following:

- Designing and implementing programs to attract women and URM;
- Creating strategic partnerships with key collaborators; and
- Engaging the institution to do more to recruit and retain women and URM in all areas of the School.

All strategic efforts target particular groups with recruitment and retention activities:

- K-12 students and teachers
- Community college students
- Undergraduate students at CSM
- Undergraduate students at other institutions
- Graduate students at CSM
- Post-doctoral faculty at CSM
- Faculty at CSM

Institutional Demographics
The data in the table below represents a Fall 2012 snapshot of Mines’ student demographics as a whole, along with the percent change since 2008. URM is defined as American Indian or Alaska Native, Black or African American, Hispanic or Latino, Native Hawaiian or Other Pacific Islander.
Enrollment has grown significantly since 2008, particularly at the graduate level. The overall female and URM populations at CSM have increased slightly since 2008. This small increase is noteworthy against the backdrop of overall enrollment growth, but there is more work to do.

The next two tables display diversity-related demographic data over time for all Mines undergraduate and graduate students.

<table>
<thead>
<tr>
<th>Student Populations</th>
<th>2012 Enrollment Data</th>
<th>% Change Since Fall 2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Undergraduate</td>
<td>4062</td>
<td>+19%</td>
</tr>
<tr>
<td>Graduate</td>
<td>1343</td>
<td>+44%</td>
</tr>
<tr>
<td>Colorado Resident</td>
<td>63.9%</td>
<td>-6.7%</td>
</tr>
<tr>
<td>International</td>
<td>11.1%</td>
<td>0%</td>
</tr>
<tr>
<td>URM</td>
<td>8.6%</td>
<td>+0.6%</td>
</tr>
<tr>
<td>Women</td>
<td>26.2%</td>
<td>+1.4%</td>
</tr>
</tbody>
</table>

Since 2008, the institution has had the clearest success recruiting female undergraduates and URM graduate students. Compared with a national data set (ASEE annual survey data), enrollment of women is higher at Mines when compared to other engineering programs (ASEE female data: UG - 16%; Grad - 21%). Enrollment of URM at Mines compares less favorably to the national picture of URM enrollment in engineering programs (ASEE URM data: UG - 18.3%; Grad - 6.4%). In 2012, the institution restructured its Minority Engineering Program and staffing, and just recently appointed an Associate Provost for Diversity and Inclusion. These actions followed a restructuring of Undergraduate Admissions in 2011 to be more effective in recruiting women and minority students. While the results may not show for several years, the institution is taking real steps to address the flat growth in the URM population. REMRSEC faculty played very important roles in producing all of these changes.

**Demographics for REMRSEC Programs and Groups**

REMRSEC embraces the idea that broadening participation at CSM and in STEM fields in general begins at the level of the Center and its connection to various communities. Consequently, the REMRSEC maintains data on participation of URMAs and women in the following REMRSEC-related programs:

- Summer Research Experience for Undergraduates (REU)
- Renewable Energy Minor
- REMRSEC Community
  - Graduate Students
Post-Doctoral Fellows
Faculty

The Summer Research Experience for Undergraduates (REU)
Directed by teaching professor of Physics, Dr. Chuck Stone, the REU has been a consistently strong program with respect to Center diversity goals. The program has been so successful that last year, Dr. Stone’s was awarded an MLK Recognition Award by the institution for his commitment to diversity.

The graphs that follow indicate the breakdown of female and URM applicants and participants for the first four years of the REMRSEC REU program.

In 2009 - 2011, women were strongly represented in the applicant pool and even more well-represented among participants (more than 50% each year). 2012 was different for reasons described below; however, it is worth noting that in all years, participation in the REU by female students outpaced the enrollment of women at Mines.

URM participation in the REU, while lower than that of females, has still been quite strong across all years of the REU (see graph below). Notably, there was a jump in URM participation in the REU in 2012. There are several reasons for this outcome. First, the deadline for applications was moved earlier in the year, from March to January, in order to better compete with other REUs for the highest quality students. This change cut the total number of applicants in half compared to the year prior. The smaller pool of applicants included fewer women and minority students than previous years.
This translated into fewer female participants, but did not translate into fewer URM participants. One possible reason for this is that the program director recruited for the REU at conferences targeting URM students in STEM, and with themes of diversity and inclusion in STEM fields (SACNAS and Frontiers in Education). He also identified and recruited high quality students who were involved in the MEP Program at Mines. Dr. Stone’s recruiting activities and commitment contributed to higher REU participation from URMs in 2012.

To explain the lower female participation in 2012, there were several women who had initially committed to the REMRSEC REU, but who ultimately took offers at other institutions late in the commitment process. In light of small numbers, and the fact that those women could not be replaced at that point in time, there was a negative impact on female participation.

In 2012, the REMRSEC issued a survey to former REU participants. The goal of the survey was to gauge the influence of the REU experience on students’ aspirations and current work or graduate school status. 54 students who participated in the 2009, 2010, and 2011 REUs were surveyed, and 34 responded (half were women; four were URM; two identified as disabled). Key findings of the survey are as follows:

- 50% said the REU had a significant influence on post-graduate aspirations
- 35% said it had a moderate influence
- 16 of these students were from underrepresented groups (55%)
- 29% reported having at least one scholarly publication
- 35% were employed
- 24% were in graduate school
- 30% were still undergraduates

Of the 19 students from underrepresented groups who responded:
- Five are employed (CH2M Hill, HRL Labs, UC-Berkeley, AGM Container Controls)
- Four are in graduate school (UC-SB, Oregon, CU-Denver, Mines)
- Seven are undergraduates who have intentions for graduate school

The results of this survey indicate that the REU experience plays some role in influencing students to remain committed to STEM fields and graduate education. Additional surveys will be conducted with each REU classes in future years.
**Energy Minor**

The Renewable Energy track of the new Energy Minor has generated significant interest among students at CSM. As an example, total enrollment in ENGY 200: Introduction to Energy (a foundation class for the Energy Minor) has more than doubled since its first offering in 2009. The REMRSEC tracks enrollment in Energy courses because of the possibility that renewable energy coursework and the Minor may be particularly attractive to underrepresented students. So far this is proving to be the case with women, but less so with URM students.

The graph below shows URM, female, and total enrollment in ENGY 200. Female enrollment in the most recent offering of ENGY 200 was at 30%, outpacing the percentage of women enrolled at Mines. URM enrollment, however, was only 5%, several percentage points lower than the percent of URM enrolled at Mines. It’s clear that while the Energy Minor and coursework has been marketed to students in the MEP program, as of yet, these efforts have not made a significant impact. These results will be considered in discussions of a revised diversity plan in preparation for the REMRSEC re-competition process. In the meantime, efforts to attract underrepresented students to the Energy Minor and its coursework will continue.
The REMRSEC Community

Graduate Student Group
Twenty graduate students were supported financially by the REMRSEC in 2012, and of that number ten were women and three or less were URM. These students, along with several others from Dr. Taylor’s research group, met twice a month to discuss their research. Food was provided by the REMRSEC, and Reuben Collins continues to serve informally as a faculty advisor to the group.

Post-Doctoral Fellows
Of the five post-doctoral fellows who were part of the REMRSEC in 2012, two were women.

Faculty
In 2012, there were 76 faculty or faculty affiliates that were part of the REMRSEC. Of those faculty members, 25 were women and three or fewer were URM.

Strategic Efforts in 2012 to Enhance Diversity in the REMRSEC
The REMRSEC recognizes that more must be done to attract URM graduate students, post-doctoral fellows, and faculty. This will be addressed in a revised strategic plan for diversity.

Minority Engineering Program Outreach
The REMRSEC diversity team continued to focus efforts in 2012 on internal recruiting of URM students to programs such as the REU and the Energy minor by engaging more with the CSM Minority Engineering Program (MEP). REMRSEC faculty and students were involved in the following efforts:

• Dr. Stone recruited two URM students active in MEP at Mines into the REU, and identified and secured funding for those students (March, 2012).
• For a second year, Tom Brenner, a REMRSEC graduate student, taught a renewable energy unit as part of the SUMMET program, which is a three week summer residential program, hosted jointly by MEP and Admissions, targeting rising URM juniors and seniors (June, 2012).
• Dr. Fernando Guzman, newly hired Executive Director of MEP, joined the REMRSEC diversity team (June, 2012).
• Dr. Tim Ohno and graduate student, Idemudia Airuoyo, created a hands-on learning activity and presented it as part the September MEP retreat, which is an orientation program for new and returning URM students (September, 2012).
Post-Doc Mentoring Program
The REMRSEC post-doctoral mentoring program is a group mentoring/ professional development program that targets Center post-docs and graduate students. Programs focus on topics that might not otherwise be covered as part of graduate education and training at CSM. In 2011, the program expanded to become a partnership with CSM's Graduate Student Association, and this collaboration continued into 2012. All graduate students and post-docs on campus were invited and the GSA provided lunch to attendees. Topics covered in 2012 included:

- The Ins and Outs of Presenting Scholarly Research…and How to Avoice Inducing Zzz’s  
  Presenter: Dr. Reuben Collins, Physics Professor; Associate Director of the REMRSEC
  Facilitator: Dr. Reuben Collins, Physics Professor; Associate Director of the REMRSEC  
  Panelists: Dr. Ian Schick, Patent Agent at Pillsbury Winthrop Shaw Pittman, LLP, in San Diego; Dr. Will Vaughn, Director of Technology Transfer at the Colorado School of Mines

Partnerships with Other Universities:

Since its beginning in 2008, the REMRSEC has developed relationships with personnel and students at two colleges which have a niche focus on underrepresented groups. The first connection was with Salish Kootenai College (SKC) located on the Flathead Indian Reservation in Montana. The SKC partnership began with an NSF-funded MRI grant for high performance computing equipment just before REMRSEC was awarded in 2008. Since then, REMRSEC has funded:

- Scholarships for five SKC seniors who worked on three research projects; four graduated and found employment; one worked on a project involving organic photovoltaic molecule design (IRG1)  
- Full and partial participation for two REU students from SKC, one of whom transferred to CSM in 2010  
- Hardware to repair/upgrade computer cluster at SKC

Dr. Mark Lusk, professor of Physics at CSM and a REMRSEC faculty member, has made three visits to SKC. He has met with most of the faculty and has established a rapport with the Computer Engineering students. He was a key mentor to the SKC REU student who transferred to CSM. Unfortunately, she did not stay, but hopes to return.
The second REMRSEC/university partnership in development has been with Fisk University, a private HBCU located in Nashville, Tennessee, which is known for advancing a high number of its graduates into Ph.D. programs in the natural sciences. Dr. Richard Mu, a faculty member in the Physics Department at Fisk, contacted Dr. Taylor in 2010 to inquire about a partnership with the REMRSEC. Fisk offers graduate programs though the Master’s level, and Dr. Mu’s research overlaps with that of Dr. Collins, the Associate Director of the REMRSEC. Dr. Mu has visited CSM several times since his initial contact; Dr. Taylor and Director of Graduate Admissions, Jahi Simbai, visited Fisk in November of 2011 to talk with Dr. Mu and recruit students for the REU and graduate programs. Also in the fall semester, Dr. Mu and Dr. Collins submitted a PREM proposal, which was not funded; however, there was great value in the collaboration process.

Working to develop partnerships with both SKC and Fisk has been an important learning experience for REMRSEC faculty. The connection with Fisk became strong enough in 2012 for the REMRSEC to begin realizing its goal of bringing promising Fisk graduates to Mines to continue their graduate education. Idemudia Airuoyo from Fisk began the master’s program in physics at Mines last Fall. He was awarded a summer assistantship and took courses over the summer to become acclimated to Mines. The chair of the physics department is in conversation with the REMRSEC director about seeking additional funding to support more Fisk students in the future.

REMRSEC Strategic Plan: Areas of Focus in 2013

Evidence of success in 2012 towards REMRSEC’s diversity goals include:

- Strong representation of women at all levels and in all programs of the REMRSEC.
- Increased participation of URM in the REU program due to strategic, personalized recruiting.
- Continued focus on the CSM Minority Engineering Program through outreach/awareness-building and internal recruiting to various REMRSEC programs.
- Deepened Fisk University/CSM partnership; active recruiting into CSM programs; first graduate student from Fisk admitted.

The program continues to build on these successes, particularly with regard to continuing to foster strong enrollment from underrepresented groups in the REU and Energy courses, as well as the MEP relationship and the Fisk partnership.

Last spring, the REMRSEC diversity team hosted the diversity and outreach leadership from the University of Utah MRSEC. One of REMRSEC’s External Advisory Board members had suggested this visit based on the strength of the REMRSEC in diversity and educational outreach. While the program appreciates being held up as a model, there is more to do. In 2013, the diversity strategy will be substantively revisited with a focus on how to be more effective in attracting URMs to all levels of the REMRSEC. Many REMRSEC programs build on the efforts of the institution’s core, a core which has traditionally lacked underrepresented minority participation. This fact has been a major challenge in increasing diversity within the REMRSEC; however, a developing strategy has been to work actively to influence institutional efforts in the diversity realm. Although our efforts to build diversity within REMRSEC will continue, the Center will continue actively to influence campus broadening participation efforts.