

Above: A camper draws the outline of a projected S&T for Science and Technology, part of the new name of the former University of Missouri -Rolla where Explosives Camp is held each summer. The project was part of a fireworks finale that students organize. **Right:** A shape charge forces a perpendicular spout of water more than 200 feet into the air, soaking the unsuspecting campers when it returns to the ground. **Below**: Professor Paul Worsey, center, talks to campers about cast boosters, an explosive used to blow up watermelons at the Experimental Mine site. The students get to explode various materials during the week-long camp.





The AB(C-4)s of Explosives

Teens have a blast at a unique camp where blowing things up is the point

by Amber Hanneken

ire in the hole! Fire in the Hole! Twenty campers wearing ear plugs, hard hats and safety glasses eagerly hold their breaths in anticipation. With a cue from the instructor, an excited teenager activates the firing mechanism. BOOM!

A hall of

A ball of fire erupts where once a portion of a steel I-beam stood. Black smoke and the campers' cheers are left in its wake.

Summer is here and at Missouri University of Science and Technology, that means it's time for Explosives Camp — a week of demolition and demonstration for 20 high school juniors and seniors from across the country. Explosives Camp this summer included three one-week sessions from June 8 to June 28.

"It's the whole smorgasbord of explosives-related activities. It bounces around highlights of all different applications of explosives," says Paul Worsey, the camp's lead instructor and professor of Mining and Explosives Engineering at MS&T. "We do everything from mining to demolition, fireworks to EOD (Explosive Ordinance Disposal), rock concerts and special effects to blowing up food."

Students were selected for the camp based on a one-page resume, a 250-word essay on why they are interested in a career in explosives and a letter of recommendation. Accepted students paid \$500 for the camp, which included room and board. "I want to be a mining engineer, I think it sounds fun," says camper Joe Cook of Republic. "I really like rocks and explosives."

Worsey and other faculty created Explosives Camp as a fluke four years ago. There were three high school students that wanted to participate in research for the summer, but with no work available for them, Worsey took them to the campus' Experimental Mine and conducted the first Explosives Camp by actively teaching them about explosives.

"The kids were so over-awed with it and it was so positive that we thought, 'Why don't we put in a camp?'" Worsey recalls.

The camp, the first and only one of its kind in the world, blossomed the next year and became a vital recruitment tool for the mining and explosives department at MS&T.

Mining programs across the country have dwindled and disappeared as fewer students become aware of the industry as a career choice. Worsey says many students learn about chemistry in high school and go on to study chemical engineering in college, but they don't realize the field is more about creating a chemical process that doesn't explode than one that does.

Five thousand mining engineers have retired in the past decade, which means that there needs to be 500 graduates a year to fill those spots. The demand for these jobs is high and it pays well, which is why MS&T boasts 100 percent job placement for seniors graduating in the program.

Through lectures and field trips, students at the camp learn that a min-





Top left: Flabbergasted campers emerge from a safety chamber to see the results of a high-powered blast that destroyed a concrete pillar. **Above:** Students place lancers, a type of colorful firework, on the S&T sign. As a final project, they cut out the letters from wood and decorated them with the fireworks to create an explosive and glowing finale to a fun-filled week. **Left:** This fiery flash is the result of the detonation of Composite-4 (C-4) explosive and a portion of a steel I-beam — one of many blasts students get to see during their week at Explosives Camp in Rolla.



ing or explosives engineering degree can get them jobs in not only mining but civil construction, demolition, excavation, fireworks, special effects or EOD. Campers watch a surface shot blast rock in a local quarry, go deep underground to view a mine blast and tour Premier Pyrotechnics, a Missouri fireworks factory and distributor.

"I think the coolest thing we saw was the blast at the quarry where they used explosives to move an entire set of rocks to the ground," says camper Isaac Wagner-Muns of Crystal Lake Park. "I'm thinking very hard now about entering the field because it just seems like so much fun."

About two-thirds of campers end up attending MS&T, and about half of them go into the mining program.

Of course the best part of the camp is the hands-on experience that students gain. They learn to prime and shoot explosives such as dynamite and Composite-4 (C-4), the plastic explosive, to blow up everything from frozen chickens and watermelons to concrete pillars and pools of water. Though fun, exploding things like frozen chickens holds a lesson for campers — the skin and bones of a chicken are similar to a human hand.

"It's an important safety demonstration. It gives them the idea of how powerful explosives are," Worsey says. "We can get it to them in a fun way so they know what will happen if there's a problem."

Safety is a major factor during the camp. Campers learn the correct way to handle explosives and are required to wear hard hats, steel-toed boots and safety glasses at all times. They get the chance to take part in the entire process with supervision.

Some of the students who come to the camp have had a long-time interest in explosives and may have been experimenting on their own, Worsey says. Explosives Camp teaches them to do it both legally and safely. The parents are happy about that, too.

"It's a great learning experience and a great way to learn about something that is perceived as dangerous but is very beneficial to everything," says camp counselor Brandon Austin Meadows, an MS&T student who also was a camper last year. "We handle all the explosives in a completely safe environment, and this is the best learning experience you can get in this field by far."

Campers stay in the MS&T dorms during the week and get to participate in typical camp activities including a pool party, barbecues and a special ice cream stop.

Students have come from as far as Hawaii, Florida, Texas and Montana to be a part of the camp. Because of government regulations, only U.S. citizens may attend.

"The word is getting out there so more people are finding out about it," Worsey says. "A lot of kids say, 'Wow I never knew Missouri had this.'"

Word has spread in part by a lot of national media attention. Last year, Explosives Camp was featured in both *The New York Times* and on National Public Radio. Past campers also have posted their experiences on popular Web sites like the video sharing site YouTube and various online journals.

Rolla

At the end of the activity-packed week and after the students got some practice with fireworks by destroying cardboard cities with pyrotechnics, parents are invited to come to a barbecue where campers get to show off what they learned with a fireworks display that they set up.

After cleaning up the leftover casings, the campers linger, not quite wanting to leave the experience behind, before finally giving a warm good-bye to Worsey and the camp counselors.

"I think it's the reaction from the kids, to me, that's the most enjoyable," Worsey says. "That's what camp's about, having fun."

For more information about Explosives Camp or the explosives program e-mail barb@mst.edu or visit www.explosives. mst.edu or call 573-341-4753.