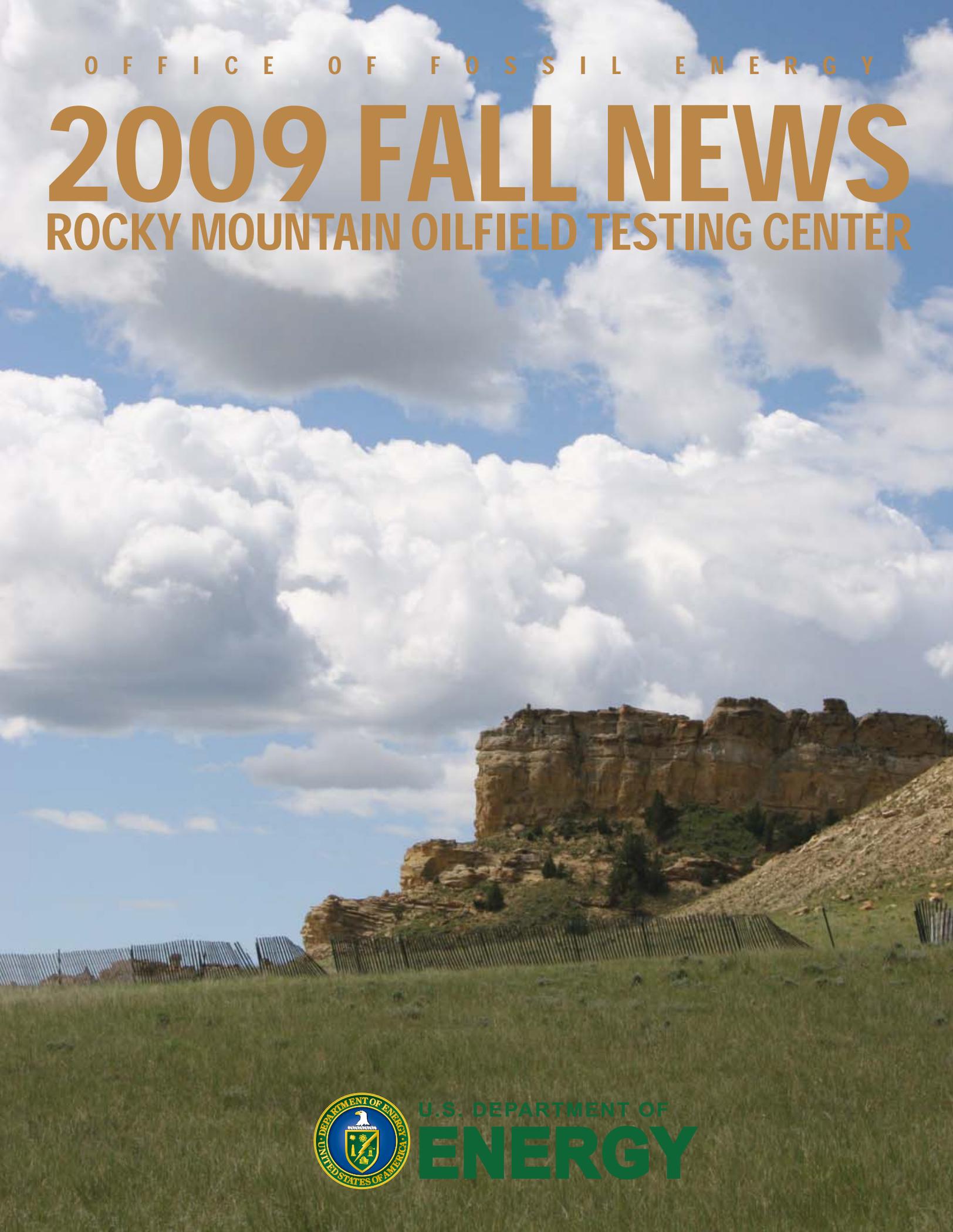


OFFICE OF FOSSIL ENERGY

2009 FALL NEWS

ROCKY MOUNTAIN OILFIELD TESTING CENTER



U.S. DEPARTMENT OF
ENERGY

SEISMIC WHILE DRILLING

PARTNER RECEIVES FEDERAL LABORATORY CONSORTIUM AWARD FOR SWD TECHNOLOGY

A Rocky Mountain Oilfield Testing Center (RMOTC) partner, Technology International, Inc., was honored for “excellence in technology transfer” by the mid-continent region of the Federal Laboratory Consortium (FLC). Technology International developed a borehole imaging system using drill bit “seismic while drilling” (SWD) technology. Drill bit seismic methods allow for data to be acquired without expensive interruptions to drilling operations and provide geophysicists and drillers with valuable information to optimize drilling efficiency. The award-winning

pending SeismicPULSER™ in June 2008 at Teapot Dome Oil Field, RMOTC’s field site about 35 miles north of Casper. The system will allow operators to be able to visualize the subsurface while drilling. This in turn allows drillers to steer the bit toward more optimal drilling targets and can be used for predicting abnormal pressure zones ahead of the bit while drilling. Technology International has been granted patent rights to this technology and will license it to several major oilfield service companies. Advanced prototypes will be manufactured with the financial support of

major oil companies for their application both onshore and offshore. This technology is particularly useful for drilling in deep water, high-pressure, and high-temperature environments to depths of over 30,000 feet.

An article on the technology was published in *World Oil* in July 2009 and discusses the successful development of the technology. A technical paper was also presented in Houston at the 2009 Annual Offshore Technology Conference.

Technology International was

formally honored at the FLC Mid-Continent and Far West annual meeting Sept. 2 in San Francisco, Calif. The award will also be submitted for a national award along with the winners in the five other regions of the FLC.

“We are honored to have been selected for this award,” said Robert Radtke, president of Technology International. “It’s a wonderful opportunity to extend the application of this technology to other government agencies and the industry.”

Technology International field tested its SWD technology at Teapot Dome in June 2008.

technology transmits seismic signals generated at the bit to the surface, allowing real-time subsurface monitoring from depths beyond 30,000 feet.

“RMOTC’s test facilities are helping companies like Technology International bring valuable new ideas to the industry,” said Clarke Turner, RMOTC director. “We are excited to see their hard work honored and showcased with this well-deserved award.”

Technology International began field testing its patent-



GEOHERMAL TESTING

RMOTC EXPLORES ADVANCING ENERGY DEVELOPMENT USING OILFIELD INFRASTRUCTURE

RMOTC is uniquely positioned to respond to the increased national and international interest in both low-temperature and Enhanced Geothermal Systems (EGS) power generation with its testing, validation, and demonstration capabilities. Wells tapping the Madison and Tensleep formations produce water at temperatures between 195° to 210° F in volumes ranging from 6,000 barrels per

RMOTC provides:

- A 10,000-acre facility to field test, demonstrate, and document technology
- Neutrality — no vested interest in any specific technology
- The opportunity to leverage your dollars via cost sharing
- Acceptance of the shared risks of your test
- A well-characterized reservoir and extensive geologic database

day to 60,000 bpd. With over 1,000 existing wellbores at the 10,000-acre Teapot Dome Oil Field, RMOTC offers companies the opportunity to test their geothermal technologies while using existing oilfield infrastructure.

The geologic structure at RMOTC

offers promising potential for EGS testing. The granite basement rock at Teapot Dome is within 7,000 to 8,500 feet. The temperature in the granite at 9,000 feet is an estimated 300° F. This is sufficient for geothermal testing but needs validation. The temperature estimate assumes the abnormal geothermal gradient observed in the Tensleep and Madison formations continues to greater depths. RMOTC has the infrastructure and experience to conduct testing on developing projects and can accommodate multiple EGS systems.

In addition to EGS testing potential, RMOTC has reliable resources for supporting low-temperature geothermal testing. RMOTC's most recent geothermal project with Ormat uses 190° F water co-produced with oil, primarily from the Tensleep Formation, at depths of about 5,200 feet.



Produced water from the Tensleep and Madison formations at Teapot Dome exceeds 190° F.

Previously, like all oil fields in Wyoming, when the produced water was disposed of, all heat energy value was lost. For more information on the Ormat project, refer to the RMOTC 2009 Winter newsletter at www.rmotc.doe.gov/newsevents/newsletters.

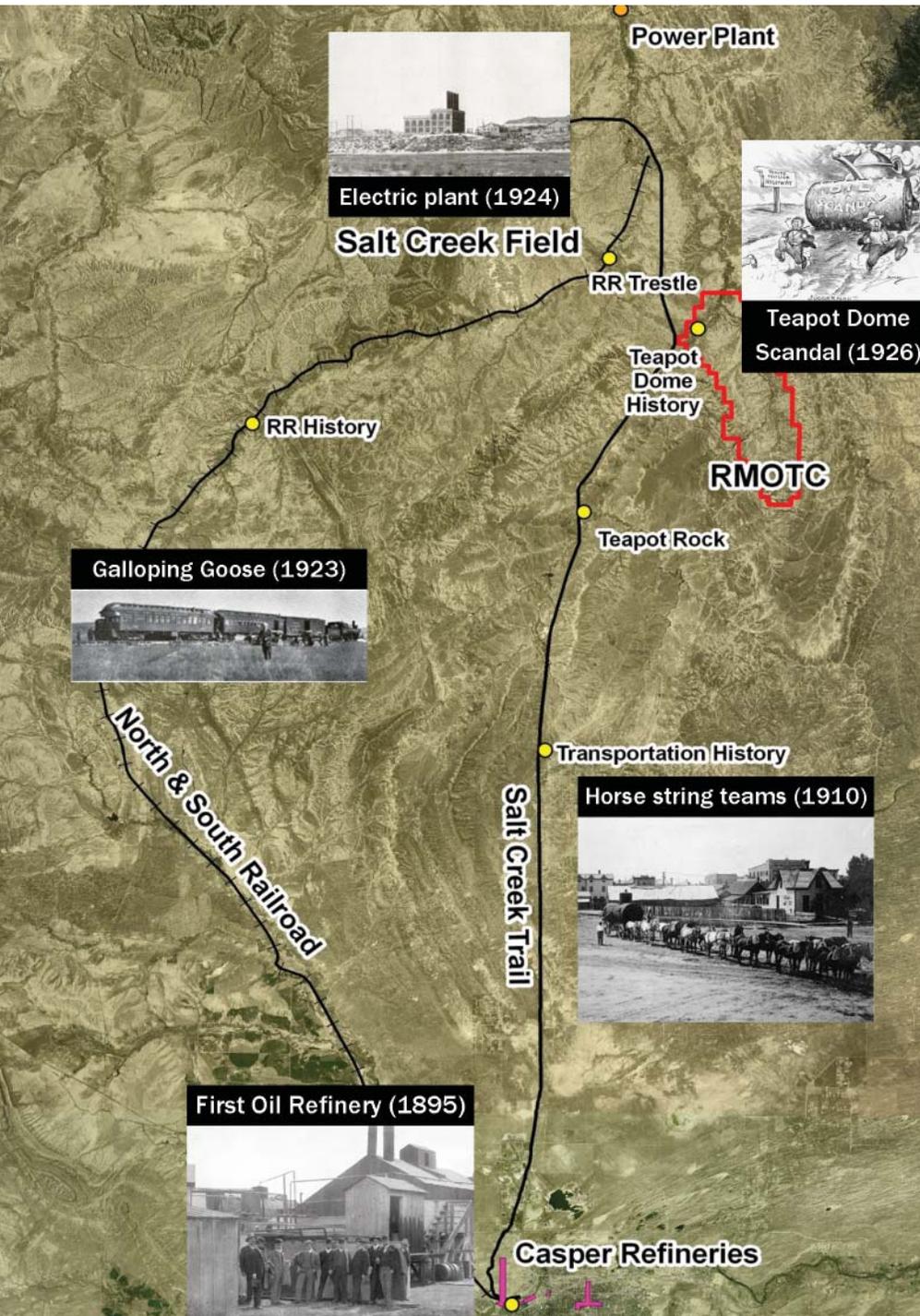
RMOTC has several funding options available:

- Cooperative Research and Development Agreement — Provides for the private sector and academia to partner with the federal government on mutually beneficial projects. Under the CRADA, RMOTC can contribute in-kind services and supplies to the project.
- Funds-In — Allows the testing partner full confidentiality and control over intellectual property developed at RMOTC, where the testing partner funds 100 percent of the costs.
- Memorandum of Understanding — Can be used by RMOTC to partner with other U.S. government entities.

For more information on these or any other testing possibilities, go to www.rmotc.doe.gov or call (888) 599-2200.

PARTNERING WITH STUDENTS

RMOTC COLLABORATES WITH COMMUNITY TO TEACH YOUTH ABOUT GIS



The electronic historic interactive map and 3-D field tour video feature historic highlights of the Teapot Dome and Salt Creek oil fields in their heyday.

Tyler Leinonen, a 13-year-old 4-H member from Casper recently gave a presentation on what he has learned about GIS technology at ESRI's Petroleum User Group (PUG) Conference in Houston. The seventh-grader thoroughly impressed the crowd of about 200 people with what he has accomplished in the last several months. Leinonen spent the 2008 fall semester working with his 4-H leader and four Casper College Advanced GIS students, among others, on a project to create an electronic interactive historic map of the 1920s campsites for the Teapot Dome and Salt Creek oil fields. The map not only locates the historic sites, but also provides viewers with hyperlinks to historic information, documentation, original photos, as well as a virtual 3-D field tour video.

Creating a 4-H GIS program

In early 2008, RMOTC's GIS specialist Jeanette Buelts received an e-mail about ESRI's 4-H Community Atlas Program. As a long-time 4-H sewing leader in Casper, Buelts had an immediate interest and wanted to get a 4-H Community Atlas project started in Casper. In order to get the program off the ground, Buelts enlisted some help from around the community and it wasn't long before RMOTC, Anadarko's Salt Creek Oil Field staff, and Casper College were on board to teach the community's youth about GPS/GIS technology. Buelts also enlisted ESRI's 3-D Technical Services Group to help out

with the project by providing the class with training in 3-D modeling via live net meetings. They also helped smooth out some software compatibility issues that were encountered during the video stage.

When Buelts first presented her 4-H collaboration idea to management, RMOTC was in the process of discussing the possibility of building a visitor's center at its Teapot Dome Oil Field testing site located about 35 miles north of Casper. The intention was to preserve the 100-year history of both the Teapot Dome and neighboring Salt Creek oil fields through this mapping visualization project. ArcGIS offers the perfect solution for storing, analyzing, and displaying the historic spatial data, documentation, and pictures, and it also provides an environment for capturing 3-D modeling and creating virtual field tours.

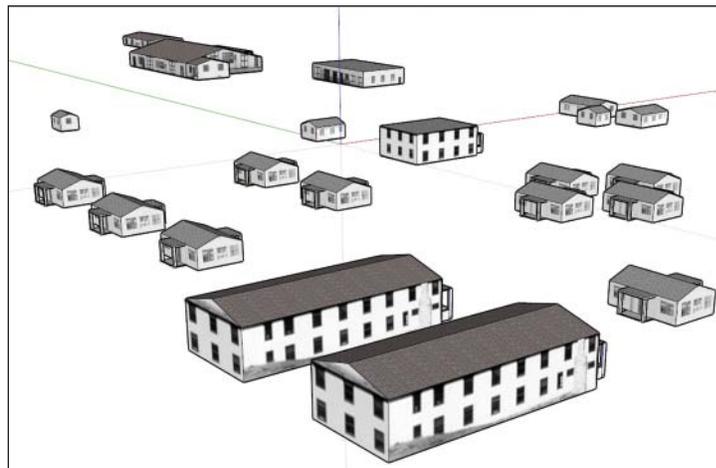
Field work

Buelts worked with two Anadarko Salt Creek Field employees to select nine historic field sites for the group to concentrate on. With all of the partners on board, a curriculum was designed to achieve the project objectives. Using Trimble GeoXT handheld GPS units, the 4-H members played a vital role in collecting GPS field data on the remnants of the nine historic sites. With the help of the Casper College students, they downloaded the data into ESRI-ArcMap

software where site location maps were made. Then they used aerial photography to validate the spatial location of the building sites. Using old photos of the sites, they were able to determine where some of the buildings were missing from their data.

Once everything was located in ArcMap, the spatial footprints of each building were then exported to Google SketchUp software where Leinonen built 3-D replicas of the campsites. He used Snagit Screen Capture software to clip images from the digital version of original 1920s photographs which he then snapped to the 3-D structures. During this portion of the project, ESRI's 3-D Technical Services Group web conferenced into a few classes to provide training and support in the art of 3-D modeling.

At the end of the 2008 fall semester, the college students and Leinonen gave a public presentation to all of the historic project partners highlighting the progress they had made. However, the virtual field tour video was not yet created at that point. Eager to complete the video por-



The spatial footprints of historic buildings at Teapot Dome were exported to Google SketchUp software where 3-D replicas were built.

tion of the project, Leinonen continued to work with Buelts, Casper College, and ESRI's Technical Services Group. The 3-D buildings were imported onto a satellite image in ESRI-ArcGlobe software where Leinonen was able to create the virtual field tour video.

The three-minute virtual field tour starts in Casper at the Pennsylvania Oil and Gas Refinery built in 1895 and flies along the Salt Creek Trail over to the Mammoth Camp 1 where RMOTC's field office is currently located. After visiting several historic sites from the early 1900s in the Teapot Dome and Salt Creek oil fields, including the New York Gas Plant, Sinclair Pump Station, Salt Creek Power Plant, Ohio campsite, and the town site of Salt Creek, the tour follows the North and South Railroad back to the refinery in Casper. To view the video, go to www.rmotc.doe.gov/gis.

SUMMER INTERNS

TWO COLLEGE STUDENTS SPEND THEIR BREAK WITH RMOTC

At a time when many college students were taking a break from their studies, RMOTC's Mickey Leland Energy Fellowship interns wrapped up their summer internship program at Teapot Dome.

Jennifer Anderson from Buffalo, Wyo., and Jane Ng from San Francisco, Calif., conducted field studies at Teapot Dome as part of the DOE Office of Fossil Energy program that supports women and under-represented minorities majoring in math, science, and engineering.

Jenn will graduate from Casper College in May 2010 with an associate of science degree in geology and chemistry and certificate in GIS. Jennifer has been the president of the Casper College Geology Club, a member of the Baptist Collegiate Ministries, and served as a resident hall assistant. Jennifer is also an accomplished artist and graphic designer in her spare time. After graduation, she plans on transferring to the University of Wyoming to complete a bachelor's degree in geology.

Her project titled "Identification of Bentonite-Rich Areas and Shallow Sub-Surface Faults through Surface Geology Mapping at DOE's Naval Petroleum Reserve No. 3" was conducted under the guidance of RMOTC chief scientist

Tom Anderson.

Jane is a junior majoring in earth and planetary sciences/engineering at Harvard in Cambridge, Mass. She hopes to lead the nation's transition to more sustainable forms of energy production through researching more cost effective and



efficient technologies and work to market and generate consumer demand for such technologies. She speaks English, German, and Mandarin and plans to study abroad in Germany next year. When she is not chasing down her future career, she enjoys event planning, tennis, and soaking in the serenity of

California's beaches.

Her project "Characterization of Lakota, Dakota, and Muddy Sandstones: Teapot Dome, Wyoming" was an integrated analysis of subsurface data from wellbores and 3-D seismic data with direction from RMOTC geologist Brian Black. She also worked with project manager Mike Curtis and public relations manager Jim Nations on a sustainability proposal for RMOTC's Science Center greenhouse.



Above: RMOTC intern Jane Ng visits the drilling rig at Teapot Dome.

Left: RMOTC's chief scientist Tom Anderson mentored Jennifer Anderson during her internship at RMOTC.



A crew from Wyoming PBS-TV filmed students from Casper learning about wind energy development in May 2009.

LIGHTS, CAMERA, WIND!

WYOMING PBS SHOOTS PILOT AT TEAPOT DOME

RMOTC hosted a film crew from Wyoming PBS-TV along with students from Oregon Trail Elementary School in Casper in May to shoot an pilot for the “A Wyoming Field Trip” program at Teapot Dome Oil Field. The new web-based production is geared to encourage students in the areas of science, technology, engineering, and math.

Wind energy was the focus and involved Teapot Dome through an interesting series of links within the Casper education community. PBS contacted the coordinators of the Wyoming FIRST (For Inspiration and Recognition of Science and Technology) LEGO League competition for assistance in finding wind turbine locations and a school able to participate in the production. RMOTC’s public relations manager Jim Nations has been involved with the competition for the past two years and encouraged the production staff to incorporate the Casper College turbine at Teapot Dome in the program.

The initial filming had the Oregon Trail students visiting

three small wind turbines at the VFW in Casper before traveling to Teapot Dome to visit with college faculty. Students learned and incorporated vocabulary along with turbine engineering and science concepts for their time on camera. The RMOTC field crew lowered the turbine for maintenance conducted by students in the college’s wind technician class, so the Oregon Trail students had a chance to view the internal mechanism firsthand. Initial concerns about “not enough wind” to operate the turbine quickly faded as the late-morning wind kicked up above the safe limit to raise it back to the vertical position. The kids and crew left for lunch and their next stop at the Rocky Mountain Power commercial wind farm north of Glenrock to shoot the final segment.

The PBS crew returned a week later to film the raising and operation of the turbine with RMOTC personnel. The web-based video experience featuring students learning about wind turbines at various locations in central Wyoming is available online at wyomingpbs.org/windfarm.



Rocky Mountain Oilfield Testing

C E N T E R

Rocky

Mountain

Oilfield

Testing

Center

907 North Poplar

Suite 150

Casper, WY 82601

888.599.2200

www.rmotc.doe.gov

PRESORTED
STANDARD
U.S. POSTAGE
PAID
CASPER, WY
PERMIT NO. 165

RMOTC BRIEFS

RMOTC-sponsored Science Bowl date set for February

RMOTC and the U.S. Department of Energy will once again sponsor the Wyoming Regional Science Bowl in 2010. The 12th annual event will be held Feb. 6 in Casper.

High school students from across the state will participate in the quiz event. Students answer questions related to biology, physics, and other math and science related topics.

If you're interested in supporting the Science Bowl through volunteering or a monetary donation to get the event off the ground, call (888) 599-2200 or e-mail sbcoordinator@rmotc.doe.gov.

On the trade show circuit

Along with much of the rest of the industry, RMOTC's trade show attendance will slow down after the fall season. But 2010 will be a busy year and will gear up starting in February. Visit with RMOTC personnel at these shows:

- SPE/IADC Drilling Conference
New Orleans, Feb. 2-4, 2010
- AAPG Annual Convention
New Orleans, April 11-14, 2010
- Offshore Technology Conference
Houston, May 3-6, 2010

Check out www.rmotc.doe.gov for more details on RMOTC's conference plans.

