

Search for the Director Energetic Materials Research and Testing Center

Spring/Summer 2022

New Mexico Tech is an EEO-AA Institution



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Message from the President

April 28, 2022



Dear Prospective Candidate,

I am pleased to announce the search for our next Director of the Energetic Materials Research and Testing Center (EMRTC) at New Mexico Tech. This is an exciting time to join our team as we work to jointly advance the research and educational missions. EMRTC is one of our most respected centers with national recognition for its explosives research and testing work spanning over 75 years. The next Director will play an integral part in shaping the center's future growth by capitalizing upon its past success. I believe this is an excellent opportunity for an entrepreneurial-minded leader with an enthusiastic commitment to research, training, and service. As you consider this position, I strongly encourage you to think about the following questions as you prepare your application materials:

- 1. How will I develop a cohesive operational structure that accounts for the complexity of EMRTC? (Leadership Philosophy)
- 2. How will I expand and diversify the EMRTC business model to ensure long-term sustainability? (Business Development Approach)
- 3. How will I recruit, develop, and retain a dynamic team of faculty, staff, and students? (Workforce Management)
- 4. How will my leadership promote a culture of respect where diversity, equity, and inclusion are embraced at all levels of the EMRTC team? (Values Approach)
- 5. How will I personally communicate EMRTC's value, impact, and importance to the community, state, and nation? (Communication)

Should you have any inquiries related to this opportunity, please do not hesitate to contact by email the hiring official Carlos Romero, Associate Vice President for Research, at <u>carlos.romero@nmt.edu</u> and/or the search committee chair, Matt Gallegos, Executive Director, Tech Transfer Collaborative Office, at <u>matthew.gallegos@nmt.edu</u>.

Sincerely,

Stephen G. Wells, Ph.D. President

New Mexico Tech is an EEO-AA Institution

Search Committee

Hiring Official

• Carlos Rey Romero, Associate Vice President for Research

Search Committee Chair

• Matthew Gallegos, Executive Director, Tech Transfer Collaborative Office

Search Committee Members

- Michael Hargather, Associate Professor of Mechanical Engineering / Research Scientist, Energetic Materials Research and Testing Center
- Robert Balch, Director, Petroleum Recovery Research Center
- Michael Smith, Director, Institute for Complex Additive Systems Analysis
- Tim Collister, Safety Officer, Energetic Materials Research and Testing Center
- Susan Bilek, Professor of Geophysics, Earth and Environmental Sciences
- Leslie Griego, Program Manager, Training Division, Energetic Materials Research and Testing Center

Applicant Information

Position Inquiries: Matthew Gallegos / Email: <u>matthew.gallegos@nmt.edu</u> / Phone: 505-321-0806

Nominations:

We welcome nominations of qualified individuals from the community. Please use the following link to submit a nomination: <u>https://forms.gle/6qxE8KRxjejsoNqAA</u>. <u>Note: A nomination does not constitute an application and all nominees will be encouraged to follow the appropriate procedures to complete the process.</u>

Application Process:

- A complete application will consist of: (1) NMT Employment Application Form (see link below), (2) Cover Letter, (3) Resume or Curriculum Vitae, and (4) Contact information for at least (3) three professional references.
 - Application Link: <u>https://www.nmt.edu/hr/docs/hr/jobs/Employment%20Application0719.pdf</u>
- All applications should be sent by email to <u>nmtjobapps@npe.nmt.edu</u> OR by post to NMT/ HR 801 Leroy Place Brown Hall Box 047, Socorro, NM 87801.



Position Announcement

Posted: May 16 2022

TITLE: <u>DIRECTOR, ENERGETIC MATERIALS RESEARCH & TESTING CENTER</u> DEPT: <u>OFFICE OF RESEARCH / EMRTC</u>

REG. 🛛 TEMP 🗌 FULL TIME 🖾 PART TIME 🗌

STARTING RATE or SALARY RANGE Negotiable at Paygrade

Employees being promoted to a higher classified position receive the minimum for the position or a pay rate adjustment of 8% whichever is greater. All regular positions also entitle the employee to several benefits including health, dental, vision, life insurance, and retirement which is largely paid by New Mexico Tech for the employee and dependents.

INTERNAL POSTING THROUGH: Concurrent* consideration will be given first to temporary and regular tech employees who apply within the 7 day internal posting. Applications received after the 7 day posting margin will be considered with other outside applicants.

Job Summary

New Mexico Tech seeks a dynamic and entrepreneurial-minded leader to serve as the Director of the Energetic Materials Research and Testing Center (EMRTC). Reporting to the Associate Vice President for Research the selected hire will oversee all facets of center management and planning. Specifically, they will be responsible for demonstrating leadership and/or ability in the following areas:

- Strategic Direction The Director must have an in-depth understanding of applied research, testing, and evaluation for use in strategic planning for the Center. The Director develops and presents strategic plans for review/approval of leadership and implementation by Center staff. The Director works with the Associate VP for Research to define priorities and direction of the Center. The Director works with EMRTC employees and stakeholders to share the strategy to develop buy-in and support.
- Business Development The Director must have established relationships and credibility with experts and leaders. The Director will communicate with experts and leaders on a regular basis to explain EMRTC strategy, current projects, and accomplishments to emphasize the value of the Center. The goal is to demonstrate why these stakeholders should support the EMRTC with funding, collaboration, or other resources. The Director will also oversee the development proposals, grant and contract applications, and make funding presentations to companies, government agencies, prospective donors, and University leaders.
- Management, Supervision, and Mentoring The Director must have strong leadership and mentoring skills to
 inspire and manage employees, students, and collaborators. The Director will be the Principal or CoInvestigator on most EMRTC projects and will supervise a leadership team and both full- and part-time
 employees. The Director will lead and participate in the hiring, management, and supervision of
 employees.
- Research The Director must have a desire to solve difficult problems through supervising and ensuring cutting edge research. The Director must be able to collaborate with experts in industry, academia, and government agencies on a variety of topics.
- Communication The Director will need excellent written communication skills to write proposals, papers, and articles, as well as to review papers written by the EMRTC team. The Director will need to make presentations about the Center's research at technical conferences, professional meetings, and as a part of educational classes.

- Education The Director must value the education mission of NMT. The Director will also work to recruit and guide leading experts in a wide variety of subject areas to provide content and presentations for courses and other training initiatives.
- Diversity, Equity, and Inclusion The Director must demonstrate a commitment to promote a culture of respect where diversity, equity, and inclusion are embraced at all levels of the EMRTC team.

For more information on EMRTC, please use the following link to access the center's web page: http://www.emrtc.nmt.edu.

Job Duties and Responsibilities:

1. General

- a. Performs a full range of supervisory personnel management functions and supervising Senior Leadership, the activities of engineers, scientists, technicians, and support personnel including NMT faculty, staff, student, and contractor personnel.
- b. Makes program assignments to the EMRTC's existing workloads, mission area, funding status, organizational capabilities, and established priorities.
- c. Oversees the management and operation of the outdoor field research, testing, and training laboratory located in the mountainous area adjacent to the NMT campus in Socorro, NM.
- d. Engages in effective and transparent decision-making, consistent with NMT and EMRTC goals and values, and in consultation with key stakeholders.

2. Business Development

- a. Provides vision for developing and expanding EMRTC's enterprise across the spectrum from small scale programs to large scale, multi-disciplinary projects.
- b. Leads efforts to effectively organize and identify funding for the Center's research initiatives.
- c. Represents the Center in high-level conferences with other top-level government, academic, and commercial management, scientific, and engineering groups to discuss, plan, and solidify program requirements and follow-up courses of action.
- d. Seeks out, then acts on business opportunities for the Center and NMT; develops and establishes business-related partnerships; and crafts, coordinates, and finalizes formal agreements and contractual arrangements with customers/clients.
- e. Assumes full responsibility for planning, coordinating, and representing the Center in institutional and functional activities.
- f. Fosters visionary initiatives that develop and connect faculty expertise with EMRTC's research mission.

3. Personnel

- a. Periodically reviews progress and makes reassignments, if necessary, to keep the programs of EMRTC and its business units (i.e., the Center) on schedule in terms of research, development, test, and evaluation (RDT&E) and training commitments and priorities.
- b. Evaluates subordinate supervisors and reviews evaluations performed by subordinate supervisors on other employees.
- c. Interviews candidates for vacant supervisory positions and makes selection of such.
- d. Advises, counsels, and instructs subordinates on both work and administrative matters.
- e. Hears formal group grievances and employee complaints that cannot be resolved by Senior Leadership supervisors.
- f. Reviews serious disciplinary actions and problems involving key Center personnel.
- g. Maintains a continuous appraisal of the technical competence of the Center's workforce and directs such actions as may be necessary for improvement of this competence through properly designated training.
- h. Approves the Center's developmental and training programs.
- i. Periodically reviews job descriptions of subordinates for currency and accuracy and reviews positions to eliminate inappropriate jobs to achieve optimum position management.
- j. Ensures organizational adherence to Equal Employment Opportunity (EEO) principles and policies, and complies with NMT efforts on energy conservation, organizational safety, and security matters.

4. Operations

- a. Develops a sustainable financial model that includes a balanced budget, appropriate resources, and effective financial controls.
- b. Manages the operations of EMRTC and its business units.
- c. Performs long-range planning for, and maintains continuous review of, resources, including funding and work activities of the Center.
- d. Oversees and guides major expenditures for equipment, facilities, and additional personnel.
- e. Collaborates with heads of other NMT organizations and departments to negotiate, decide on, and coordinate work-related changes affecting their units and advises the Vice President for Research on problems involving the relationship of the work of the individual organizations to broader programs and its impact on such programs.
- f. Maintains technical contact with state agencies; federal agencies, and organizations such as, but not limited to, the Departments of Defense, Energy, State, Homeland Security, Commerce and Justice; the Environmental Protection Agency; the National Aeronautics and Space Administration; the National Laboratories; and agencies within the intelligence community.
- g. Through the Vice President for Research and in coordination with the Director of Governmental Affairs, develops, establishes, and maintains a working relationship with New Mexico's congressional elected officials and their respective staffs.
- h. Leads the development of business opportunities and actively pursues collaborative efforts with federal, state, tribal, local, academic, and commercial entities.
- i. Resolves major technical or scheduling problems with test and training support elements or outside organizations through discussion with their representatives.

5. Other duties as assigned by supervisor.

Required Qualifications

A Master's degree from an accredited institution in Science, Technology, Engineering, Math, or related field is required. Minimum of ten (10) years of progressively advancing technical, management and marketing experience. Must have demonstrated skills and ability to communicate at all levels and to solve interpersonal problems. Strong leadership qualities and abilities to organize and manage contract research and development partnership with government and private industry. Demonstrated experience in managing staff. Experience, knowledge and familiarity with top level administrators and decision makers from the federal government. Experience and knowledge of government functions, organization, appropriation processes, contracting methodologies and contracts in top level organizations. Current or past experience in obtaining funding and conducting research. Have a valid New Mexico Driver's License or the ability to obtain and maintain a valid New Mexico Driver's License within 30 days of employment. Have an active DOD TS/SCI security clearance or the ability to obtain and maintain a DOD TS/SCI security clearance.

Desired Qualifications

Earned doctorate or equivalent from an accredited institution in a relevant field of study is preferred. Familiarity and experience with government grants/contracts and procurement programs, particularly the Department of Defense, Department of Homeland Security, National/Federal labs, Department of Energy, and Department of Transportation. Previous military or civilian Department of Defense/federal government programmatic experience at the O5, GS-15, DR-3/4 level. Leadership experiences in relations at the State and National levels. Demonstrated excellence in leading or participating in a complex organization-focused on research, testing, or evaluation.

Apply to: nmtjobapps@npe.nmt.edu OR NMT/ HR 801 Leroy Place Brown Hall Box 047, Socorro, NM 87801

Institutional Leadership

Dr. Stephen G. Wells serves as the 17th President of New Mexico Institute of Mining and Technology (New Mexico Tech or NMT), a public academic and research university granting undergraduate and graduate degrees in science, engineering, technology and mathematics and reports to the NMT Board of Regents. As President and Chief Executive Officer, Dr. Wells oversees a university with 2150 students (undergraduates and graduates) and 888 faculty and staff, providing leadership in the execution of the university's strategic plan and maintaining the budget as allocated by the state legislature along with grants received from various entities. He assists the NMT faculty and staff in pursuing research projects that compliment degree offered programs.

President Wells leads the university in fundraising efforts, as well as cultivating relationships with the NMT alumni to gain support in the advancement and development of NMT activities. He provides continuous dialogue between students, faculty, and administration in the changing climate of higher education with respect to societal topics. As President, he maintains and/or enhances the quality of academic programs to ensure the



President Stephen G. Wells and wife Beth Wells

integrity of conferral of such degrees. President Wells maintains a continuous dialogue with the Board of Regents, providing an annual report on all aspects of the university, as well as providing a voice and presence in the community and state for recruiting potential students. He builds collaborations by integrating new faculty, researchers, students, and staff into a community of scholars to enhance the overall success by bridging two communities.

Dr. Wells has a B.S. (Geology) from Indiana University as well as a M.S. and Ph.D. in Geology from the University of Cincinnati. In 2007, Dr. Wells has received distinguished alumni awards from the Department of Geology at Indiana University and from the College of Arts and Sciences at the University of Cincinnati. <u>Click here for Full Bio</u>



Institutional Profile



In 1889, Socorro was a mining boom town, wild, raucous, and, at a population of about 4,500, one of the largest towns in New Mexico. The Territorial Legislature, wanting to boost New Mexico's economy, decided to found a School of Mines to train young mining engineers, and Socorro was the ideal location. Silver and lead ores taken from the nearby Magdalena Mountains were processed at the smelter owned by German immigrant Gustav Billings, and the new School of Mines would allow young mining engineers to train near the eventual site of their work.

The New Mexico School of Mines (NMSM) proudly opened its doors on Sept. 5, 1893, with one building, two professors, and seven students. Courses offered included chemistry and metallurgy.

The college grew a bit, but remained small through the next couple of

decades, with a curriculum that focused on mining, metallurgy, chemistry, and related fields. For a while, around the turn of the century, the School of Mines also served as Socorro's "prep school" or high school, for anyone who wanted more than the eight grades of education which the local school system then offered.

In 1927, a new division was added to the NMSM, called the <u>New Mexico Bureau of Mines and Mineral Resources</u>. (The name has since changed to "New Mexico Bureau of Geology and Mineral Resources.") Functioning as the state geologic survey, the Bureau's job was to explore and map the resources of the state and make the information available to mining businesses and the general public. The Bureau n ow functions as a state geologic survey, with their main job expanded to include the investigation of geologic hazards, such as landslide and earthquake hazards, and the analysis of water resources.

During 1930s, NMSM enrollment increased as more people sought a college education during the Depression.

Graduating classes now numbered in the dozens, rather than the handfuls. Petroleum engineering was added to the curriculum and quickly acquired more students than mining engineering. The college's president, Edgar Wells, was instrumental in obtaining funds from federal programs such as the WPA to increase the number of buildings on campus. Several of the campus' classic mission-style buildings with red tiled roofs date from this period.

In another landmark, the School of Mines had its first woman graduate, Irene Ryan, in 1939. The college had never had a "men only" policy and never had a



formal date when it "went coed," but in the world of the 1890s, women didn't attend a college that called itself a "school of mines." By the 1930s, things had changed, and by the end of the decade, mining companies were anxious to hire female (non-draftable) mining engineers.

However, with the coming of World War II, enrollment at the School of Mines dropped precipitously, as potential students entered the military instead. Richard H. Reece, who was president of the school from 1942 to 1946, arranged with the military for an Army Specialized Training Program (ASTP) at the School of Mines. This was a program designed to give special college training to young men already in the military. Many colleges and universities across the nation had similar units. The ASTP supplied the great majority of students to the School of Mines during the years 1943 to 1945. Under this program, the school's traditional emphasis on engineering courses gave way to a greater focus on physics and mathematics.

After the war, the school's enrollment jumped, with the return of veterans; in 1947, enrollment was 213. In 1946, the school acquired a dynamic new president, E. J. Workman, and its character changed.

Workman was a physicist, primarily interested in atmospheric electricity. During the war, like many physicists, he had worked on weapons development. On assuming the presidency of the School of Mines, he brought with him a research group which worked on weapons testing and analysis (the Terminal Effects Research and Analysis group, or TERA) and also the determination to build a research center for the study of thunderstorms, his primary peacetime interest. Out of Workman's dreams and labor rose Langmuir Laboratory for Atmospheric Research, a mountaintop laboratory for the study of thunderstorms.

Workman brought a new emphasis on scientific research to NMSM. He added a Research and Development Division, recruited a more diverse faculty with a strong research bent, and, in 1951, altered the college's name to "New Mexico Institute of Mining and Technology." TERA attracted defense research. Workman built faculty housing and began construction of a golf course in the desert. College enrollment remained steady, at about about 200 students per year during the 1950s, and many of those students were interested in petroleum engineering, which was then a booming area.

Also during Workman's time, a hydrology program was founded, which grew to be one of the foremost in the world. Workman added a graduate program, which produced Tech's first Ph.D. in 1956.

Workman retired in 1964, and under subsequent presidents the college began to grow in size and subject matter.



Graduating classes went from about 50 people per year to over 200. A computer science department was founded circa 1965, one of the first in the country. The Tech Computer Center was started at about this time. Astrophysics joined atmospheric physics as a major interest, especially after the <u>National Radio Astronomy Observatory</u> built its Very Large Array 60 miles west of town. By the late 1970s, astrophysics was important business in Socorro. The proximity of the VLA helped attract astrophysicists to New Mexico Tech's faculty.

In 1977, Tech added another division, the <u>Petroleum Recovery Research</u> <u>Center</u>, whose mission is to study improved methods of recovering oil. The PRRC's home, Kelly Hall, and Jones Hall, home of the Chemistry and

Materials Engineering Departments, were built during the late 1970s.

Macey Center, a theater/conference center, opened in 1982, adding to the cultural life of the campus. The <u>Performing Arts Series</u> also began at about this time.

In the late 1970s and early 1980s, campus enrollment grew to about 1500, partly because high oil prices made a career as a petroleum engineer look attractive to many young people. But the field dried up in the mid-80s, and, to diversify the offerings, new programs were added under Dr. Laurence H. Lattman, who was president from 1983 to 1993. Electrical engineering and business administration departments were added, and growing numbers of students were attracted to environmental engineering, which also grew. Enrollment reached a high of 1700 in the 1993- 1994 academic year.

An active building program during the Lattman years added several buildings to campus, most importantly, MSEC (the Mineral Science and Engineering Complex) and the new Library. (The library was named after retiring U.S. Representative Joe Skeen in 2002.)

Dr. Daniel H. López became president of the university in 1994 and proved an effective leader for the further growth of the campus, in both academic and physical terms.

In terms of academic growth, some new majors and areas of study were added in the 1990s and early 2000s. Chemical, mechanical, and civil engineering have been added as majors. Two specializations have been added to the Master of Science in Engineering Mechanics: one in explosives engineering and one in engineering mechanics. The business department grew into a Management Program, offering master's program in engineering management, delivered off-campus via distance-education. Tech's offerings in the humanities have been expanded to include Hispanic studies, theater, poetry, and art history.



Increased offerings plus increased capabilities of Distance Education have boosted New Mexico Tech's enrollment to an all-time high of 1891 in the fall semester of 2005.

Research at Tech expanded enormously during the 1990s and early 2000s, with the acquisition of government contracts to support new divisions. With the ending of the Cold War, TERA changed its name to <u>Energetic Materials</u> <u>Research and Testing Center (EMRTC)</u>, which is using its expertise to expand into areas such as anti-terrorism testing and training, land mine detection, and safety testing of explosives.

Two geophysics research centers, <u>PASSCAL</u> and <u>EarthScope</u>, have been added. <u>Magdalena Ridge Observatory</u>, in the design and planning stages, will be a state-of-the-art astronomical instrument. The <u>Institute for Complex Additive</u> <u>Systems Analysis (ICASA)</u> studies behavior, vulnerabilities and predictability of complex systems. The <u>National Cave</u> and <u>Karst Research Institute</u> facilitates speleological research, enhances public education, and promotes environmentally sound cave and karst management.

New Mexico Tech has jokingly been called a research institution that happens to have a university. In reality, it's not far from the truth. However, the vast majority of research projects have a strong student component. Nearly all professors in every academic department maintain active research projects that involve undergraduate students. Also, more than 400 graduate students are conducting research – along with their academic advisors and committees – to finish their master's and doctorate degrees. NMT conducts applied research in explosive technology, explosive materials engineering, information security, and modeling and simulation for numerous U.S. Government agencies, including the Departments of Defense, Homeland Security, Justice, State, Transportation, and Energy.

New Mexico Tech recognizes the importance of research projects to prepare all students for their career. Therefore, all researchers, even those who are not tenure-tracked faculty members, are strongly encouraged to hire students and give them active roles in projects. In all the engineering departments, seniors finish their undergraduate careers with a "capstone" project. In Senior Design Clinic, students often work with off-campus sponsors who present a challenging project to Tech students. These sponsors often become active partners, mentoring and advising seniors. Senior Design truly gives students a taste of what they will experience once they enter the workforce

Under the presidency of Dr. Stephen G. Wells, an emphasis was placed on following a trajectory that goes beyond STEM, offering students insights, inspiration, and opportunities into the entrepreneurial world. This emphasis was encapsulated in a new institutional brand: STE²M – science, technology, engineering, entrepreneurialism and mathematics, or STEM raised to the exponent of entrepreneurialism. Established under this new brand were the <u>Office of Innovation Commercialization, Annual Inventors and Entrepreneurs Workshop</u>, and <u>Summer STE²M</u> <u>Experience</u>. Together these efforts seek to provide students, faculty, and staff with effective ways of realizing ideas to better humanity and monetize the intellectual property developed at New Mexico Tech.

EMRTC Overview

The Energetic Materials Research and Training Center (EMRTC) is a world-class Research, Development, Testing, and Experimentation (RDT&E) of all types of energetic materials from improvised explosive devices to Military munitions. It also offers a highly effecting training environment for first responders. The 40-square-mile (100 km2) field testing and training areas are located west of the town of Socorro, New Mexico, in Socorro County.

A History of Success

The New Mexico Institute of Mining and Technology's (NMT) Energetic Materials Research and Testing Center (EMRTC) has a well- earned reputation for high quality, responsive, cost effective, technically reliable work. EMRTC has its roots in the very important, successful activities of Dr. E. J. Workman and his team in the development of the Variable Timing (VT) fuze commonly known as the proximity fuze—during World War II.



In 1946, Dr. Workman relocated his team from what was then known as the New Mexico Experimental Range in Albuquerque to form the Research and Development Division at the New

Mexico School of Mines in Socorro, now the New Mexico Institute of Mining and Technology (New Mexico Tech). To evaluate the effectiveness and proper functioning of the proximity fuze, Dr. Workman's team also had to investigate related areas such as stress loads, blast damage effects, and fragmentation patterns. They were then able to fully examine the nature of various explosive effects. So began the science of energetic materials testing.

This fuze system had to be ruggedized to withstand the acceleration forces associated with launch and flight. Essentially the proximity fuze was a radar system that transmitted and received reflected electromagnetic energy from potential targets. It is typical of EMRTC to start with a specific problem, identify and explore difficult areas of the problem, identify solutions and investigate and share potential impacts to other technologies. This approach has led to numerous inventions and many patents.

During its 75-year history, EMRTC has evolved, in part, as the result of mergers with other related organizations at New Mexico Tech, and the incorporation of their missions, highly skilled science

and engineering staff, and their technological capabilities. As a major component within

the overall complex of research, development, test, and evaluation (RDT&E) activities at New Mexico Tech, EMRTC draws upon the assets and capabilities of the other RDT&E activities, as well as those of the various academic departments, to complement and enhance its technical base, providing valuable synergy of the technical community.

Building on that Success

EMRTC today is a world-class RDT&E complex of more than 30 test facilities located within

its 40 square mile field research complex. A close-knit team of more than 100 highly experienced, technically proficient, multi- talented professionals perform in-depth science and engineering investigations and studies in a number of technological areas in conjunction with:

- Departments of Defense, Homeland Security, State, Justice, and Transportation
- Los Alamos National Laboratory
- Sandia National Laboratory
- Lawrence Livermore National Laboratory
- Other academic institutions, such as Louisiana State University, Texas A&M University, Georgia Institute of Technology, New Mexico State University, and the University of New Mexico
- Various commercial entities such as Aerojet Rocketdyne, Orbital ATK, ARA, Honeywell, Lockheed- Martin, Raytheon, along with others.

APPLIED TECHNOLOGY DIVISION

The Applied Technology Division (ATD) performs research, design, engineering, analysis, fabrication, and experiment supervision. Our engineers and scientists have more than 150 years of experience performing energetic materials research and experiments in interior and exterior ballistics, projectile and sabot design, warhead design and fabrication, structural and non-structural building component construction and testing, anti- terrorism research, hydrocode modeling, explosives testing, sled track design and testing, rocket engine testing, data reduction and analysis, and professional report preparation. The ATD works closely with the other divisions at EMRTC providing customers with world-class research and experimentation programs.

FIELD LABORATORY FACILITIES

EMRTC's 40 square mile field testing laboratory is located in the mountains adjacent to the New Mexico Tech campus. All-weather roads provide access, with the most remote site located only 25 minutes from the main offices. The semiarid climate allows year-round use, with very few inclement weather days. The mountainous terrain provides security and natural backstops for containing/shielding the effects of EMRTC can store more than 500,000 pounds of explosives on site. Appropriate federal and state permits, as well as approved monitoring systems, are in place for conducting investigations involving high explosives munitions, flash x-ray systems, and both conventional and hypervelocity gun systems.

HIGH-PERFORMANCE MAGAZINE

The High-Performance Magazine Site, developed for scaled structure experiments that require a large recovery area, has been used for NATO testing of quarter scale aircraft shelters, and for evaluating the survivability/vulnerability of magazine structures. This site has been used for large detonation overpressure tests involving more than 20,000 pounds of explosives. diverse sources such as explosives, propellants, electromagnetic radiation, directed energy, etc.

COOK-OFF SITE

Cook-Off Site was recently constructed for dedicated use in Insensitive Munitions (IM) test programs. Fast and slow cook-off experiments on large and small items can be conducted. The 1,000-foot monorail track is used for dynamic testing of warheads, penetrators, and shape charges. It provides a dynamic method of precision impact control for target penetration studies, development of hard target penetrators, and proof of concept testing. Velocities up to 1,800 feet per second are achievable.

GUN RANGES

The EMRTC field laboratory contains several gun ranges providing firing ranges from point blank to more than 5,000 meters. Several of the ranges support large- and small-scale explosive experiments, fragment projector experiments, warhead characterization tests, large and small caliber gun firings, fuze evaluations, IM testing, target response to single and multiple impacts, vulnerability assessment experiments, fragment or debris distribution studies, tactical rocket firings, and vehicle and running engine experiments.

STANDARD AND HYPERVELOCITY GUN SYSTEMS

EMRTC's diverse inventory of gun systems—and its ability to modify these systems to meet ballistic experimental requirements—is a major asset. U.S. Army and Navy standard gun systems (5.56 NATO to 8-inch Howitzer) are available on site. EMRTC has designed and modified a large range of gun systems that are used to fire specialized/ prototype projectiles and fragments at more than 6,500 feet per second. EMRTC also owns a twostage light gas gun with a 1.5-inch diameter launch tube that can fire projectiles at velocities greater than 21,000 feet per second.

COUNTERMINE TEST FACILITY

The Countermine Test Facility, developed to test and evaluate technologies for detecting and disarming anti-tank mines, anti- personnel mines, and unexploded ordnance (UXO), has recently been expanded to include more test tracks and an unimproved field area.

RESEARCH & DEVELOPMENT

EMRTC's numerous field test sites and laboratory facilities offer a unique complex for conducting research and development (R&D) in areas such as process safety, chemical analysis, explosives processing, formulation and characterization, computer modeling and simulation, and counterterrorism.

ENERGETIC MATERIALS

EMRTC researchers can conduct analyses of anything from low-level explosives contamination to post- blast residue. The lab also houses an array of small-scale thermal analysis equipment as well as small scale safety testing equipment. Active research programs are ongoing in explosives detection, compatibility, forensics, thermal hazards, aging, and mechanistic decomposition. Additional capabilities include a 2-ton pilot plant processing bunker, remote building and extensive wet- lab facilities can be used to prepare a large assortment of energetic materials, including common pyrotechnics, isotopically labeled explosives, and a wide variety of improvised explosives. One highly unique feature of EMRTC is the Torres Laboratory complex. Its dedicated melt-cast and pour building, 2ton pilot plant processing structure, remote mix building and extensive wet-lab facilities can be used to fabricate a large assortment of energetic materials, ranging from common pyrotechnics and isotopically labeled explosives, to a wide variety of improvised explosives (replicating materials used in actual terrorist attacks). Test charges have ranged from milligrams to tons.

A strong contract base in the commercial sector has resulted in an expanding expertise in ammonium nitrate explosives, pyrotechnic mixtures, air-bag propellants, reactive chemicals, and other exotic formulations not traditionally studied by standard explosive research programs.

FORMULATION AND SYNTHESIS

A strong contract base in the commercial sector has developed extensive expertise formulating Fuel/Oxidizer energetics including: AN/Chlorates/Peroxides/Etc., ammonium nitrate explosives, pyrotechnic mixtures, air-bag propellants, reactive chemicals, and other exotic formulations not traditionally studied by standard explosive research programs.

COUNTER-TERRORISM

With the increase of terrorism worldwide, the need for blast resistant buildings are increasingly more important and is in high demand. EMRTC is working with our customers to develop technologies for protecting our nation from terrorist attacks.

STRUCTURAL AND NON- STRUCTURAL TESTING

EMRTC is currently performing multiple R&D efforts investigating the effects of blast overpressure on building materials and both structural and non-structural components. This includes items such as I-beams, columns, windows, doors, infill walls, and facades. Tests on infrastructure such as bridges, tunnels, and other components, are also conducted.

SMALL ARMS RANGES

EMRTC has multiple areas where small arms can be fired at extreme ranges both flat and high-angle. This capability can be supported with Doppler radar, Schlieren or Shadowgraph imaging diagnostics for bullet design and development.

SUPPORT SERVICES

EMRTC field investigations and R&D programs are supported by state-of-the-art data collection and processing systems, comprehensive machine shop and fabrication facilities, including a wide variety of heavy equipment that allows for rapid preparation and restoration of test sites, as well as construction of test structures.

INSTRUMENTATION

EMRTC has more than 20 channels of orthogonal flash x-ray available for use in testing, including 150 kilovolt, 450 kilovolt, and 1 megavolt systems. EMRTC also has a wide range of fixed and portable electronic digitizers that cover needs from very slow digitizer rates up to 1 nanosecond per point. Numerous computer-controlled data collection systems are available for enhancing ballistic analyses.

IMAGING

EMRTC owns and operates multiple Phantom and Photron digital High- speed video cameras, with up to 2 million frames per second frame rates available.

TRAINING PROGRAMS

EMRTC provides DHS/FEMA certified training courses for local, county, and State First Responders. These courses are listed on the EMRTC website and include both on and off-site training. Over 525,000 First Responders have been trained by EMRTC, both in Socorro and off-site. Graduates of these programs are uniquely qualified to assist their communities in preparation for and response to bombing incidents, which includes critical response operations. EMRTC also conducts an Explosive Firing Site and Laboratory Safety Course for other agencies and contractors.

UNMANNED AERIAL SYSTEMS (UAS)

The EMRTC facilities in Socorro and Playas are both within an

FAA approved Flight Test Center Airspace operated by New Mexico State University (NMSU). NMT and NMSU work closely together to fly UAS's for testing/training. Flights may occur in over 15,000 square miles of coordinated airspace featuring a very low volume of aviation traffic and overlies mostly undeveloped Government owned land. Helicopter Rescue

EXPANDING TECHNICAL HORIZONS

As it was, more than 50 years ago, with the development of the proximity fuze and all of the technologies and applications that resulted, EMRTC stands poised to extend its military, space, and commercial systems capabilities to better meet the diverse and complex challenges of its wide and varied customer base. EMRTC is an extremely capable and unique facility from the 40 square mile test range to the New Mexico Tech faculty and students that participate in the research and testing programs.

Other Information of Interest

- Office of Research: <u>https://www.nmt.edu/research/</u>
- Human Resources: <u>https://www.nmt.edu/hr/</u>
- Campus Rankings: <u>https://www.nmt.edu/rankings/index.php</u>
- Academic Programs: <u>https://www.nmt.edu/programs/index.php</u>
- Student Data: https://www.nmt.edu/academicaffairs/research/studentdata.php
- Employee Data: <u>https://www.nmt.edu/academicaffairs/research/employeedata.php</u>