



2017 ANNUAL REPORT

PERSPECTIVES

CONTENTS

\$57.9M

Technical Assistance Provided by Labs

2,797

Businesses Assisted

6,858

Jobs Created and Retained

33

New Mexico Counties Supported

Cumulative numbers since the inception of NMSBA in 2000.

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Dear Governor Martinez and New Mexico State Legislators,

We are pleased to present the 2017 Annual Report for the New Mexico Small Business Assistance (NMSBA) Program. This report highlights just a few of the hundreds of successful projects from 2017 and quantifies the overall performance of NMSBA, both for the past year and since its inception in 2000.

During 2017, a total of 346 small New Mexico businesses participated in NMSBA. Thanks to the *Laboratory Partnership with Small Business Tax Credit Act*, the State of New Mexico, along with Los Alamos National Laboratory and Sandia National Laboratories, invested \$4.6 million of national laboratory expertise and resources to help small businesses in 28 counties overcome technical challenges and grow.

The success stories in this report demonstrate the impact of NMSBA on small businesses from various industries around the state. Here are just a few points from some of the featured stories:

- Test results and improvements of a new crate and suspension system designed to protect valuable artwork enabled a Santa Fe County company to receive funding for alpha testing and get four major museums to take part in these tests.
- A San Juan County company has diversified its product lines, grown sales, and added jobs after learning how to make their company's workplace more organized, safe, and efficient.
- Receiving independent test results for a cool ambient technology resulted in a Doña Ana County company securing its first contract to apply their nontoxic coating on structures for an East Coast distribution company.
- Using data from technical research, a Quay County company was able to apply for loans to reconfigure an idle ethanol plant to convert animal manure to biomethane and create local jobs.

One project received the *Honorable Speaker Ben Luján Award for Small Business Excellence* for demonstrating the most economic impact. UBiQD, Central Park Square, and Stephen Auger Studios' collaboration on Safe Quantum Dot Materials for Solid-State Lighting has resulted in multiple research grants. The companies have also received \$1 million in investment funds and made new hires.

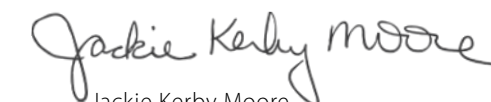
NMSBA has helped New Mexico's small businesses create jobs, increase revenues, decrease operating costs, and attract new funding opportunities. Since 2000, the two national laboratories have provided \$57.9 million in technical assistance to 2,797 businesses, enabling 6,858 jobs to be created and retained across the state's 33 counties.

Your continued support of NMSBA, which promotes collaboration between our national laboratories and small business community, leads to economic development throughout our great state. Thank you!

Sincerely,



Micheline Devaurs
Los Alamos National Laboratory



Jackie Kerby Moore
Sandia National Laboratories

In 2017, \$4.6 million of national laboratory expertise and resources was invested to help small New Mexico businesses.

We're glad to have NMSBA working alongside us to help nurture innovation in New Mexico's economy. It's crucial that we continue to cultivate New Mexico's innovation ecosystem to help grow and diversify our economy.

Matt Geisel
Cabinet Secretary
Economic Development Department
State of New Mexico

NMSBA is a valuable economic development program that benefits small businesses across New Mexico. Nurturing our homegrown talent and technologies is crucial to growing New Mexico's economy.

John Monforte
Acting Cabinet Secretary
New Mexico Taxation and Revenue Department
State of New Mexico

PROGRAM INFORMATION

OVERVIEW

In 2000, the New Mexico State Legislature created the *Laboratory Partnership with Small Business Tax Credit Act* for the purpose of "bringing the technology and expertise of the national laboratories to small businesses in New Mexico to promote economic development in the state, with an emphasis on rural areas." As a result, Sandia National Laboratories established the New Mexico Small Business Assistance (NMSBA) Program to provide technical support to small businesses throughout the state. Los Alamos National Laboratory began participating in NMSBA in 2007. Jointly, the labs are committed to solving small businesses' critical challenges with national laboratory expertise and resources; influencing New Mexico business development by building capacity, capabilities, and competencies; and acting as an advocate for small businesses through an entrepreneurial culture.

While each company utilizes NMSBA in a different way, all use it as a means to maintain or grow their businesses. NMSBA services are provided at no cost to the participating small businesses in the form of lab staff hours valued at up to \$20,000 per calendar year for businesses located in rural counties and \$10,000 for businesses located in urban counties (currently just Bernalillo County). The total amount of assistance is capped at \$2.4 million annually for each laboratory. NMSBA may not provide assistance that is available in the private sector, and no equipment or cash can be given to a participating company.

FUTURE DIRECTION

NMSBA continues to support the growth and diversification of the New Mexico economy by helping to further develop technologies into new and improved products and services ready to move into the marketplace. As NMSBA broadens the types of businesses receiving assistance each year, it increases the range of technical expertise offered by the national laboratories. At the same time, the expertise provided is aligned with the laboratories' missions. NMSBA also continues to partner with New Mexico universities and leverage other business support programs to make the most of valuable local resources. Businesses receiving assistance from NMSBA cover a wide variety of industries, and are located across the state, including in underserved rural counties.

During 2017, NMSBA helped 346 small businesses across the state reach business goals, develop their products for commercial use, and increase profitability.

NMSBA makes a statewide impact by:

- Enabling New Mexico small businesses to access cutting-edge technology
- Increasing New Mexico small businesses' technical sophistication and capabilities
- Sharing knowledge and resources between laboratory personnel and small businesses to address issues and develop real-world applications

TYPES OF SMALL BUSINESS ASSISTANCE

Individual Projects

Individual NMSBA projects involve a single New Mexico for-profit small business. Projects address business-specific challenges that can be solved with national laboratory expertise and resources. Technical assistance challenges are wide ranging; however, the majority include testing, design consultation, and access to special equipment or facilities. Requests for individual projects are accepted year-round until funding is exhausted.

Leveraged Projects

Leveraged NMSBA projects allow a group of small businesses that share technical challenges to collectively request assistance. Leveraged projects address issues that are too large or complex to solve through an individual project. Proposals for projects are reviewed semi-annually by the NMSBA Advisory Council.

Contract Projects

Legislation allows NMSBA to contract with entities that have the capability to provide small business assistance services not available in the private sector. For the benefit of New Mexico's small businesses, NMSBA has contracts for specific services with the New Mexico Manufacturing Extension Partnership and the state's three research universities.

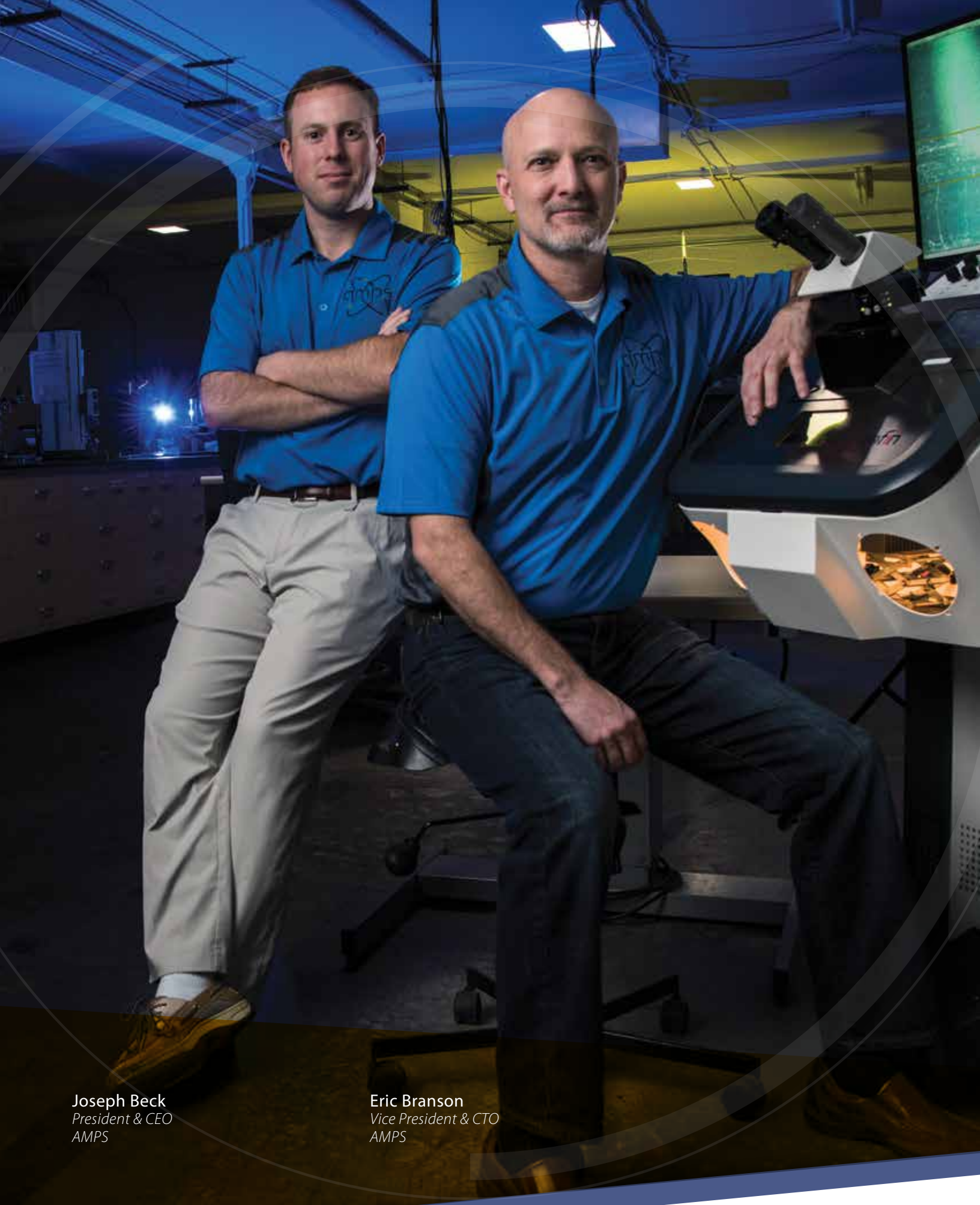
The New Mexico Manufacturing Extension Partnership provides training and assessments in the areas of quality and lean manufacturing principles.

The Arrowhead Center at New Mexico State University evaluates small business capabilities and technologies using subject matter experts throughout the university.

The New Mexico Tech Department of Management interfaces with a variety of disciplines taught at the university to help accurately assess the current competitive position of small business technologies.

The University of New Mexico Management of Technology program at the Anderson School of Management evaluates the commercial potential of small business technologies and identifies commercialization challenges and pathways.

The University of New Mexico School of Engineering addresses technical challenges faced by small businesses in computer science and chemical, biological, electrical, computer, civil, nuclear, and mechanical engineering.



Joseph Beck
President & CEO
AMPS

Eric Branson
Vice President & CTO
AMPS

BERNALILLO COUNTY

The people at NMSBA and UNM-MOT helped us technically, but more importantly they helped us understand new markets and establish successful relationships with potential new customers. It certainly gave us a new way to look at things.

Eric Branson
Vice President & CTO
AMPS, LLC

ADVANCED MANUFACTURED POWER SOLUTIONS

Located in Bernalillo County, Advanced Manufactured Power Solutions (AMPS) provides custom, high-quality and high-reliability battery packs for the defense and space industries. The company's primary customers consist of government organizations and defense contractors.

Wishing to expand the business from this niche market, AMPS Vice President Eric Branson reached out to NMSBA. Branson's goal was to identify new research areas related to energy storage and identify markets and end users for custom solutions. NMSBA connected Branson and his company to Steve Walsh of the University of New Mexico Management of Technology (UNM-MOT) program.

Walsh and his team of students implemented a technical assessment known as product paradigm development. They applied advanced learning curve techniques and advanced road-mapping processes to identify ways for AMPS to expand their product line and secure new customers.

AMPS used the results of this technical assistance to better position themselves with new business opportunities. AMPS has since formed a spin-off company dedicated to these new markets and has started negotiating a new market space from which to produce new products. AMPS is participating in a joint venture to progress the technology, developing a prototype, and meeting with potential customers. They plan to expand locally.



Meet the
PRINCIPAL
INVESTIGATORS

**Ben Clapp, Steve Walsh, Greg Flynn,
and Nikhil Patel (not shown)**
University of New Mexico



Tony Burger
 Founder & CEO
 PJ Woodlands

**BERNALILLO, CIBOLA,
 SAN MIGUEL, AND
 TORRANCE COUNTIES**

I attribute much of the current industrial excitement for our product to the technical results we received from our collaboration with Sandia. We can now scientifically support everything we claim.

Tony Burger
 Founder & CEO
 PJ Woodlands, LLC



**ALTREE
 LEVERAGED PROJECT**

Over a century of livestock grazing, fire suppression, logging, predator control, and exotic species introductions have altered most southwestern ponderosa pine forests. This has promoted unnaturally dense stands of small-diameter trees that threaten remaining large trees through competition and by fueling extensive crown fires. A new technology developed by Phil Archuletta in 2001 and 2002 resulted in a wood fiber/plastic composite called Generation I Altree™ for non-structural sign substrates and shaped and flat decking products.

In 2015 and 2016, Archuletta expanded this technology to incorporate a screen mesh into the surface of the waste wood/recycled plastic composite. This new patented product was named Generation II Altree. Preliminary testing indicated that the new Altree could handle more demanding uses, including in building components, and applications where high impact strength or adhesion of another substrate were required, but additional test data was needed.

To address this problem, PJ Woodlands and partnering companies GL Environmental, Inc.; Highway Supply, LLC; Mt Taylor Machine, LLC; P & M Lumber, Inc.; and P & M Signs, Inc. reached out to NMSBA, which connected them with Tom Bosiljevac at Sandia National Laboratories. Bosiljevac and his team performed a battery of mechanical and U.S. standards for roadway signs and building products.

PJ Woodlands now has demonstrable test data to address questions from new customers regarding Altree's use in a greatly expanded number of eco-friendly product applications. They are now in the process of selecting their strategic partner to build an Altree production facility employing 41 full-time employees within the next three years.



Tom Bosiljevac
 Sandia National Laboratories

GEORGIA O'KEEFFE MUSEUM INNOVATIONS

SANTA FE COUNTY

The services the Los Alamos engineer provided were essential to the success of our proof-of-concept—these are services not easily found anywhere. Thank you NMSBA for getting us started on protecting priceless artwork for the world to enjoy.

Alex Padilla
 Consulting CEO
 Georgia O'Keeffe
 Museum Innovations, Inc.

Recognized as the "Mother of American Modernism," Georgia O'Keeffe spent much of her later life in New Mexico, which inspired paintings of vast landscapes and animal skulls. Sadly, with age, the priceless paintings by O'Keeffe and other famous painters have become prone to paint fracturing. During transportation to museums around the world, crates cause fractures due to vibration and shifting.

Located in Santa Fe, Georgia O'Keeffe Museum Innovations (GOKMI) is a for-profit subsidiary of the museum. The company developed a new crate design and suspension system to limit damage caused by vibration, but they lacked the expertise and equipment to test it.

GOKMI reached out to NMSBA, which connected the business with Neil Loychik at Los Alamos National Laboratory. Neil and his team optimized GOKMI's existing design for shock and vibration loads based on the result of various tests, including a 24-channel laser Doppler vibrometer test, a data-quality assessment, and tests for size and position of the wire-rope isolators.

The optimum design for the new system has been tested and it cuts harmful vibrations by 50%, increasing the travel life of priceless artwork. The successful tests led to \$250,000 in funding to produce an alpha crate for more testing. Four of America's top ten art museums have agreed to participate in the next set of tests. As for the economic impact, the market needs approximately 100,000 such transportation crates. At \$10,000 per crate, GOKMI anticipates a total manufacturing stream of \$1 billion.



Neil Loychik
 Los Alamos National Laboratory



Alex Padilla
 Consulting CEO
 Georgia O'Keeffe Museum Innovations

Dale Kronkright
 Head of Conservation and Preservation
 Georgia O'Keeffe Museum



Errol Baade
Partner & CEO
Jack's Plastic Welding

SAN JUAN COUNTY

This NMSBA project with New Mexico MEP brings ownership of business to the workers. Having them work with my crew to implement ideas that they already have is bringing more brainpower into the system.

Jack Kloepfer
Designer & Vice President
Jack's Plastic Welding, Inc.



JACK'S PLASTIC WELDING

Founded in 1982 and located in Aztec, Jack's Plastic Welding produces inflatable boats, dry bags, and waterproof self-inflating mattresses. Over the years, the company has expanded, concentrating on developing prototypes for products customized for a variety of markets, from amusement rides and scuba diving to emergency spill containers and medical gear.

With custom orders becoming more frequent and time consuming, CEO Errol Baade and Designer and Vice President Jack Kloepfer wanted to create a more organized, efficient, and safe workplace. To accomplish this goal, they reached out to NMSBA, which in turn connected them with the New Mexico Manufacturing Extension Partnership (New Mexico MEP).

Denise Williams Monaghan and her team worked with the business' employees utilizing a system known as 5S. This system consists of five concepts that start with the letter s: sort, set-in-order, shine, standardize, and sustain. The objectives of 5S are to improve work quality, efficiency, and safety of industrial processes by reducing waste and bolstering value-added activities.

As a result of New Mexico MEP's assistance, Jack's Plastic Welding has diversified its product lines and now offers more alternatives with respect to custom orders. Since this technical assistance, sales for Jack's Plastic Welding have grown by 10%. This consists of \$70,000 in new sales and more than \$680,000 in retained sales. Value stream mapping and other business facilitation has enabled the company to retain and create 11 jobs, including 4 new hires, as well as realize cost savings of over \$183,000.

Meet the
**PRINCIPAL
INVESTIGATOR**

Denise Williams Monaghan
New Mexico Manufacturing Extension Partnership



Mauricio Murguia
Owner
Kool Armor

DOÑA ANA COUNTY

Our collaboration with the Arrowhead Center through NMSBA provided the results needed to demonstrate that our product does what we claim and allowed us to enter the U.S. marketplace.

Mauricio Murguia
Owner
Kool Armor, LLC



Meet the
PRINCIPAL
INVESTIGATORS

Griselda Martínez and Kristin Morehead
New Mexico State University

KOOL ARMOR

On any sunny day, the temperature of roofs can increase up to 50 degrees above ambient temperature. This means that more heat on the surface allows more heat to transfer into the building. These higher temperatures in buildings result in increased energy usage and deterioration of roofs over time.

To address this issue in the United States, Mauricio Murguia formed Kool Armor, a company dedicated to using a cool ambient technology known as KoolKat. Already extensively used in Mexico, this water-based, nontoxic coating is designed to dramatically reduce the temperatures of surfaces exposed to the sun. However, until now no testing had occurred in the U.S. to validate the empirical results already observed.

To get the needed data, Murguia reached out to NMSBA, which connected him to the Arrowhead Center at New Mexico State University. The team led by Griselda Martínez and Kristin Morehead tested KoolKat against other types of coatings, and analyzed KoolKat under a variety of temperatures on various types of structures over an extended period of time.

With these independent test results, Kool Armor was able to secure its first contract, with a major distributor on the East Coast. Worth \$70,000, this contract consists of Kool Armor applying KoolKat to more than 140 storage trailers over the next six months. Kool Armor is expanding its application and testing of KoolKat on larger suites of materials and is aggressively pursuing more contracts for their product.



Stephen Auger
Director
Auger Studio

Karthik Ramasamy
Director of Chemistry
UbiQD

Nikolay Makarov
Director of Spectroscopy
UbiQD

Phillip Kunsberg
Owner
Central Park Square

Hunter McDaniel
CEO
UbiQD

Matt Bergren
Chief of Product
UbiQD

LOS ALAMOS AND SANTA FE COUNTIES

The technical assistance we received from Los Alamos through NMSBA gave us the firepower to go to investors, partners, and grant agencies so that we can better compete in this growing worldwide market.

Hunter McDaniel
CEO
UbiQD, LLC



SAFE QUANTUM DOT MATERIALS FOR SOLID-STATE LIGHTING LEVERAGED PROJECT

LED systems are becoming the lighting of the future. However, LEDs cannot achieve the purity of color created by traditional bulbs, so can feel too bright. Quantum dots are effective at converting one spectrum of light into another, making them an attractive potential material for LED lighting. Yet most quantum dots are toxic and they haven't been proven to have the color purity needed.

UbiQD in Los Alamos has quantum dot technology that is nontoxic, but they needed to validate its color purity. To address this issue, UbiQD, and collaborators Central Park Square, LLC and Stephen Auger Studio, LLC, reached out to NMSBA, which connected them with Victor Klimov at Los Alamos National Laboratory. Klimov and his team have extensive expertise in quantum dots. They took UbiQD's quantum-dot design and quantified its fundamental color purity limits, also known as linewidth or luminescence.

Klimov and his team demonstrated that these single quantum dots have a color purity of approximately 20 nanometers, exceeding the minimum 50-nanometer color purity necessary for LEDs. With this quantitative proof in hand, the collaborators now know that there are no fundamental limitations when it comes to using their quantum dots for LED lighting.

The companies have received Small Business Innovation Research grants including \$150,000 from the Department of Energy and \$225,000 from the National Science Foundation. They also were awarded a \$350,000 grant from Breakout Labs and have received more than \$2 million in investment funds to compete in a growing \$30 billion industry. They plan to continue to expand and manufacture in New Mexico.



Addis Fuhr and Victor Klimov
Los Alamos National Laboratory

VALUE OF PROGRAM ASSISTANCE IN 2017

In 2017 the State of New Mexico, along with Los Alamos National Laboratory and Sandia National Laboratories, invested **\$4.6M** helping **346** small businesses in **28** counties to solve technical challenges. The following table contains the number of small businesses that received assistance from NMSBA, dollar value of the assistance for calendar year 2017, and cumulative value from 2000 to 2017.

	Los Alamos*	Sandia	Total
Number of Small Businesses Served			
2017	161	188	346**
Rural	117	101	216**
Urban	44	87	130**
2000 - 2017	886	2,192	2,797**
Rural	639	1,328	1,779**
Urban	247	864	1,018**
Value of Assistance Provided			
2017	\$2,201,499	\$2,399,989	\$4,601,488
Rural	\$1,850,407	\$1,693,353	\$3,543,760
Urban	\$351,092	\$706,636	\$1,057,728
2000 - 2017	\$21,473,694	\$36,437,783	\$57,911,477
Rural	\$18,826,544	\$27,046,536	\$45,873,080
Urban	\$2,647,150	\$9,391,247	\$12,038,397

*Los Alamos began participating in NMSBA in 2007. **Some companies are served by both laboratories.

ACCOUNTABILITY & ECONOMIC IMPACT

NMSBA, enabled by the *Laboratory Partnership with Small Business Tax Credit Act*, is accountable to the State of New Mexico for its expenditures. NMSBA measures its economic impact through client surveys conducted by Research and Polling, Inc., and economic analysis provided by Robert Grassberger, PhD Economist.

ECONOMIC IMPACT FOR BUSINESSES FROM NMSBA PROJECTS	2000-2016*
Small Business Jobs Created and Retained	6,858
Average Reported Salary (2016)	\$43,560
Increase in Revenue	\$325,996,166
Decrease in Operating Costs	\$159,445,655
Investment in NM Goods / Services	\$124,854,081
New Funding / Financing Received	\$130,080,719
Return on Investment**	For every \$1.00 of tax credit invested, the State receives a return of \$1.35.
Matching Investment	For every \$1.00 of tax credit invested, the labs provide a matching investment of \$.81.

* Surveys are performed six months to one year after project completion.
** ROI is based on salaries of jobs created and retained.

BENEFITS TO NEW MEXICO SMALL BUSINESSES

New Mexico small businesses achieved positive results after receiving technical assistance from NMSBA. Feedback from companies that participated in the 2016 economic impact client survey revealed that:



NMSBA identifies the areas of technical expertise that the national laboratories and their contractors utilized in NMSBA technical assistance projects, as well as the industry sector for the participating companies. The counties in which the small businesses are located are tracked to gain a better understanding of the reach of the program across the state.

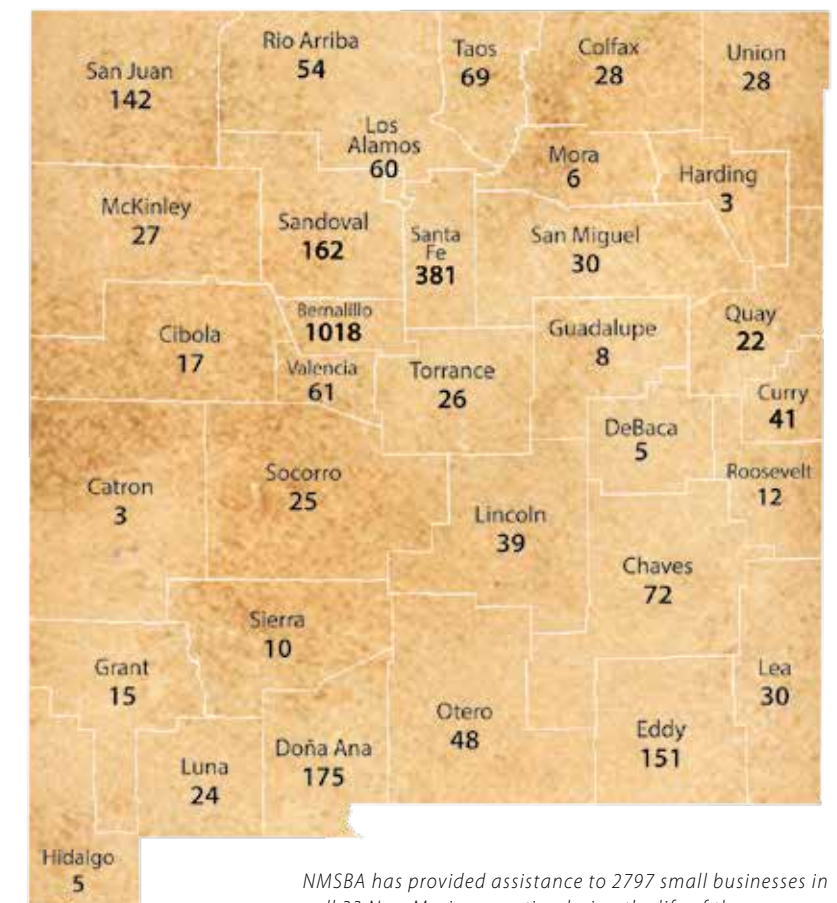
LABORATORY CAPABILITIES UTILIZED IN 2017

Engineering.....	23.9%
Manufacturing.....	23.1%
Advanced Modeling and Simulation.....	9.8%
Materials Science.....	8.1%
Biological and Medical.....	6.9%
Energy.....	6.9%
Earth and Environmental Sciences.....	6.1%
Business Development.....	4.9%
Chemistry.....	4.6%
Micro-Nano Technology.....	4.0%
Math and Computer Science.....	1.4%
Astronomy and Physics.....	0.3%

INDUSTRIES OF SMALL BUSINESSES SERVED IN 2017

Manufacturing.....	38.0%
Professional, Scientific, and Technical Services.....	34.8%
Agriculture and Natural Resources.....	11.3%
Retail and Wholesale Trade.....	4.6%
Education Services and Health Care.....	4.1%
Oil & Gas, Utilities and Mining.....	2.9%
Other Services (except Public Administration).....	2.0%
Real Estate, Finance, Insurance, and Management Services.....	1.4%
Media and Hospitality.....	0.9%

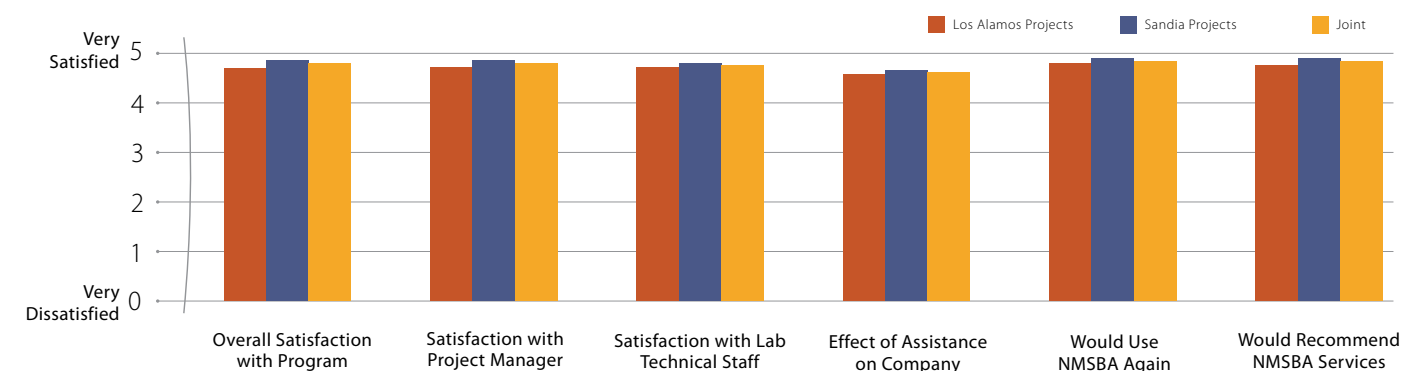
BUSINESSES ASSISTED BY COUNTY 2000-2017



NMSBA has provided assistance to 2797 small businesses in all 33 New Mexico counties during the life of the program.

CUSTOMER SATISFACTION IN 2017

Each year, NMSBA surveys the participating businesses to learn about their satisfaction with the program. In 2017, 93% of the businesses responded to the survey.





Bob Hockaday
President
Tucumcari Bio-Energy

QUAY COUNTY

I recommend reaching out to NMSBA if you have a technical problem. The national laboratories have the resources small businesses simply do not have.

Bob Hockaday
President
Tucumcari Bio-Energy, Inc.

TUCUMCARI BIO-ENERGY

Agriculture can create a lot of waste products. Tucumcari Bio-Energy has a vision of a synergistic integration of dairy farming, feedlots, municipal waste, biofuel production, and greenhouse farming that would address this issue. As a first step, the company intends to build a high-efficiency biomethane processing facility by reconfiguring an ethanol plant in New Mexico. This facility will take animal manure and convert it to energy. It will also serve as a prototype for other highly efficient digester systems utilizing unused ethanol plants in the Midwest.

As Bob Hockaday and his team at Tucumcari Bio-Energy made plans, they soon learned that the process used to convert manure to energy suffered from various instabilities. Tucumcari Bio-Energy turned to NMSBA, which in turn connected the company with Sal Rodriguez at Sandia National Laboratories.

Rodriguez and his team worked to determine the optimum water-to-manure ratio to maximize energy conversion. Such a ratio minimizes instabilities, such as extreme temperatures, high alkalinity, or the plugging of anaerobic digestion tanks. To perform this analysis, Rodriguez and his team used advanced computational fluid dynamics and theoretical modeling, along with natural circulation dynamics.

Using the information resulting from this technical assistance, Tucumcari Bio-Energy was able to apply for loans to fund the conversion of the ethanol plant in Tucumcari. Once the plant is producing energy, the company anticipates a revenue stream of approximately \$10 million per year and the creation of 20 new jobs.



Sal Rodriguez
Sandia National Laboratories



Donald Voss
CEO, Principal Scientist
Voss Scientific

Tom McVeety
Senior RF Engineer
Voss Scientific

BERNALILLO COUNTY

With the technical assistance provided by Sandia through NMSBA, we are now in a position of manufacturing the highest frequency bandwidth current sensors in the world.

Donald Voss
CEO, Principal Scientist
Voss Scientific, LLC



Romeo Fabia
Sandia National Laboratories

VOSS SCIENTIFIC

In business for 30 years in Albuquerque, Voss Scientific's areas of expertise include fully integrated data acquisition systems for capturing transient signals, autonomous electromagnetic susceptibility testing of electronic systems, high power short pulse lasers, and computational plasma physics simulations software. The development of the CP-560 sensor naturally grew out of these activities. A little bigger than a dime, the CP-560 allows current measurements for any experiment or application involving electrical signals with ultrafast temporal phenomena, such as protecting explosive ordnance, electrostatic discharge testing of electronics, and even developing improved hard disks for computers.

Although the CP-560 worked well, Romeo Fabia, an engineering technologist at Sandia National Laboratories, contacted his supplier, Voss Scientific, to discuss his program's need for a higher frequency response. To help tackle this problem, Voss Scientific reached out to NMSBA, which provided a method for Fabia and the company to work together in utilizing the extraordinary instrumentation capability available at Sandia. Working with Fabia and his team, Tom McVeety, senior RF engineer at Voss Scientific, improved the sensor's performance through a redesign. As a result of Sandia's technical assistance, the bandwidth of the CP-560 was extended from 6 GHz to beyond 20 GHz. Moreover, the company received outside validation from Sandia regarding the product's enhanced performance.

NMSBA's technical assistance enabled Voss Scientific to increase annual sales by \$75,000. It also led to the company expanding its customer base to include MIT and the United States Army, with recent product orders exceeding \$52,000.



Steve Vrooman
President
Keystone Restoration Ecology

Kina Murphy
Owner/Ecologist
Global Conservation Assistance

Wetherbee Dorshow
President
Earth Analytic

SAN MIGUEL AND SANTA FE COUNTIES

For us, having NMSBA connect us with Los Alamos enabled us to obtain expertise we could not find anywhere else.

Steve Vrooman
President
Keystone Restoration Ecology, Inc.

WATERSHED RESTORATION LEVERAGED PROJECT

In 2017, the U.S. experienced a record number of forest fires, with a total of more than 9 million acres charred. However, the fires themselves are just the beginning of environmental damage. Communities experience disastrous mudslides, flooding, and impacts to drinking water supplies and fisheries.

Keystone Restoration Ecology, Inc., Earth Analytic, Inc., Global Conservation Assistance, and Zeedyk Ecological Consulting, LLC have been working together to rebuild wetlands and water tables in New Mexico and throughout the world. For several years the companies were using a technique known as "Plug and Pond," but wanted more data about the technique's effectiveness in improving hydrologic conditions and mitigating excessive nutrient loads from wildfires.

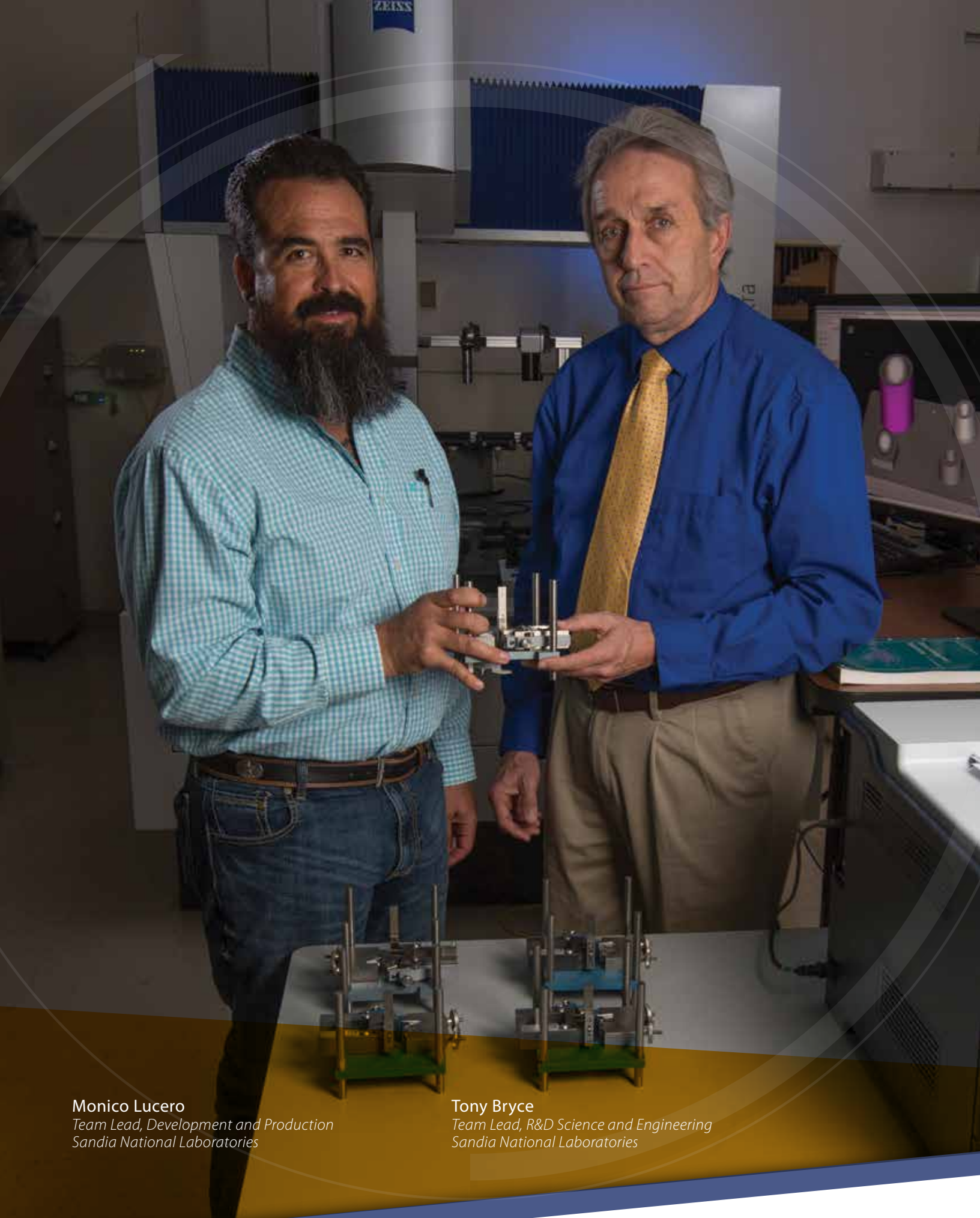
To address this issue, the collaborators reached out to NMSBA, which connected them with Brent Newman at Los Alamos National Laboratory. Newman and his team provided novel sampling methods to evaluate hydrological residence times and obtain fingerprint nutrient sources, transport, and attenuation. The results provided extensive biogeochemical and hydrological characterization of a variety of restoration sites before and after using Plug and Pond.

Demonstrating that Plug and Pond works for post-fire watershed restoration has enabled the collaborators to bolster this technique's credibility, with Global Conservation tackling places such as Tanzania and Uganda, and Zeedyk Ecological Consulting restoring rangelands across the western U.S. For Keystone Restoration Ecology, the results enabled the company to expand its market, receive approximately \$450,000 in grants, and hire two crew members to implement restoration activities.



Meet the
PRINCIPAL INVESTIGATOR

Brent Newman
Los Alamos National Laboratory



Monico Lucero
Team Lead, Development and Production
Sandia National Laboratories

Tony Bryce
Team Lead, R&D Science and Engineering
Sandia National Laboratories

GEOMETRIC DIMENSIONING AND TOLERANCING

The NMSBA GD&T classes are fantastic! The classes provided by NMSBA at Sandia National Laboratories give us a deeper knowledge that helps us service our customers and we truly value them.

Kenton Losinski
Sales Engineer
Jaguar Precision Machine

NMSBA wants to thank and recognize Tony Bryce and Monico Lucero for their tireless work in organizing, coordinating, and teaching GD&T for so many years.

Established in 2000, the NMSBA's Geometric Dimensioning and Tolerancing (GD&T) courses have enabled representatives from small businesses throughout the state to gain a deeper knowledge of the degree of precision needed to add value to their products. For the past 18 years, Sandia National Laboratories Development and R&D Science and Engineering Team Lead Tony Bryce and Production Team Lead Monico Lucero have taken the time to ensure that anyone taking their courses can successfully apply what they have learned to improving their company's products.

After beginning with the basic course in 2000, an advanced course was added in 2012. To date, 400 people from 48 companies have participated in this training. A system for defining and communicating engineering tolerances, GD&T uses a symbolic language on engineering drawings to describe geometry and allowable tolerances. GD&T tells manufacturing staff what degree of accuracy and precision is needed on each feature of the part. In other words, GD&T is used to define the allowable variation.

"I am a firm believer that everyone must possess an in-depth grasp of GD&T," notes TEAM Technologies CEO Bob Sachs. "GD&T ensures that we are delivering the best quality machined parts to our customers. We are extremely fortunate to have this great education available to us for our workforce."



LEVERAGED PROJECTS

Los Alamos National Laboratory and Sandia National Laboratories provide technical assistance for both individual and leveraged NMSBA projects. The following is a listing of this year's leveraged projects.

	PROJECT	DESCRIPTION	BUSINESS PARTICIPANTS	COUNTIES	FUNDING
Sandia	Altree	The Labs provided technical consultation and material characterization testing of customer-provided samples in order to determine the performance of Altree™ in a battery of ASTM-defined tests.	GL Environmental, Inc. Highway Supply, LLC Mt Taylor Machine, LLC dba Mt Taylor Manufacturing P & M Lumber, Inc. P & M Signs, Inc. PJ Woodlands, LLC	Bernalillo Cibola San Miguel Torrance	\$97,000
Sandia	Autophagy Drug Combo	The Labs identified spectral signatures and binding patterns of autophagy stimulants in combination with isoniazid-potentiating activity of compound combinations in TB-relevant cell lines. The Labs also conducted hyperspectral imaging time course studies of the localization patterns for these drug combinations. Confocal imaging was also used on an engineered cell line expressing autophagy markers to study the effectiveness of combination drug treatment on inducing autophagy.	Avisa Pharma, Inc. Biophagy Pureinfo Discovery, Inc.	Bernalillo Santa Fe Torrance	\$49,000
Sandia	Battery Inventory	The Labs developed a system for tagging batteries and integrating with a charger/appliance system to enable monitoring of battery state of health among field deployed units.	Bye UAS, Inc. dba Silent Falcon UAS Technologies, Inc. Emerging Technology Ventures, Inc. Necessity Systems Robotic Technology Solutions Voice International dba Motion Picture Marine, Inc. aka Perfect Horizon	Bernalillo Otero	\$78,000
Sandia	Cancer Detection	The Labs adapted the Center for Integrated Nanotechnologies (CINT) Microfluidic Discovery Platform® to aqueous antibody conjugation of magnetic nanoparticles. Using real-time analytics to monitor the reaction may enable the production of a consistent product.	Duke City Materials Imagion Biosystems, Inc. Radigan Engineering, LLC The Grafe Law Office PC Upham BioConsulting	Bernalillo Sandoval	\$58,000
Los Alamos	Copper Nanoink Development	The Lab investigated the suitability of commercially available copper particles for use as copper inks and examined the synthesis of suitable copper nanoparticles using organocopper compound.	Optomec, Inc. fka Optomec Design Company Sandia NanoInks, LLC	Bernalillo	\$19,000
Sandia	Directional Flame	The Labs provided technical assistance to develop software that calculates and displays real-time heat flux measurements from experiments using Directional Flame Thermometers. Consultation was provided on a model and code that enables viewing experimental results with only a minimal delay, adaptable to variations in hardware. This development will aid fire research and the development of fire safety standards.	Fire Instrumentation Research, LLC Kurey & Associates, LLC dba Cybernetics	Bernalillo	\$18,000

	PROJECT	DESCRIPTION	BUSINESS PARTICIPANTS	COUNTIES	FUNDING
Sandia	Electrical Bonding	The Labs provided technical consulting to evaluate the relevant factors in bonding a PV module to its supporting rack via integrated bonding mechanisms. In particular, bonding methods evaluated by the UL 2703 high current bonding conductor test were studied and relevant bond factors were identified, researched, and explained.	Kaehr Corporation Salteydogg Metal Fab, LLC Thompson Machine Tool & Die Group, Inc. Unirac, Inc.	Bernalillo	\$38,000
Sandia	FarmPod	The Labs provided technical consulting and assistance on commercial off-the-shelf (COTS) devices as to their ability to meet requirements including automated processes to maintain the health of the ecosystem. The general parameters of these solutions are that they be networked, low power, low cost, high-reliability and easily sourced.	AMEnergy, Inc. CUB, Inc. FarmPod, LLC SolarLogic, LLC	Santa Fe	\$78,000
Sandia	Gold from Biosolids	The Labs performed thermal analysis, thermal processing, batch reactor runs, and metals analysis.	Diver Solar, LLC Hall Environmental Analysis Laboratory Harkwell Electric, Inc. JT Maintenance ReGen Technology, LLC fka SoilCo, LLC	Bernalillo	\$49,000
Los Alamos	High Demand Guar Gum	The Lab evaluated the platform technology proposed by the partnering companies to efficiently produce guar in a high-biomass yielding indigenous plant called prairie cordgrass.	Eldorado Biofuels, LLC Mar Oil & Gas Corporation Mountain Vector Energy White Tree Ventures Yates Industries, LLC	Eddy Sandoval Santa Fe	\$96,000
Sandia	Nitrogen Dosing	The Labs provided technical consulting and design work to investigate modelling and experimental validation of N ₂ liquid-vapor injection within a variety of canned beverages produced throughout the state of New Mexico. Experimentally-validated models were developed to investigate interfacial boiling and optimized injection of liquid N ₂ with gaseous CO ₂ in various commercial beverages. Designs were investigated to ensure consistent and optimized dosing was facilitated for ensuring a high-quality delivered product.	365 Brewing and Distilling Company, LLC dba Broken Trail Spirits Mother Road Mobile Canning New Mexico Hard Cider Pour Vida Coffee Roasters Second Street Brewery Taos Mesa Brewery Villa Myriam Coffee	Bernalillo Santa Fe Taos	\$100,000

LEVERAGED PROJECTS CONTINUED

PROJECT	DESCRIPTION	BUSINESS PARTICIPANTS	COUNTIES	FUNDING
Sandia Off-Grid Ice Melter	The Labs provided technical consulting and pilot design/operation support directed at evaluating an innovative approach using solar energy to provide heat to melt ice by warming water in livestock water drinkers during cold weather.	McKenzie Land & Livestock Company Milagro Ranch Resources, Inc. Remote Well Solutions, LLC Roswell Livestock and Farm Supply TP Pump & Pipe Company	Bernalillo Chaves Guadalupe Otero Torrance	\$88,000
Los Alamos Predictive Algorithms for Recovery after Severe Brain Injury	The Lab explored practical analysis strategies of data for patient monitoring; identified potential sources of signals that could develop and inform algorithms and visualization techniques; reviewed data and existing medical literature; established a data analysis plan; discussed improvements to existing user interface; and explored aspects of patient data, nuances of data processing and sources of errors.	New Mexico Neuromonitoring Rio Grande Neurosciences	Bernalillo Santa Fe	\$30,000
Sandia Radiation Dose Detector	The Labs tested an advanced solid state radiation detector/dosimeter that will directly measure the dose and dose rate in biological equivalent terms, regardless of the type of radiation. In the course of the testing, the Labs developed a screening protocol for isolating non-functioning solid state tissue equivalent radiation detectors (SSTED) from functioning detectors. Narrow beam and wide beam X-ray radiation was applied to SSTED devices to examine X-ray detection resolution. Then, duration consistency, dwell times, and maximum intensity as a function of the device response was evaluated.	Durham Mackay Architects, Inc. fka Durham & Associates Noel Savignac Consultants nStone Corporation Radiation Detection Solutions, LLC Sigma Science Testudo Engineering	Bernalillo Eddy Los Alamos Santa Fe	\$89,000
Los Alamos Reactive Tracer Testing to Support the Development and Expansion of a Geothermal Power Facility	The Lab conducted reactive tracer tests and analyzed the data results of these tests to inform the geothermal power facility how best to utilize their use of their wells.	DL Sanders, LLC Geo-Science Solutions, LLC Lightning Dock Geothermal, HI-01, LLC Michelle Henrie, LLC dba MHenrie Land Water Law	Hidalgo Sandoval Santa Fe	\$63,000
Los Alamos Safe Quantum Dot Materials for Solid-State Lighting	The Lab conducted a single-particle photoluminescence measurements on quantum dots fabricated by UbiQD. The results indicate that it should be possible to achieve narrow ensemble linewidths by refining synthetic protocols so as to reduce sample heterogeneities.	Central Park Square, LLC Stephen Auger Studio, LLC UbiQD, LLC	Los Alamos Santa Fe	\$59,000

PROJECT	DESCRIPTION	BUSINESS PARTICIPANTS	COUNTIES	FUNDING
Sandia Sprinkler Nozzle	The Labs provided technical assistance with design consultation, modeling, and validation of an advanced fire-sprinkler nozzle design.	A-1 Machine, Inc. Cooper Construction Services Cooper Fire Protection Services Foster Plumbing and Heating Company, Inc. Westates Supply, Inc.	San Juan	\$85,000
Sandia Suicide Bomb Detection	The Labs increased the range of the detection from 3m to 30m. Antennas were modified to increase the range and reduce the field of view for more accuracy. Software on the radar and GUI was updated to support the increased range.	APPI, Inc. Counter Terrorism Consulting Indelible Enterprises, LLC McLemore Enterprises, LLC R3 Technologies, LLC The MacAleese Companies, Inc. dba Safe Zone Systems Wind Mountain Research Associates	Bernalillo Doña Ana	\$99,000
Los Alamos The VASP Instrument	The Lab tested the VASP Instrument by repeating materials science calculations on one of Los Alamos' high performance computer clusters. Real world calculations were performed on the VASP Instrument, gathering data to use in a manuscript to submit for publication.	Absolute Powder Coating, LLC Applied Capital, LLC CreativeC, LLC Jacobson Consulting Manufacturing Technologies, Inc.	Bernalillo Los Alamos Sandoval	\$59,000
Los Alamos Validation of an Electromagnetic Stimulation Integrated Bioreactor System for Commercialization	The Lab developed protocols and experimental setup for testing the functionality of a U.S. patent pending electromagnetic algae bioreactor system, a.k.a. "BioStim".	BioStim, Inc. BioSystems, Inc. Electrical Technical Services GeoScan, Inc. Instrument Service Laboratories, Inc. Rio Electro Optics Corporation Technical Management Solutions, Inc.	Bernalillo Los Alamos Santa Fe	\$79,000
Los Alamos Watershed Restoration from Wildfire at the Valles Caldera National Preserve, Surface and Groundwater Chemistry Post-Treatment	The Lab characterized redox and hydrological processes within Plug and Pond treatment areas, took depth profiles in constructed ponds, analyzed water samples, and demonstrated various simple sampling approaches that can be used to assess the effects of watershed restoration on biogeochemistry and hydrology.	Earth Analytic, Inc. Global Conservation Assistance Keystone Restoration Ecology, Inc. Zeedyk Ecological Consulting, LLC	San Miguel Santa Fe	\$69,000

INDIVIDUAL PROJECTS

Bernalillo

@Pay
3D Glass Solutions
A Nelson, LLC
ABQMR, Inc.
Actoprobe, LLC
Adams Balloons, LLC
Advanced Air Vehicles (AAV)
Advanced Arts Design Development dba aadd
Advanced Manufactured Power Solutions, LLC (AMPS)
Advanced Optical Technologies, Inc.
Affordable Solar Installation, Inc.
Applied Technology Associates (ATA) / A-Tech Corporation / ATA Sensors
Assila, LLC
ATA Aerospace, LLC
Automotive Test Solutions, Inc.
AWS Bio-Pharma Technologies
Bi Ra Systems, Inc.
Bio-Tec Environmental
BiRIO Systems, Inc.
Black Mesa Coffee Company, Inc.
Blue Sky Distributors
Bogue Machine Company
BrightCores, Inc.
Building Envelope Services
Burgoon Company
Burmeister Manufacturing
C12 New Mexico
Captiva Group, Inc.
Castillo-Beyerlein's Counseling & Electronics
CDS Lighting Studios, Inc.
Continental Machining Company
Cosant Materials
Desert Paper & Envelope Company, Inc.

Desert Plastics, LLC
El Encanto, Inc. dba Bueno Foods
Electrodynamic
Energy Analyst, LLC
Enthentica, Inc.
Eric Archuleta, LLC
Eternal Stone
FanSeat
Fiore Industries, Inc.
FischerSci, LLC
Fortitude Machine and Mold, LLC
Goodman Technologies, LLC
Guardian Sensors, Inc. fka Sentient Business Systems, Inc.
Halcyon Wellness Initiative, LLC
IC Tech Incorporated
Industrial Water Engineering
LAD Engineering
Los Poblanos Historic Inn & Organic Farm
Machining Solutions, LLC
Management Sciences, Inc.
Midtown Metal
MVD Specialists dba MVD Now, LLC
NanDei McAnally Enterprises, LLC
OGB Architectural Millwork, Inc.
Old Santa Fe Trail Enterprises, Inc.
Omphalos Bioscience, LLC
OptiPulse
Optisource R&D, LLC
OptiSource, LLC
Passages International, Inc.
Perky You
Precision Grinding, Inc. (PGI)
Professional Technical Services
Roberta, LLC
Sandia Biotech
Segue Enterprises

Sentient Sensors, Inc.
Skyndex
Sombra Cosmetics, Inc.
Steward's Plumbing
SugarShopper, Inc.
Sustainable Planet Solutions (SPS)
Tau Technologies, LLC
Taylor Needs
TEAM Technologies, Inc. fka TEAM Specialty Products
The 377 Brewery
The Gregory Agency
The Ornatelier
The Winrock Bakery, Inc., dba Pastian's Bakery
Thunder Scientific Corporation
Toltec Enterprises, Inc.
Unser Racing Development
Vibrantcy, LLC
Voss Scientific, LLC
Zummit Labs

Cibola

bioLime Innovations, LLC
C & E Concrete, Inc.

Curry

Antelope Ridge Wind Farm, LLC
Douglas Reid Farm
Elmer White Farm
Front Line Equipment Company
Heritage Dairy
Lay Land and Cattle Company dba Lay Wind Farm
Lon Sultemeier, Inc.
Marvin Estes Farms
SDP Corporation
Web Farms, Inc.

Doña Ana

AEGorsuch Designs, FieldMMAK

Backyard Farms
Donohue Research Associates
EcoSeal, LLC
FlashAg
KaizenRhino Solutions
Kool Armor, LLC
Pivotal Biotech, LLC
SameDay Security, Inc.
Soil Analysis
Southern New Mexico Speedway
TYMMBER Outdoor, Inc.
White Sands Research and Developers, LLC

Eddy

George Rauch Ranch
Taddy Healthcare Services, LLC
United Materials, LLP

Grant

Mojo Product Development

Guadalupe

Bedford Family, LLC

Harding

Ute Creek Cattle Company

Lincoln

Noisy Water Winery

Los Alamos

HyPwr, LLC
Sci Tac, LLC
SIVI, LLC dba CarbonACE.com
Tibbar Plasma Technologies, Inc.

McKinley

Navajo Spirit Southwestern Wear
Redsand, LLC

Mora

Mora Valley Woodworking, LLC

Otero

Grace Fire, LLC
Systems Technology Solutions, LLC

Quay

Box Insurance Agency
Energy Related Devices, Inc.
Gary Gunn
Phillip Box Farms
Tucumcari Bio-Energy, Inc.

Rio Arriba

Freshies of NM, LLC
Levi-Cash
Manzanar Los Silvestres

Roosevelt

Sure Green

San Juan

ABC Canvas, Inc.
Alpha Bioscience Company, LP
Animas Medical Supply, LLC
Aztech Power and Energy, LLC
Dr. Herman Four Corners Orthodontics and Dental
Drake Energy Services, LLC
EZ Shade
Gas Analysis Service
Glenhasbah Renewable Energy Technologies, Inc. (GRET)
Hank's Welding
Henry Production, Inc. (HPI)
High Point Options, LLC
Industrial Cooling Exchange (ICE)
Jack's Plastic Welding, Inc.
Joshua Ray

Lightwave Connections, LLC
Linear Motion 120
MMJ Delivery Courier, LLC
Nosstrious Designs dba Forte Digital
One Source Service
Performance Products, LLC
PESCO, Inc.
Princess Energy, LLC
Pro Dip Hydro Grahips
Quick Carriers dba Hauling Accessories
R & T Holdings, LLC
San Juan Closet Works
Surefire Burner Management Systems
Tethering Ideas
Thales Energy
Trotting On Innovations
Valley Mills

San Miguel

Montibon Provenance International, Inc.
MxRam, LLC
Old Wood, LLC
San Miguel Sun Dwellings
Tall Foods

Sandoval

9/M Ranch
Arjuna Resources, LLC
CloudSolar
Data Center Transitions, Inc.
Fit Marketing, LLC
Ideum, Inc.
Insight Lighting
Intrepid Designs
Jemez Hot Springs fka Giggling Springs / Giggling Star, LLC
KEWA Resources, Ltd.
Mai Solutions, LLC
MyoSENS Health Solutions, LLC

Navajo Tours, LLC
Philip S. Fullam, PE
Rescue Tactics and Training, LLC
Vamco, LLC

Santa Fe

1N1 Materials
Aerblock Enterprises, LLC
ARVRUS, LLC
ASM, LLC
Atmocean, Inc.
Best Feeling Brewing Company
Bioponic World Vegetables, Nutrients & Bio-Products, LLC
Bioponic World, LLC
Bonner Design Consultancy
Chili Line Brewery
Cold Thumb Agriculture
Divine Beauty
Earth System Sciences, LLC
EcoPesticides International, Inc.
El Milagro Herbs
Fault Tolerant Technology
Genoma International
Georgia O'Keeffe Museum Innovations, Inc. (GOKMI)
Glenn Wikle
Hollowpoint, LLC dba Wicked Edge Sharpeners
HoneyMoon Brewery
iBeam Materials, Inc.
IR Dynamics, LLC
Labzy, LLC
Luca Industries USA, LLC
Necessity Gas
New Solutions Energy Corporation (NSE)
Nomad Systems, LLC
OpenEye Scientific Software, Inc.
PK Consulting

Rader Awning & Upholstering, Inc.
Resonant Body
Santa Fe Spirits
SAVSU Technologies
SolarSPOT, LLC
Solstar Energy Devices, LLC
Solstar Space Company
STAR Cryoelectronics, LLC
Sun Harvest, LLC
The Pink Giraffe of Santa Fe fka Casa De Artesanos
Turtle Rock Foods, LLC dba The Kombucha Project
Twist Resist
Verde Food Company
Wound Solutions, LLC

Sierra

St. Cloud Mining Co., Inc.

Socorro

Honest Dollar Enterprises
Space Sciences Corporation

Taos

George R. Dreher
George R. Dreher Ranch
Lock on Designs, LLC
Private Label Select, Ltd. Company

Union

Hutcherson Family, LP

Valencia

ABO Viejo Investment, LLC
Geomni New Mexico fka Blue Skies Consulting
NanDei McAnally Designs, LLC
Pi8 Solutions
Sisneros Bros. Mfg., LLC
TBE CrossFit
Wall Colmonoy

INNOVATION CELEBRATION

Projects from 2017 that achieved outstanding innovations through NMSBA were honored at an Innovation Celebration Awards event in 2018.

One leveraged project received the *Honorable Speaker Ben Luján Award for Small Business Excellence* for demonstrating the most economic impact. UBiQD, Central Park Square, and Stephen Auger Studios' collaboration on Safe Quantum Dot Materials for Solid-State Lighting has resulted in Small Business Innovation Research grants from the DOE and National Science Foundation, as well as a grant from Breakout Labs. The companies have also received \$1 million in investment funds and made new hires.

In addition to honoring NMSBA participants, the event provided an opportunity for small businesses, local economic development representatives, elected officials, and community leaders to network and learn what NMSBA offers to help businesses grow.



SAFE QUANTUM DOT MATERIALS FOR SOLID-STATE LIGHTING LEVERAGED PROJECT

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- Thank you to the Advisory Council for their leadership, advice, and guidance in support of NMSBA.

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|---|---|--|---|
| Todd Bisio
Qynergy Corporation | Karl Halpert
Private Label Select Ltd. | Donald Quintana
Los Alamos National Laboratory | Regan Stinnett
Sandia National Laboratories |
| Barbara Brazil
New Mexico Economic Development Department | Terry Lombard
New Mexico State University | Michael Roach
Entrepreneur | Toni Taylor
Los Alamos National Laboratory |
| Adriene Gallegos
New Mexico Small Business Development Center | Mary Monson
Sandia National Laboratories | Dan Sanchez
U.S. Department of Energy NNSA Sandia Field Office | Eva Woods
Woods Farms, Inc.; ZC Partners |
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Los Alamos National Laboratory | Jeff Nelson
Sandia National Laboratories | Francine Sommer
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|---|---|--|--|
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University of New Mexico | Griselda Martínez
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New Mexico Tech | Steve Walsh
University of New Mexico |
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University of New Mexico | Kristin Morehead
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|--|--|---|---|
| Shandra Clow
Los Alamos National Laboratory | Ian Foti-Landis
New Mexico MEP
Los Alamos National Laboratory | John Martinez
Sandia National Laboratories | Kim Sherwood
Los Alamos National Laboratory |
| Micheline Devaurs
Los Alamos National Laboratory | Judy Hendricks
Sandia National Laboratories | Genaro Montoya
Sandia National Laboratories | Janelle Ulibarri
Los Alamos National Laboratory |
| Sharon Evans
Sandia National Laboratories | Mariann Johnston
Los Alamos National Laboratory | Jackie Kerby Moore
Sandia National Laboratories | Linda von Boetticher
Sandia National Laboratories |

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contributed to this report.

PERSPECTIVES ANNUAL REPORT TEAM

SANDIA NATIONAL LABORATORIES

Jackie Kerby Moore
Manager

Genaro Montoya
Program Leader

Linda von Boetticher
Annual Report Project Manager

Sharon Evans
Financial Administrator

Judy Hendricks
Project Manager

John Martinez
Project Manager

Laura Hatfield
Designer

NEW MEXICO MANUFACTURING EXTENSION PARTNERSHIP

Ian Foti-Landis
Project Manager

LOS ALAMOS NATIONAL LABORATORY

Micheline Devaurs
Program Manager

Shandra Clow
Regional Team Lead

Kim Sherwood
Project Manager

Mariann Johnston
Communications Lead

Octavio Ramos
Writer

Sandra Valdez
Photographer

CONTRACTORS

Ellen Cline
Editor

Norman Johnson
Photographer



Kim Sherwood, Project Manager
P.O. Box 1663, C333
Los Alamos, NM 87545
P: 505-665-1305 E: ksherwood@lanl.gov

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Genaro Montoya, Program Leader
P.O. Box 5800 MS 1495
Albuquerque, NM 87185-1495
P: 505-284-0625 F: 505-284-9551 E: gmontoy@sandia.gov

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