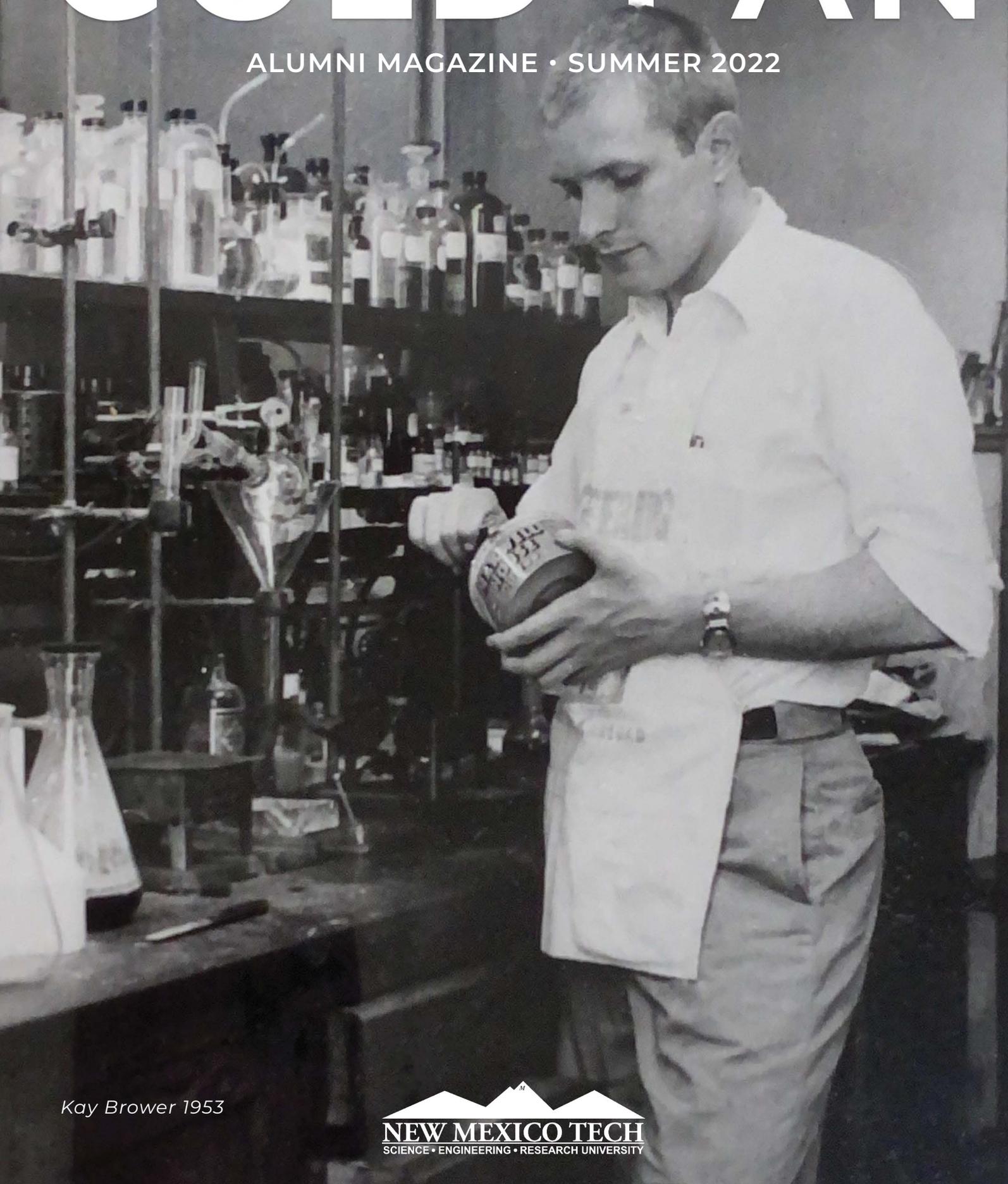


GOLD PAN

ALUMNI MAGAZINE • SUMMER 2022



Kay Brower 1953

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In His Memory

President Wells,

The May 14, 2022 recognition at Commencement, awarding the posthumous [doctorate] degree for John's many and varied ways he promoted New Mexico Tech during his years as a student and as a member of the faculty, is important to me and our family and friends.

John was not one to draw attention to his endless interesting endeavors - whether it was to family, friends, or his many acquaintances - and it was only through his untimely death that I learned what an important person John was to me, to Tech, and to so many others.

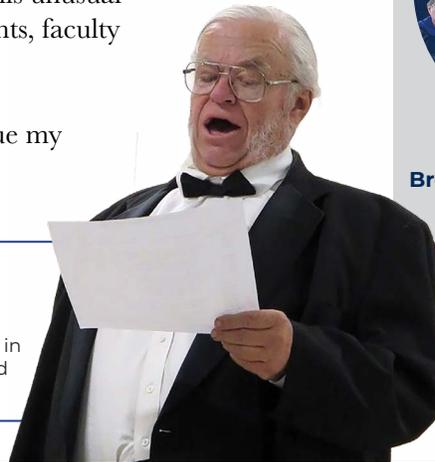
I particularly want to thank the faculty members who promoted this recognition, the Faculty Senate for their examination and acceptance of the efforts on behalf of John, and the Board of Regents who saw the benefit of making this unusual award - all of whom joined friends, coworkers, fellow students, faculty mentors, and community residents to make this possible.

I will display his award proudly and, in his memory, continue my support for New Mexico Tech in whatever way possible.

Kindest regards,
Sara Shipman Breeden

Thank you, John!

Honoring John Shipman for his heartfelt dedication and service in support of New Mexico Tech and our alumni.



Doctorate Presentation



Breeden & President Wells

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MARX AND DOROTHY BROOK ENDOWMENT FUND FOR LANGMUIR LABORATORY

A Legacy Continued

Initiated by the generosity of an anonymous donor, the Marx and Dorothy Brook Endowment Fund for Langmuir Laboratory was approved by the New Mexico Tech Board of Regents on February 11, 2022. The endowment honors the achievements of renowned NMT atmospheric physics researcher Dr. Marx Brook and supports research and operations at New Mexico Tech's Langmuir Laboratory for Atmospheric Research.

After finishing his M.A. (1949) and Ph.D. (1953) in Physics at UCLA, Brook was recruited to NMT by President E.J. Workman, who happened to be one of Brook's undergraduate professors at UNM. Formally accepting the position in 1954, Brook began what would become a distinguished 45-year-long career at New Mexico Tech and Langmuir Laboratory studying lightning and thunderstorm electrification processes.

Brook's studies ranged from time-resolved photographic and electrical investigations of lightning to the development of special radars for observing storms. These were used in collaborative studies of thunderstorms both at Langmuir Laboratory and at Kennedy Space Center in Florida, and of volcanic lightning in Iceland.

A few of Brook's contributions to the field include an increased understanding of cloud-to-ground and intracloud lightning inside storms, investigating the lightning incident triggered by Apollo 12, and in his later years, studying winter storm lightning in the U.S. and Japan. He's also still the Guinness

World Record holder for "Most Strokes Recorded in a Lightning Flash" (26 strokes to ground in a single flash in 1962).

Brook was Chair of the New Mexico Tech's Physics department from 1968 to 1978 and directed Tech's Research and Development Division until his retirement in 1986. During his time as Research Director, Brook established the Center for Explosives Technology Research - the forerunner of Tech's current-day EMRTC.

Brook received many awards, including the American Geophysical Union Lifetime Achievement Award in 1993. The award was signed by more than 120 colleagues in the atmospheric electricity and radar meteorology communities. It recognized not only Brook's outstanding research record but also his extraordinary mentorship of students and young colleagues and selfless assistance to many researchers worldwide.

If you would like to support this fund, donations can be made [here](#).

Scroll down to Brook on the Designation menu.



"It is refreshing, in this age of data-taking machines and digitalizing devices, to be able to report a simple visual observation which appears to have scientific worth."

— *Journal of Geophysical Research, Brook and Vonnegut*

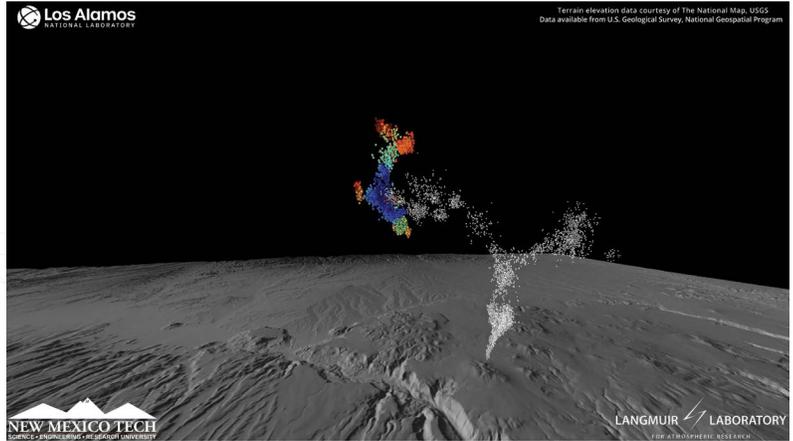
Physics Department

Every year The Langmuir Award, consisting of a plaque and \$400 cash award, honors an outstanding scientific research paper by a student or recent graduate of New Mexico Tech. The 2022 recipient was current Ph.D. student (Physics with Concentration in Instrumentation) and alum Daniel P. Jensen (B.S. Physics and B.S. Mathematics, 2016).

A Farmington native, Jensen is one of many extraordinary people who have worked at Langmuir Lab, studying lightning under his advisor, Dr. Richard Sonnenfeld. Since September 2021, Jensen has been working as a graduate research assistant at Los Alamos National Laboratory on a three-year joint internship between New Mexico Tech and LANL.

Dr. Sonnenfeld nominated Jensen for his research paper, "Dart-Leader and K-Leader Velocity From Initiation Site to Termination Time-Resolved With 3D Interferometry," which was published in the Journal of Geophysical Research in March 2021.

Jensen used data from two interferometers collected from a thunderstorm near



Jensen's Langmuir Data

Langmuir Lab to produce a three-dimensional interferometer data set, the most accurate verified result to date for a broadband lightning interferometer. The data also showed that certain in-cloud lightning processes (K-leaders) slow down as they progress over kilometers, and observation is not possible without this technology. ([Animation video link](#) courtesy of Dr. Sonnenfeld.)

Jensen has been described by Dr. Sonnenfeld as an "extraordinary young scientist" who produced outstanding research in the study of this exceedingly complex natural phenomenon becoming more frequent and impactful with climate change.



Presidential Teaching Award

MASTER OF SCIENCE FOR TEACHERS (MST)

In February 2022, President Joe Biden announced Hope Cahill (MST 2020) of Santa Fe Public Schools as the New Mexico K-6 Science awardee of the Presidential Award for Excellence in Mathematics and Science Teaching (PAEMST). Established in 1983, PAEMST is the highest award kindergarten through 12th grade mathematics and science (including computer science) teachers can receive from the U.S. government. [Read more](#)

Student Life

MECHANICAL ENGINEERING

The *NMT Society of Automotive Engineers (SAE) Baja Team* participated in the 2022 Baja SAE competition in Cookeville, TN, in mid-May that hosted 91 collegiate teams and involved four days of technical inspections, design presentations, dynamic events, and an overall endurance race. The Tech team placed 43rd overall. Read the full story [here](#).

The *SunChaser solar education trailer, 2K22*, planned and designed by New Mexico Tech mechanical engineering faculty, students, and others and built by ACE Leadership High School students, was part of the Solar Fiesta during American Solar Energy Society's SOLAR 2022 National Conference in Albuquerque June 21–24, 2022 Read more [here](#).

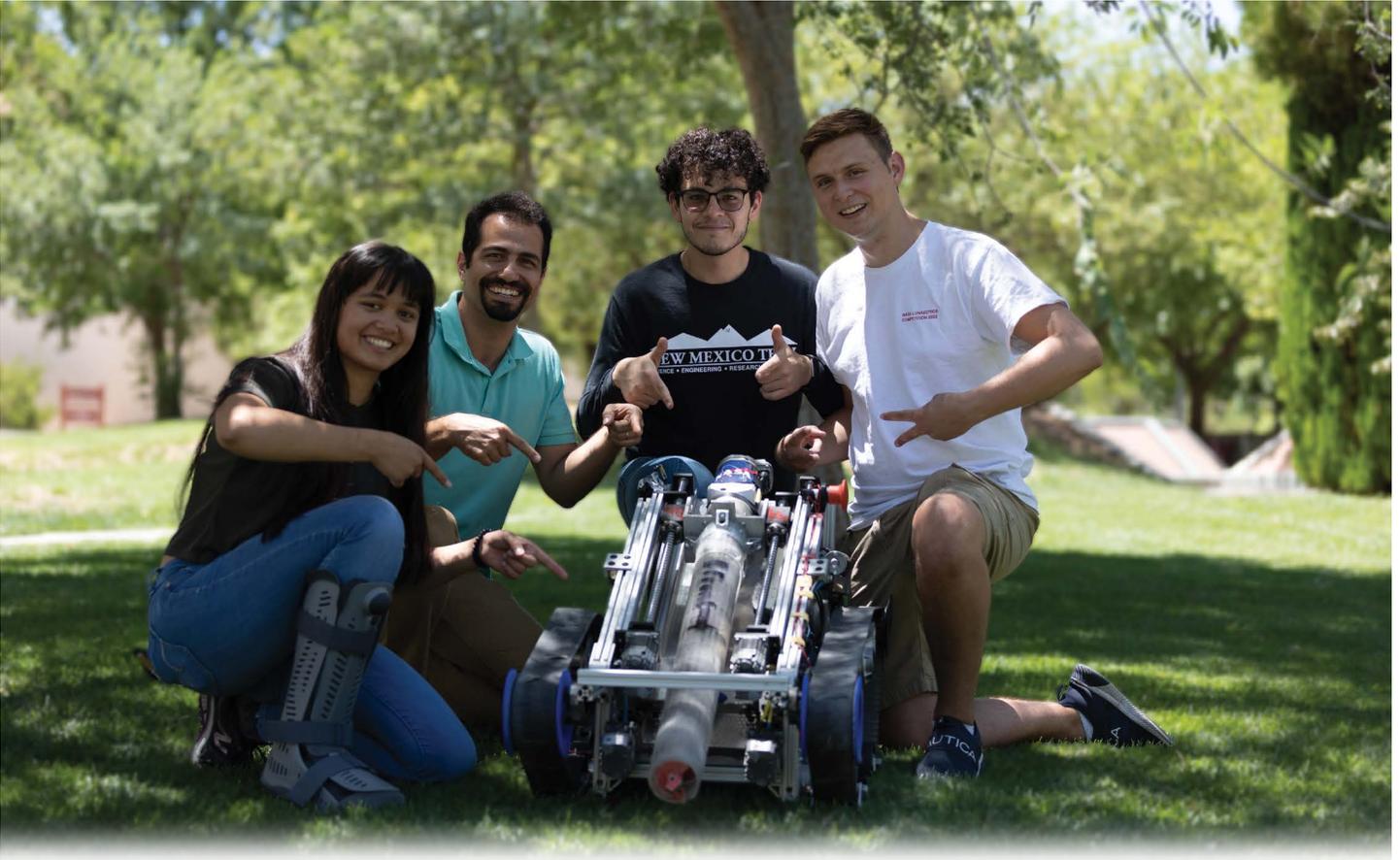
Mechanical Engineering Sounding Rocket

The *NMT Sounding Rocket* team participated in the 2022 Spaceport America Cup competition with a student-designed and -built solid rocket motor that they had been testing over the past year. The rocket motor performed perfectly in the launch on June 23, but the airframe seemed to have a failure. Read the story [here](#).



Mechanical Engineering SAE Baja





Mechanical Engineering Lunabotics team

The *NMT Lunabotics* student team competed, for the first time, in the NASA Lunabotics Challenge in which college students design, build, and operate an autonomous lunar miner. The event took place May 22-27, 2022, at Kennedy Space Center in Florida. The NMT team received the Nova Award for stellar system engineering performance by a first-year team and the Project Management Plan Award from NASA. Read more [here](#).



DONATE TO NEW MEXICO TECH

How can you show your support? Give your time, your energy, or your financial support, and together we can make the future great. Your gift to New Mexico Tech students, programs or research is greatly appreciated.



Scan Code to make your gift online!

Studying STEM

SUMMER 2022 CAMPS, CONFERENCES AND PROGRAMS

New Mexico Tech has been expanding the number and types of summer programs it sponsors and hosts. Below are NMT camps (middle through high school) and programs (through undergraduate) that took this summer. Some were new this year; some are long-running. Know any middle school through university students interested in or already studying STEM? Set a reminder to check the websites for 2023 options!

AFRL NM Career STREAM—Mechanical Engineering (student mentoring)

- *High school*
<https://afrlnm.com/stem/stem-opportunities/>

Summer STE²M Experience—Office of Admission

- *High school sophomore or junior*
https://apply.nmt.edu/portal/summer_stem

Tech Trek NM STEM—American Association of University Women (AAUW)

- *Rising eighth-grade girls*
<https://techtrek-nm.aauw.net/about/camp/>

The Summer Science Program (SSP)—Astrophysics

- *High school junior*
<https://summerscience.org/>

Kelly Mine Leadership Camp—Residential Life Office

- *Incoming NMT freshmen*
<https://www.nmt.edu/news/2022/leadership-camp.php>

Computer Science Buzz Camp—Computer Science & Office for Advancement

- *7th and 8th grade; high school (two sessions)*
<https://nmt.edu/buzzcamp/>

Minerals & Fluids Camp—NM Bureau of Geology & Mineral Resources

- *Undergraduates*
<https://geoinfo.nmt.edu/mineralsfluids-camp/home.html>

NMT Intense REU

- *Undergraduates*
<https://www.nmt.edu/academics/mecheng/intense/index.php>

Upward Bound Math & Science (UBMS) Summer Program

- *Manzano, West Mesa, Valley, Atrisco Heritage Academy, Socorro High School students*
<https://www.nmt.edu/upward/>

YOU SHOP. AMAZON GIVES TO...





NEW MEXICO TECH

Scholarships

New Mexico Tech prides itself on offering an affordable, high quality education and consistently ranks in the top tier when it comes to return on investment for students. However, even Tech cannot escape the reality of the rising cost of higher education.

- *53% of the 2021 class took out some sort of student loan, borrowing an average of \$22,418 per student.*
- *Of the students who were awarded need-based aid, only 15% had their need fully met.*

Even students who qualify for need-based aid are having to find other ways to make ends meet, making NMT scholarships more important than ever.

In addition to helping those with the greatest need, scholarships give students of all income levels access to higher education, and fill the gap for students who fall between low and high income levels. Scholarships give students more time to focus on their studies, decrease student debt upon graduation, and teach students the importance of giving back.

ENDOWED SCHOLARSHIPS

One of the best ways donors can help NMT students is through establishing an endowed scholarship. With a commitment of \$15,000, donors can support New Mexico Tech students now and in perpetuity.

A donor's initial principal gift is invested with the NMT Foundation and 3.75% of the interest is awarded annually as a scholarship. Donors are able to name their scholarship and specify criteria like GPA, discipline, financial need, etc.

An endowment of \$15,000 will typically award a \$500 annual scholarship.

ONE-TIME AWARDS

Donors who are currently unable to endow a scholarship are still able to help students on an annual basis through one-time scholarship awards.

Typically, the minimum for one-time awards is \$2500. Donors who establish an award also have the benefit of naming their award and determining the award criteria.

Please contact the Office for Advancement and Alumni Relations at advancement@nmt.edu or 575-835-5352

Contact Us : Phone (575) 835-5353 | advancement@nmt.edu

www.nmt.edu/advancement

Worth the Wait

New Mexico Tech Celebrates
Class of 2022 During
Commencement

FASCINATING FACTS ABOUT THE CLASS OF 2022

For the second year in a row, New Mexico Tech Commencement was held at the Socorro Sports Complex and Rodeo Grounds. Families, friends, and more than 350 graduating students gathered to celebrate this important and joyful day.

Degrees awarded

- Two associate's, 240 bachelor's, six graduate certificates, 100 master's, and 10 doctorate.

Class Diversity

- Eight Socorro High School alumni, 88% undergraduate residents of New Mexico, and international students from 12 different countries.

Bachelor's recipients

- Six graduated with a perfect 4.0 GPA; 76% had a GPA of 3.0 or higher; class average was 3.34. 34% received at least one F.

- Ages of degree recipients ranged from 19 to 43

Most well-represented departments

- Mechanical Engineering: 49 bachelor's, 19 master's
- Chemistry: 4 doctorate

Historical numbers

- NMT has now awarded 6,947 bachelor's, 2,835 masters, and 432 doctorates



Chemistry Came to Life

It's no secret that New Mexico Tech alumni tend to have a special fondness for their former professors. You could even say that faculty are one of the secret ingredients that make this little school so great. A name that is often brought up by former students is Kay Brower. Known for his intellect and curiosity, Brower became a beloved mentor and role model to countless students during his 40 years at NMT.

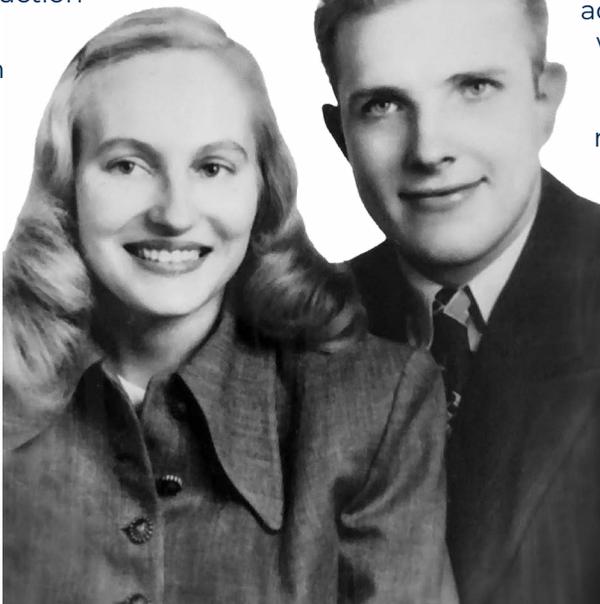
Those who have had the privilege of reading Dr. Brower's memoir, *The Life and Opinions of Kay Brower, Gentleman*, have been able to learn many fascinating and entertaining details of his life, from his early childhood in Wichita, KS to his years as a chemistry professor at Tech. It is difficult to briefly sum up the life of a man such as Kay Brower and his 300+ page memoir was just a start. We hope this article gives those who did not have the privilege of meeting him a glimpse into his life and for those that did, a jog to your memory.

AN EARLY PASSION FOR CHEMISTRY

Chemistry came to life for Brower through the chemistry sets he received as a young boy. In those days they included things like sodium cyanide and radioactive uranium ore. A particular set he received as a Christmas present allowed Brower to write with fire (potassium nitrate) and "inspired a lifelong fascination with powder and explosives."

An adolescent during WWII, the war's influence directed much of Brower's experimentation. At just fourteen years old, he made explosives such as mercury fulminate, nitroglycerine, and RDX in his basement bedroom. As part of the war effort, he wrote to military R&D offices in Washington D.C advising them on the production of military rockets.

During his senior year of high school, Brower was awarded a Pepsi-Cola scholarship which gave him a full ride to a university of his choice. Despite his excellence in academics, Brower admits to "having given no thought" to what college he might want to attend. A teacher encouraged him to apply to MIT. Brower was accepted and left for college a few weeks before his seventeenth birthday.



EDUCATION

One of the most significant events during Brower's undergraduate years came in 1947 when he met Elise Edfors on a blind date. He was instantly taken by her beauty, sense of humor, and musical talent. Brower completed his coursework in three years and proposed to Elise by letter shortly after. A job offer from Goodyear Synthetic Rubber Corporation sealed the deal. Elise arrived by rail a few days later and the couple was married. After two years of working as a chemist for Goodyear, the couple saved up a year's salary (\$4,000), enough for Brower to attend graduate school.

Brower's first graduate project at the University of Maine was so profound that it reinvigorated his advisor's research career. Brower was preparing chloromethane sulfonyl chloride when he noticed an intermediate reaction not recorded in the research. It turns out that, at just 22 years old, Brower had discovered a new class of organic compounds, methylsulfur trichloride.

Having completed his M.S. in just one year, the couple packed up once again, this time with their daughter Karen, (the first New Year's baby born in Bangor, Maine in 1951), and moved

THE LIFE OF DR. KAY BROWER



Don Bruce and Kay Bower 1945

to Bethlehem, PA so Brower could begin his Ph.D. work at Lehigh University.

Brower took an assistantship supported by the Research Corporation. For \$100 per month, he began experimenting with chemical reactions under high temperatures and pressures, an area that remained a central research interest for the rest of his life. Brower defended his Ph.D. on September 30th, 1953, the day after his second daughter, Candace, was born. He taught at Lehigh for a year and spent two years as a postdoc under Dr. Roger Adams at the University of Illinois while looking for a job in academia.

NEW MEXICO TECH

After three years struggling to find a job, two assistant professorship opportunities presented themselves.

The first was at Haverford College in Pennsylvania and the second at New Mexico Tech.

I received an offer from Haverford for \$5,000 for nine months and a telegram from E.J. Workman offering \$26,200. I had good reason to suspect that the intended figure was \$6,200, and I promptly informed Dr. Workman that I was pleased to accept....

Brower was very attracted to the idea of starting on the ground floor (NMT was rebuilding itself after the difficult WWII years), and he and Elise were quite taken with New Mexico's climate and topography.

The Browers were quickly welcomed to Socorro by NMT faculty. Dr. Schufle, professor of physical chemistry, picked the Browers up from the Albuquerque airport, as Kay and Elise had no car or even driver's licenses. Dr. Stubbs took the family to buy appliances and Dr. Buckwold gave them rides

Dr. Kay Brower stored my little-used bass under his kit-made harpsichord in their living room in vain hopes that I would practice weekly. Our fledgling chamber orchestra of 21 players played Haydn's "Trumpet Concerto" at our 12/5/1971 concert at the base of the stairs in the basement of the brand new Speare Library.

— Harry Briley, Computer Science 1976



to the grocery store. Once they saved up enough to buy a car (a new Volkswagen), Margie Sill, the wife of assistant professor Richard Sill (physics), gave Brower driving lessons.

It didn't take long for the Browsers to form friendships with fellow faculty members. They raised their children with the Sylvesters; were neighbors with Dr. Balk, Dr. Bhappu, and the Wilkenings; and backpacked with the LeFebres, Buddings, Renaults, and Colgates. Brower almost didn't make it back to Socorro after an adventure to the Gila with Colgate via his plane, the Vomit Comet. He describes the return trip home as "rare and unforgettable,"

I was taking movies as we cleared the ground and then put the camera down. Trees loomed up ahead and we obviously were not going to clear their tops. The edge of the mesa was very near. Oddly enough, my mental state was not fear but curiosity. At last I would know how it is to be involved in a plane crash. We plowed through a pinon tree which was shredded by the propeller. After a few more impacts we came to rest, and by some miracle neither of us was injured.

MUSIC

Of all the family's extracurricular interests, music was number one.

Brower had a natural fondness and ear for music. In his memoir, he recalls the strong emotion he felt as a child first hearing classical pieces like Liszt's *Les Préludes* and Mendelssohn's *The Hebrides* overture. He dabbled with playing the cornet growing up but it wasn't until he met and married Elise that his interest in music really took hold. He described Elise's talents while dating,

An additional point which carried great weight with me was her ability to play the piano better than any other non-professional I had ever met. Although my own development in musical performance was primitive, music had gained a powerful influence over me.

Brower's interest further deepened during his time in Houston with Goodyear. He and Elise attended the Houston Symphony and Brower spent slow graveyard shifts studying harmony and teaching himself how to play the flute. It was also during this time that Brower discovered an intense love for organ music, so much so that he wrote his own fugue and convinced Elise to learn how to play. As a M.S. and Ph.D. student, Brower took music courses alongside his coursework and research. Everywhere the couple went music was present in their lives.

One of their first music activities in Socorro was selling subscriptions for the Socorro Community Concert Association, helping bring notable

THE LIFE OF DR. KAY BROWER

names like Nichols Slonimsky to Socorro. After the Association disintegrated, the Browsers joined Drs. Alan Miller and Jacques Renault to establish NMT's Performing Art Series (PAS). Similar to the Association, the PAS's first set of concerts was funded through subscription sales. Elise also led one of NMT's first ever fundraising campaigns for a new concert grand piano.

It was said then and no doubt is still true: It is the Browsers who make music happen in Socorro.
– Corinne Rutledge, 50th anniversary sentiments to the Browsers

In addition to bringing outside music to Socorro, the Browsers were leading musicians within the community. Brower played the flute, recorder and violin, Elise was an accomplished pianist and organist, and their daughters Karen and Candace became quite talented on the violin and cello, respectively.

The family joined Dr. Clay Smith (baritone) in annual productions of Heinrich Schutz's "Christmas Story," Linda Keizer (flute) in the orchestra for NMT's first musical comedy performance, "A Funny Thing Happened on the Way to the Forum," and formed a chamber music group and ensembles with Dr. Marx Brook (recorder), Dr. Rousseau Flower (cello), Joe (piano) and Corinne (cello) Rutledge, Dr. Allan Stavely (bassoon), Dr. Ralph Ball (violinist & baritone), and many others.

Music was so central to their lives that they paid special attention to acoustics when designing their home. The entrance houses a pipe organ and music room where the family has hosted hundreds of receptions, classes, and productions over the years.

Kay has always been busy supporting all the musical projects. Imagine building harpsichords from scratch. He even made the tools he needed. He also made many recorders, a viola da gamba and a portative organ. – Marilyn Petschek, 50th Anniversary sentiments to the Browsers

KAY BROWER, SCIENTIST AND PROFESSOR

Arriving at NMT, Brower quickly got to work continuing his graduate research on chemical reactions under high temperatures and pressures.

Brower was a pioneer in measuring reaction rates and equilibrium constants as a function of pressure. – Dr. Carl Popp

New Mexico Tech was not equipped to support such experiments, so one of Brower's first goals was to build his own testing equipment. With funds supplied by President Workman, Brower built his own oil bath, mercury-contact temperature controller, and glassware. Brower had developed glassblowing skills while at UMaine and, with some training from Drs. Brook and Workman, he also learned how to use a lathe, becoming a skilled machinist as well.

With some help from the machine shop I built an insulated stirred oil bath about 18 inches deep with an electric stove heater and an immersion heater for control.... For containment of the samples and communication of pressure I made glass tubes of 2–10 ml capacity with a test-tube and a constricted neck with an opening of 3–5 mm.

The chemistry department was arranged so Brower had a dedicated lab for his high pressure experiments. Despite the inherent dangers, he had very few accidents, mostly because of his awareness and meticulous attention to detail.

Brower also had research interests outside of organic chemistry. One of his students, David Hughes (*Chemistry*, 1977), describes a few of his other projects,

...Dr. Brower had many research interests outside of organic chemistry. Since he had high pressure chemistry, one project was determining if coal could be liquefied. Much of the coal in New Mexico is too deep to be mined so the only way to extract it would be by liquefaction. This involved heating coal under pressure at 350–400°C in solvents. He published a number of articles on the mechanism of coal liquefaction. Another project was building a solar reflector to heat water. That was a personal project that no students were involved with. I don't know where this ended up but in the mid-1970's he was far ahead of the curve in seeing the opportunities for harnessing solar energy. Today small scale solar reflectors are in use in many countries where it is difficult to obtain energy from traditional sources.

Brower also became interested in building astronomical telescopes, a hobby that grew out of his interest in photographic lenses. This caught the attention of Dr. Brook and the two designed and built one of the first telescopes at Tech, used to observe lightning. From that effort, the astronomy club was born and despite being a trained chemist, Brower served as chair the first few years.

Chemistry and music were Brower's passions but from sentiments shared by our alumni, it seems being a professor was his calling.

In the first meeting of the organic chemistry course I try to describe the rewards of knowing the subject. It should give one the same kind of feeling of satisfaction that comes from the arts and humanities. Organic chemistry has a coherent pattern like musical composition, or a body of literature, or an era of history.

From a young age, Brower practiced the deep learning of fundamental concepts rather than mechanical rote learning and memorization. His teaching reflected this philosophy and he required his students to be able to justify basic laws, theories, and all their operations. He didn't require this without instruction, however. Brower paints a great picture of how he approached teaching,

...I invite students to ask questions about particular problems, and I pretend to be a student faced with confusion and uncertainty about how to proceed. Sometimes I look up a key term in the index and remind students that they can do the same. I sometimes intentionally explore an approach which I know will lead to a dead end, and then adopt an alternative route. I vocalize all of my thoughts as I feel my way through the problem.... I believe this teaches by example the strategic aspects of problem solving.

Brower taught countless undergraduates and dozens of graduate students throughout his 40 years at NMT, naming many in his memoir. His first research assistant, Don McKelvey (*Chemistry, 1960*), shares the impact Dr. Brower had on him,

In my senior year I had the privilege of doing my research project under Dr. Brower's direction. This proved to be the single most valuable educational experience that I encountered during my stay at New Mexico Tech... Dr. Brower's accomplishments as a research chemist are well known to and respected by other chemists

world wide. Less well known but of even greater importance are the differences he has made in peoples' lives through his teaching. Not only was he a teacher of chemistry but his exemplary lifestyle surely had a positive influence on many young lives. *Don McKelvey*

THE BROWER LEGACY

After 40 years as a Professor in the Chemistry Department, Dr. Brower retired from NMT in 1996. He and Elise remained in Socorro, enjoying PAS shows and local music groups among other pursuits and hobbies. Kay Brower passed away on January 4, 2014 at the age of 85.

Kay's and the family's legacy lives on through the many chemistry and music students who have passed through the Brower classroom and home but also with their ongoing support of students through an endowment the family established over 20 years ago. The **Kay and Elise Brower Music Scholarship** provides support to NMT's many musically gifted students and has helped over 50 students since it was established.

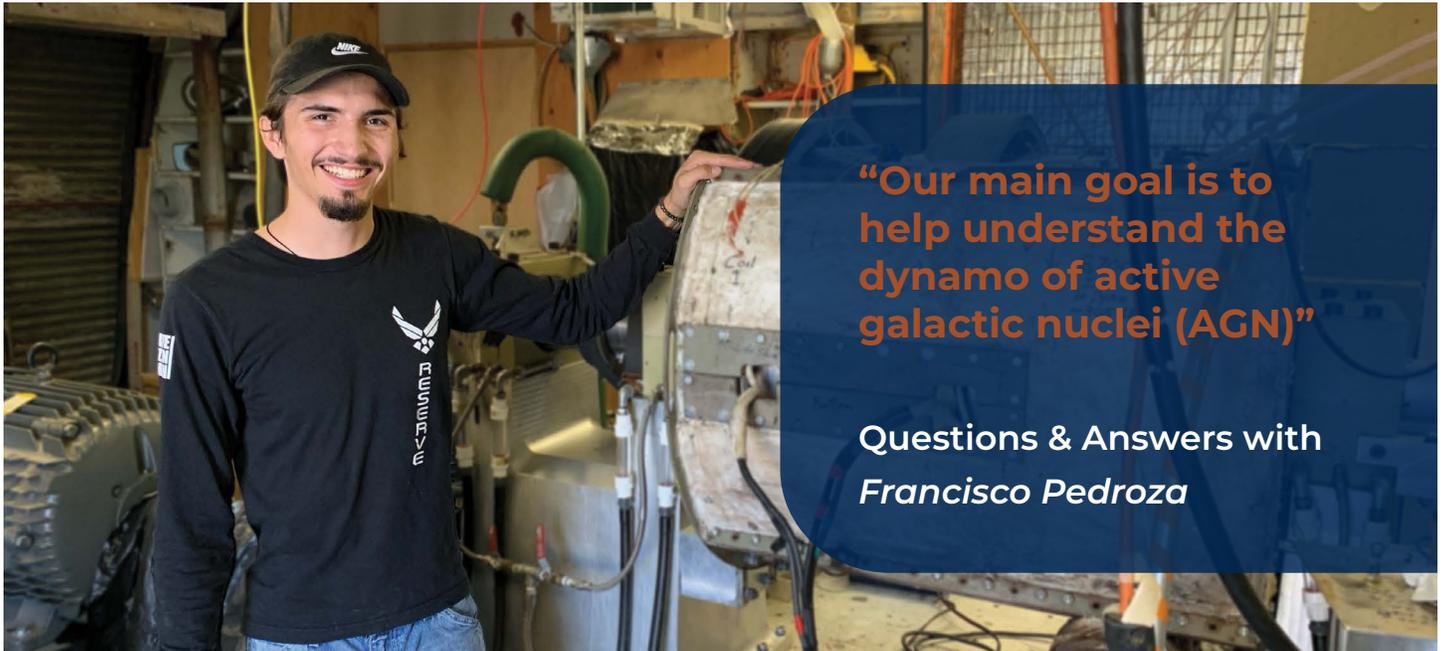
Dr. Kay Brower's legacy also continues through the students who credit him with their career trajectories and successes. In 2000, Dr. Don McKelvey established the **Dr. Kay Brower Scholarship** to honor his former advisor. The endowment has grown to over \$200,000 and provides a \$5,000 scholarship to a student each year.

Additionally, earlier this year an anonymous donor pledged \$100,000 to establish the **Dr. Kay Brower Graduate Assistantship**, hoping that the gift will inspire those influenced by Brower to contribute as well. Once endowed at \$1M, the Dr. Kay Brower Graduate Assistantship will fully fund a graduate assistantship in chemistry.

If Dr. Brower made your student experience special and contributed to your career trajectory or success, you would like to help fund the Dr. Kay Brower Graduate Assistantship, donate [here](#).

UNDERSTANDING THE UNIVERSE

FRANCISCO PEDROZA, STUDENT



Q: Where are you from?

A: I was born in Las Vegas, NV and moved to Shiloh, IL to complete high school. I graduated in 2018 with a high school diploma and two associates degrees, then brought my academic career to New Mexico Tech.

Q: Why New Mexico Tech?

A: Of the few schools I applied to, NMT was one which offered the best prospective future for me. The physics department offered an Astrophysics degree and I was immediately enticed. New Mexico is also a hub for R&D, so I saw it as opening more doors to opportunities.

Q: Do you plan on going to graduate school?

A: Yes, I am currently enrolled in graduate school starting in Fall 2022 here at NMT.

Q: Why astrophysics?

A: I was always drawn to the universe outside of this world, and I always pondered the mysteries of the cosmos. As I went through my earlier academic pursuits, I discovered I enjoyed physics and had a desire to learn more. I chose astrophysics because the Universe is everything, therefore it must be known.

Q: What is your favorite thing about your field?

A: I think my favorite aspect of astrophysics is how many assumptions you can make if they're "correct" assumptions, haha.

Q: Are there any lessons or lectures from your undergraduate years that stand out to you?

A: In my time at NMT, there have been many great lectures. Of course, I am biased to say I enjoy my astrophysics classes the most, but classes like quantum mechanics and thermodynamics are really intriguing. As I progressed through my undergraduate program, I slowly saw how all of the physics tied together and it's a really fun feeling.

Q: Is there a professor at Tech that you feel has become a mentor or guide within your field?

A: The physics department here is one large distant family all under one roof. Every professor has been influential in their own unique way, and for that I give thanks.

Q: Is there a project or program you have seen that piqued your interest?

A: Yes, the [New Mexico *aw* Liquid Sodium Experiment](#), which is designed to help understand how the magnetic forces and fields of cosmological bodies are created.

UNDERSTANDING THE UNIVERSE

FRANCISCO PEDROZA, STUDENT

The primary reason to build such an experiment is to better understand the role of electromagnetism in creating and controlling large scale structures we observe in our universe.

Specifically, in our model, we are modeling an accretion disk, like the one that exists around the black hole which was photographed in 2019 by the Event Horizon Telescope. We use liquid sodium to help simulate the magnetic fields, allowing us to induce “dynamo action.” This means the flows induced in the liquid sodium were specifically designed to increase the strength of an externally applied magnetic field. Some experiments achieved no dynamo gain and other achieved a gain of 200%. In 2011, the New Mexico Tech Dynamo achieved an 800% gain. No other experiment in the world has achieved such a strong result using natural, unconstrained flows.

Our main goal is to help understand the dynamo of active galactic nuclei (AGN). These are galaxies in which the accretion disk about the super-massive black hole in the center becomes magnetically excited, producing giant jets of ionized matter and displaying an act of enormous magnetic energy.”

They model the environment one would find in the nucleus of an active galaxy. These nuclei occasionally have million-light-year jets emanating from them, due to the superheated accretion disk around a supermassive black hole in dynamo action.

How do these disks create such powerful, concentrated beams of matter that span the cosmos? How does nature hold a positive feedback loop for magnetic fields at such a scale? These are questions that can be answered by the [New Mexico \$\omega\$ Liquid Sodium Experiment](#).

Q: Is there a specific project you have worked on that you hope translates to your career?

A: I am grateful to be a part of the New Mexico ω Liquid Sodium Experiment. I plan to use this project as the focus of my graduate studies and possibly a focus for my career.

Q: Do you have your eye on a specific company or organization after your schooling is finished?

A: I don't have any particular company in mind, but I do want to stick to the astrophysics/physics discipline.

Q: What has been your favorite, or most memorable, NMT experience?

A: No one memory stands out, but rather the entire NMT experience was memorable.

Q: Is there a Tech alum or professor that you want to meet?

A: I don't believe Jean Eilek is a part of Tech anymore, but it would be a pleasure to meet her.

Q: What would you ask if you had the opportunity?

A: I would love to inquire about the realistic potential benefits of such a machine like the NM Liquid Sodium Dynamo and poke her brain for some astrophysics with some ideas of mine.

Q: What do you do in your free time?

A: If I am not working, I will typically play video games or make music. I try to stay active as well, doing my best to keep a consistent gym schedule.



Pedroza in the lab

UNDERSTANDING THE UNIVERSE

DR. KEVIN NOVO-GRADAC, ALUM

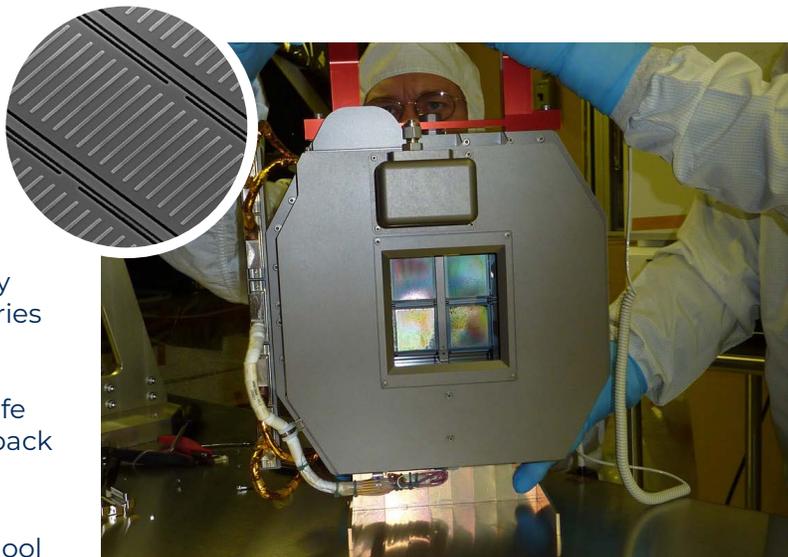
I come from a blue collar working class family in Kansas City, KS. I came to New Mexico Tech because I wanted to earn a college degree in the sciences and Tech offered me a decent scholarship and financial aid. I majored in Geology (*B.S. Geology, 1980*) as an undergraduate and continued at NM Tech for a Masters in Chemistry (*M.S. Chemistry, 1983*). I remember my classmates fondly and have a lot of good memories from our adventures. I also remember several faculty members from Chemistry, Geology, and CS, especially Carl Popp and Clay T. Smith. My wife Anne-Marie is from Socorro, and we may move back there eventually.

I received my Ph.D. in Chemistry in 1989 at the Ohio State University in Columbus, OH. After school I went to work for an EPA Research Lab in Athens, GA. I helped develop the geochemical speciation model MINTEQA2 and performed speciation and transport analyses for some of the worst Superfund sites. I moved to Maryland when my wife accepted a faculty position at the United States Naval Academy. I first worked for an environmental firm and did ecological and human health risk assessments. From there I went to work for the Maryland Department of the Environment as the Chief of the Toxics Assessment Division.

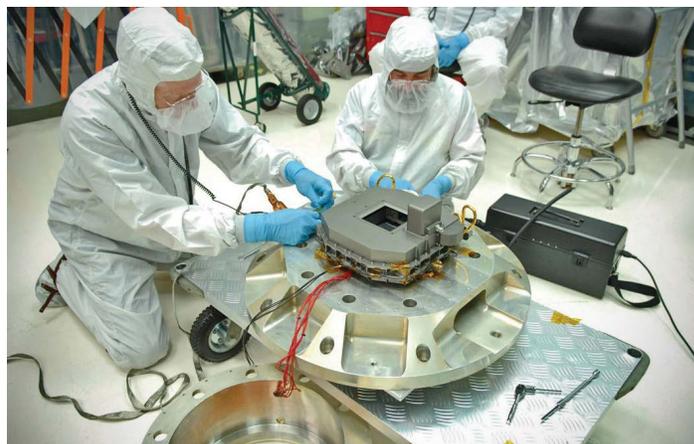
By this time my wife was working with a group at NASA Goddard Space Flight Center (GSFC) on the development of space based lasers. The lasers were suffering failures due to contamination and when her colleagues learned of my expertise, they asked me to consult on the project. This first led to a consulting position and later an offer for a full time position as a contractor supporting the James Webb Space Telescope (JWST). So I have gone from geologist, to chemist, to geochemist, to toxicologist, to engineer. I hate to admit that I have never taken an engineering class.

I worked on JWST for about 15 years at GSFC. I was first assigned to the overall mission, but that quickly turned into a focused effort on the Near InfraRed Spectrograph (NIRSpec) Detector System (DS) and Microshutters System (MSS). I worked as a lead on those subsystems from about 2005 to 2012.

We delivered MSS to Astrium in Germany in June 2010, to be integrated into the NIRSpec instrument. A very real fear was irreversible stiction from high humidity, so we shipped MSS under active dry purge to Germany on a military flight, aboard a



MSA and MSS. Individual microshutters are 100x200 microns (inset).



MSA being prepared for acoustic and vibration testing at GSFC. (Novo-Gradac on the right)

Galaxy C5 cargo carrier. I think we only had three or four pallets on the entire plane. The cockpit was comfy, but climbing ladders during flight to check on gas flow rates was interesting.

MSS and DS both spent several years in Germany, and that required me to make multiple trips there for deliveries, repairs, integration, and cryovacuum testing both at Astrium and IABC.

The MSS arrays are a very effective trap for micro-fibers, which is why we painstakingly removed all dirt and fibers from the assembly. The ends of fibers can get trapped in individual openings during vibration or acoustic testing. Most of the

UNDERSTANDING THE UNIVERSE DR. KEVIN NOVO-GRADAC, ALUM



Just before the lift of ISIM into the primary mirror back plane. We are going over all the steps to make sure no one has any issues. Novo-Gradac fifth from the left.

time, both ends of a fiber would get stuck in an array. The repair process was to pull the ~15 μm diameter fibers and then repair the damage with something like a 400x400 μm silicon patch with a small dab of epoxy. We ended up having to do those repairs in Germany. Every day we were taking a chance of putting a hole through one of the arrays; first on removal and then as the patch was pushed down onto the thin silicon for bonding. We could usually only do one fiber repair per day. Damage at that point would have been a big deal since MSS cost a few hundred million dollars.

I also worked on the flight software for MSS to make sure the arrays did not collect water/ice during the cooldown phase of spaceflight. In fact, they tracked me down on Christmas day just after launch in case we had to alter the code during flight. We monitored the progress closely and no updates to the flight code were necessary.

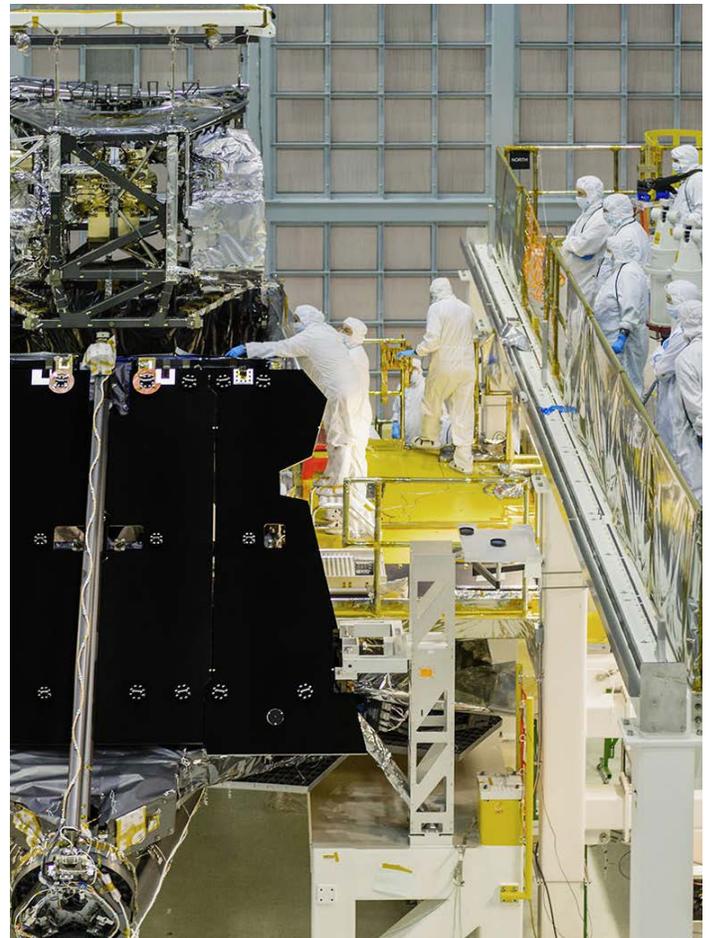
After DS and MSS were delivered to NIRSpec, I moved up to the Integrated Science Instrument Module (ISIM). In that role, I worked hands on with all the instruments at varying levels, I also became one of the lead engineers for ISIM. I supported Integration and Testing (I&T) which included the cryovacuum tests at GSFC in the space environment simulation chamber.

The integration and testing of ISIM also took a long time. I worked on ISIM from about 2012 to 2016. The three cryovacuum tests each ran for months and we held the hardware at a temperature of

30 K during those tests. That posed a lot of challenges that were complicated by blizzards, power outages, and a lengthy government shutdown.

There weren't that many people who actually touched the hardware or went into the vacuum chamber to work with the hardware. We had a tightly controlled list, key card access, and for certain times an armed guard to prevent people seeing what we were doing or causing harm. JWST at this point was considered a national asset. There were many more engineers and managers, many of whom never got into the same room with the hardware.

My work did not end with the integration of ISIM with the Optical Telescope Element (OTE). I continued as an ISIM lead for quite some time, working to resolve issues and supporting optical testing of the instruments with the OTE.



ISIM being lowered. Novo-Gradac on upper right platform.

UNDERSTANDING THE UNIVERSE

DR. KEVIN NOVO-GRADAC, ALUM

After integration with the mirrors, cryovacuum testing required an even larger chamber so the hardware was moved to Chamber A at Johnson Space Center (where they tested Apollo). I spent time there supporting those test at the Thermal Vacuum facility and Mission Control. Both are considered historic sites.

MSS was one of the most challenging parts of this telescope - it was technology created specifically for this mission. This was a very long project, perhaps the longest ever for NASA, and I earned a number of performance awards from NASA and the European Space Agency, including an Exceptional Public Service Medal.

Since JWST launched in December, a lot has happened. JWST just completed the commissioning phase on orbit and has only just begun science operations. On July 11-12 NASA released the [first science images](#) and they are amazing.

They also announced that the telescope will have enough fuel for 20 years, when we had planned for five. The launch went extremely well, so very little spacecraft fuel was used to move into the L2 orbit. This is a very good thing since the telescope cost \$10 billion to build.

President Biden released the first image on July 11, a deep field image filled with galaxies. They used microshutters to take the spectra of some of the distant galaxies. It was exciting for me that President Biden mentioned microshutters by name.

The next morning, July 12, GSFC released the rest of the five raw images. I was present for that event.

These images all have associated annotated science images to accompany them, [available online](#). The amount of detail is awesome even without downloading a high-res image and zooming in. On the evening of July 13, NOVA ran a special called "Ultimate Space Telescope."

I am now working on a new mission, [PACE \(Plankton, Aerosol, Cloud, ocean Ecosystem\)](#), that is currently undergoing some big reviews and tests. We recently passed the Pre-Environmental Review which means we can now move onto environmental testing; it took about a month to prepare for the two-day review. Soon we will start the thermal vacuum tests of the Ocean Color Instrument (OCI) which is the primary instrument on the mission.

I am currently a Chief Engineer with ATA Aerospace. Our contract with NASA ends in a couple months so I am not sure what comes next. Looking back, I'm not sure I could have planned to get here, much less having the President discuss things that I was a lead on. I just used what I had learned and tried to make the best of it. It didn't always work, but sometimes it did. It was indeed a strange path.

My daughter Sophia is now attending Tech and is in her senior year majoring in Computer Science and double minoring in Explosives and Mechanical Engineering. She has interned with Northrup Grumman the past two summers and they have her working on the Space Launch System thruster design for NASA. It looks like she, too, will be headed into aerospace from New Mexico Tech!

NORMAN BANKS



After receiving a BS (1962) in geology at NMIMT (2 years as a Coop student), I worked my way through a PhD (1967) in Geology/Geochemistry at USCD-Scripps and spent the first 11 years of my 32-year career with the USGS on Cu-Pb-Zn-Mo deposits, mostly in Arizona out of Menlo Park, California. In the following 21 years I moved from the plumbing systems of volcanoes into studying/monitoring/forecasting active volcanoes out of the Hawaiian and then the Cascades Volcano Observatories. I conceived, developed, and led the USGS-OFDA volcano disaster assistance team and program and applied it to most of the countries with active volcanoes around the Pacific, and eventually ended up at my current home in Vancouver, Washington. I also did a late-career 2-year stint as Science Officer in the Embassy in Chile.

2012: Zinfandel Crush

Along the way, I learned wine making (54 years) and vineyard care (37 years) and have been a commercial winemaker off and on for the past 16 years. During Covid isolation, I took up charcuterie and other meat curing; thus, there is no need for a deli nearby us or our two daughters living in Oregon and Washington. We grow our own organic vegetables and fruit and recycle everything that can be repurposed, composted, or fed to our worm farm. Wow, my life story since NMIMT in less than 230 words. Pretty dull huh?



2021: Elk (dark) and Soppressa Salami (aged 96 days)



April 1983: Kilauea Volcano- collecting vent spatter

PEOPLE YOU KNOW

NIRUPAM CHAKRABORTI



(M.S. 1979, Metallurgy) - I have retired from Indian Institute of Technology and now joined Czech Technical University in Prague as a fulltime Visiting Professor in the faculty of Mechanical Engineering. Established in 1707, this is a premier university in the Czech Republic.

I arrived here on June 1, 2022 and am enjoying this vibrant campus and the beautiful town.

**CTU Campus
Mechanical Engineering**

BRANDON LUTZ



**Lutz Family,
Colorado**

(Ph.D. 2021, E&ES Geology) - I just wanted to share my gratitude to New Mexico Tech for a great geoscience education. I completed a Ph.D. at NMT in Earth and Environmental Science (E&ES), with focus in Geology, from 2016-2021. NMT, New Mexico Bureau of Geology and Mineral Resources (NMBGMR), and the National Science Foundation supported my awesome education during those years. I was able to take many advanced courses, attend dozens of conferences to expand my professional network, attend dozens of field trips both through NMT and through the Geological Society of America, and utilize state-of-the-art laboratory facilities at NMBGMR. I had full access to state-of-the-art software packages used for structural geology modeling and other numerical modeling.

Just being in the central Rio Grande Valley gave me years of exposure to awesome geology, which were instrumental in my development as a geoscientist. I also got to teach courses while at NMT, which improved my resumé and helped me land a Visiting Assistant Professor position at New Mexico State University during the final year of the Ph.D. I worked briefly for a gold exploration company in beautiful eastern Oregon from September 2021- March 2022. Then I finally obtained a permanent position: Research Geologist at USGS. Special thanks to the E&ES department for a great graduate education and helping me land my dream job.

ESHANI HETTIARACHCHI



Hettiarachchi
(2nd from right) at
EIA Mixer

I earned my Ph.D. in Chemistry from New Mexico Tech in 2020. I am currently a postdoctoral researcher at the Department of Chemistry and Biochemistry, UC San Diego. Here at UCSD we have a volunteer-run program named English in Action (EIA) which caters to international students and scholars who are in need of assistance to improve their English language skills. I volunteer at EIA as a mentor to two graduate students from China. We meet every week for about two hours to chat just about anything.

EIA has been a wonderful experience so far. Sharing each other's cultures and exploring the food culture here in San Diego are some of the fun activities we've participated in. One of the students I am meeting with enjoys hanging out with my cat Pixie while we keep our conversations going. Overall, EIA has helped me create long-lasting friendships.



Pixie

DIANA GRIFFIN



(B.S. Physics, 1989) - I've worked all over the USA and most people have never heard of NMIMT, a/k/a New Mexico Tech. I often tell the old joke "I went to New Mexico Tech – and I graduated!" I went to NMT from 1989-1993, and I remember when South Hall looked like a Motel 6 before it got all of the stucco added :)

Last year I was working on terrain navigation and hazard avoidance for the Firefly Aerospace Blue Ghost autonomous lunar lander in Denver for Deep Space Systems. Since this past March I'm now at the Marshall Space Flight Center in Huntsville, AL doing trajectory analysis for the upcoming Mars Ascent Vehicle that will be the first rocket ever launched from the Martian surface to send the first soil and rock samples from Mars back to the Earth.

Aside from that, my life isn't too exciting, still single and working in VR for synthetic vision and flight simulation.

PEOPLE YOU KNOW

MORRIS WORLEY



Morris Worley

(B.S. Mining Engineering, 1958) – Old Miners Never Retire

When I retired as COO of Rayrock Resources in 1999, I envisioned laying aside my hard hat and boots and transitioning to a life of ease. But it was not to be. Retirement just wasn't in the cards. After three years as a Christian worker in Central Asia and a one-year stint managing the manufacturing sector development program at NMSU-Carlsbad, I found the perfect gig.

For the last 18 years I have managed a small surface mining operation for Honeywell in the desert of southeast Arizona. We mine a specialty mineral called chabazite that is used in the petrochemical industry as an absorbent to remove sulfur molecules from natural gas processing streams. Ore is mined by hand, broken into chunks, hauled to a rail siding in Bowie, AZ, and shipped to a grinding plant in Baton Rouge, LA. Ground ore is then shipped to manufacturing plants in Mobile, AL and Reggio, Italy. The finished product is marketed worldwide.

I have been able to maintain my basic mining and management skills as the planner, administrator, regulatory affairs contact, and safety officer. At 86, I still prove the old adage that miners never die, they just dig the hole a bit deeper.

MITCH AND NANCY BILDERBECK



Freya Beckenstrom

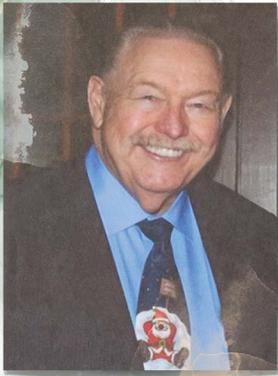
Mitch (B.S. 1977, Petroleum Engineering) and **Nancy** (B.S. 1976, Biology) welcomed their first grandchild, Freya Beckenstrom, into the world in October 2021! The Beckenstroms reside in Oxford, not far from the Bilderbecks in London.

Freya is one of the many miracles of modern medicine and an advertisement for STEM education!

In the Spring of 2022 all travelled to spend a month in Taos for an introduction to green chile!

Randol (Randy) Wayne Bradford

(B.S. Petroleum Engineering, 1971), Died Monday, June 6, 2022, at Parkview Skilled Nursing & Rehab in Big Spring, TX. He was born June 6, 1944, on D-Day, in Clovis, NM, to O.L. and Virgie Bradford.



He graduated from Clovis High School in 1962 where he was a proud member of the Clovis Wildcat Marching Band. After graduating from New Mexico Tech he worked for Freeport-McMoran in New Orleans, LA for 25 years before retiring. After retiring from Freeport-McMoran, he moved to Houston where he worked for OSI before starting a consulting business. He traveled extensively including consulting for Schlumberger in Cambridge, England for two years. He was then approached by a colleague about starting a new business. He co-owned and operated Tammany Oil and Gas. He received three patents related the oil industry.

He was known for his generosity and kindness. He was an avid gardener, a New Orleans Saints and Houston Astros fan.

He was preceded in death by his parents, two infant brothers, and a brother-in-law, Ernest Holt. He is survived by two sisters, Mary Beth Holt and Vernice Moore (Robert). He is also survived by two nieces, Deidra Houston (Kevin) and Bambi Hodges (Tim); two nephews, Brad Moore (Tamara) and Shad Holt (Jacque); and several great-nieces and great-nephews.

As per his request, his body was donated to the Texas Tech University Health Science Willied Body Program and no services were held.

Jon Michael Collis

(B.S. Mathamatics, 2001) On April 21, 2022, after a tragic accident, our beloved brother, son, father, cousin, and nephew Jon Michael Collis passed away in his sleep. He was just forty-six.



Born in Albuquerque on February 20, 1976, he was the son of David Collis and Jill Shortencarier (née Bish). The family lived in Socorro, NM, where Jon, his younger brother Steven, and their friends passed immeasurable hours playing among the cottonwoods lining the Rio Grande. Jon, always enthusiastic, criss-crossed the town on his bike, ever seeking the next adventure: at the golf course, by the river, along the many ditch banks, in Water Canyon, in the “forest” near his home, at friends’ houses, and at school. He was part of the generation who grew up with video games, computers, laser tag, VHS tapes, cable tv and walkmans and he embraced it all.

While in junior high, he fell in love with science and research. He participated in state championship Science Olympiad teams, and by the time he graduated to Socorro High School, his love of

IN MEMORIAM



learning was entrenched. He graduated in 1994 with high grades, membership in the National Honor Society, and a thirst to investigate the world. He received a scholarship to New Mexico Tech and enrolled immediately.

The next decade was one of education and exploration. While working on his schooling, he fell in love with rock climbing. For years, he bouldered and top-roped every climbable surface he could find, including buildings on the various campuses where he studied. And they were many: he graduated from New Mexico Tech in 2001 with a bachelor's, from Colorado School of Mines in 2003 with a master's, and from Rensselaer Polytechnic Institute with a PhD—all in mathematics. He walked that final stage in the spring of 2006.

Along the way, he married Monique Deforge, and they welcomed their daughter Sage into the world.

After his formal education, Jon joined the Woods Hole Oceanographic Institution in Falmouth, MA, where he began research into underwater acoustics as part of his post-doctorate training. He and Monique then welcomed a baby boy into their family, Rohin. There, along the Northeast coast, the family played in the surf, climbed whatever mountains they could find, and embarked on a future of research and discovery. Even after his divorce, Jon remained close to Monique, and the family enjoyed many adventures together.

In 2008, Jon rejoined Colorado School of Mines, this time as a professor. He continued his groundbreaking work and spent his free time exploring the Rocky Mountains skiing, teaching his nephews how to climb, visiting his sister Michaelann and her husband John, camping with family, enforcing strict rules for family card games, and hanging out with his brother and his

wife Jerusha. Jon treasured the close friendships he developed with countless colleagues throughout his years of schooling and research.

In 2015, Jon accepted a position as a researcher at Lincoln Laboratories, part of the Massachusetts Institute of Technology. Over the next seven years, Jon worked on cutting-edge research that took him across the globe, including on multiple trips to the Arctic, where he collaborated with other scientists and the crews of nuclear submarines on complex research related to how sound travels underwater.

In April 2022, Jon suffered a head injury from an accidental fall. He died in his sleep a few days later from undetected internal bleeding. After his passing, his home, completely unstaged and exactly as he left it the last night he went to bed, revealed what he truly valued in this world, deep in the core of who he was: his love of climbing, camping, science fiction and fantasy, New Mexico, all things eighties, his mom and dad and siblings and cousins and nieces and nephews and stepmom Carolyn and stepdad Mickey, friends, his research, and—above all else—his children . . . their pictures hung on every wall, and the gifts and cards they gave him over the years were on nearly every shelf and in every drawer.

Jon will be missed greatly.

For those who would like to honor Jon's memory, the family has established the [Dr. Jon M. Collis Memorial Scholarship](#) at New Mexico Tech and would welcome donations so that it can have as great an impact as possible for future mathematics students. Jon would have liked that.

Ethan Eilertsen

(B.S. Mining Engineering, 1987) died in February 2022 at home in Colorado. Though born in Connecticut, Ethan always said he was “from Vermont.” Vermont held a special spot in his heart from the early days of family vacations spent in Corinth, VT, where they later moved. In Connecticut, he earned his Eagle Scout rank in the Boy Scouts, raised animals for 4H, and worked summers on Star Island NH, all of which helped shape the adult he became.



After a brief foray into surveying, Ethan drove his Chevy Vega across the country to study Mining Engineering at New Mexico Tech, where he thrived. He made life-long friends, including his wife-to-be **Terry Borzillo** (B.S. Mathematics, 1986).

A “non-traditional” career route took him from quarry blasting to explosive metal bonding to metal fabrication engineering, and finally to aerospace manufacturing engineering. He was so proud to work at Ball Aerospace and to have some of his work end up in space.

At home, Ethan was an accomplished guitar player, a skilled carpenter and builder, an exceptional model railroader, a train enthusiast, and a friend to all animals. He enjoyed all the work that comes with rural living, and could build or fix just about anything. There was never enough time to do everything he wanted to do.

Ethan is deeply missed by his wife of 33 years, Terry Eilertsen; mother Jen Brooks-Wooding; sister Carrie Nygren (Lars Nygren) and nieces Linnea Hogle and Julia Hogle; sister Amy Eilertsen (Ralph Hoehn) and nephew Matthias Eilertsen; and numerous cousins, friends, and colleagues.

If desired, memorial contributions may be made to:

- The [Wild Animal Sanctuary](#), home to rescued tigers, bears, and lions, and where Ethan had planned to volunteer when he retired;
- [New Mexico Tech](#), where lifelong friends were made, and where Ethan’s education in mining engineering proved robust enough to support his shift to aerospace;
- Or your local animal shelter.





Yesenia Estrada

(B.S. Mechanical Engineering, 2019) Her sister T.J. Wray wrote, "But how can I learn to live in a world that doesn't include my sister? All my life, I've always been my sister's sister; it's part of my identity, part of who I am. My sister is part of my past; we share a common history. And we had plans for the future."



Yesenia was a light, a force of her own.

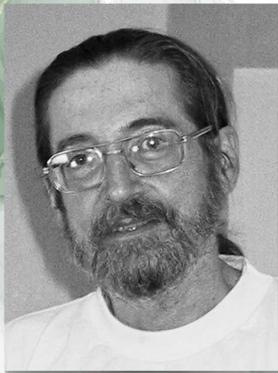
Strong minded, witty, wise, caring, the list can go on.

It seemed like she always knew what to say no matter the situation.

Yesenia was a role model to many. At a young age she coached soccer teams and led a youth group at her church. She enjoyed cooking and baking. She also enjoyed anything to do with crafts and she always excelled at them. There was not one thing she set her mind to she didn't accomplish. Even at the end she overcame so much. She will be dearly missed.

John D. Hawley

(B.S. Physics, 1974) Passed away at home on March 24, 2022 at the age of 70 years. He is survived by his brother, Michael C. Hawley, his sister-in-law Heidi, and eight nephews and nieces.

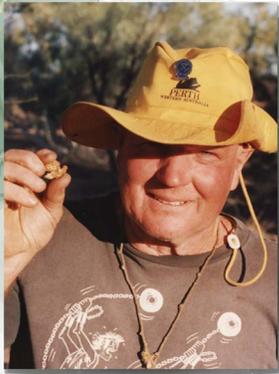


John was born in 1952 and spent his growing-up years in several towns throughout the western states, as his father was with the U.S. Forest Service. In these years John developed a lifelong love for nature, science, and the environment. The forest also impacted his gentle spirit and led him to always be open, welcoming and generous with his attention and his belongings.

After graduating from New Mexico Tech in 1974 John worked with the Crystal Ball Collaboration at Stanford Linear Accelerator Center in Palo Alto, CA, and at Lockheed Martin Advanced Technology Center of Palo Alto, where, among many other things, he wrote imaging software for new and amazing X-ray photographs of the sun. For several years, John was the hardware lead on the ranging system of the Airborne Laser defense system, which was among the highest performing subsystems of that huge project.

After retiring from Lockheed, John moved to Socorro, NM and lived with closest friends Candace Lindquist and Richard Sonnenfeld in a rambling house on the Rio Grande. "Uncle John" was much beloved also by their sons Thaddeus and Cody, and contributed his own passions for fantasy gaming and science fiction to their lives. On John's passing, Thaddeus commented, "A wizard is never late, nor is he early, he always leaves precisely when he means to."

Marvin W. Ratcliff



(M.S. Economic Geology, 1962) Passed peacefully on February 16, 2022 after a joyous day spent laughing, being a comic, and telling stories. He was born in Los Angeles, CA on May 30, 1931. KS. Marvin had one older brother, Rollin, and the bond between them was always about a good laugh. They were raised on a rabbit ranch in Escondido and the family enjoyed sailing off Catalina Island when times were good.

Marvin loved rocks (the more gold the better), clowning, tennis, hunting, philosophy, stained glass, antiques, oil painting and a myriad of other things.

The day after his 18th birthday he left California and started his cowboy life in Arizona. He was a plumber's assistant part time and a part time student at Northern Arizona University (NAU).

He was a student so long that the professors told him to just pick a degree and graduate. So he selected geology. During this time he met Dorothy in the NAU library; they married shortly after in Albuquerque while he was studying at New Mexico Tech. He completed his M.S. in Economic Geology and off to the exploration fields they went!

Marvin's work included chasing precious metals with employers including Cyprus Amax, Phelps Dodge, Bunker Hill, Anaconda Co., Atlantic Richfield Corp., Western Minerals Exploration, and GoldSil Mining & Milling. He started his career in his 30's and enjoyed both underground and surface geology. The education bug got him again early in his career so he pursued post-graduate studies in economic geology and mining engineering at the University of Arizona. This gave him the opportunity to study the geology and geochronology of the Marysville (MT) district.

Aside from his geology career, which took the family to mining camps all over the west (including Bisbee, Kellogg, Butte, Park City (UT), Nye (MT), and then Helena), Marvin had many hobbies and interests. Playing a mean game of tennis or having tennis lessons; a good verbal bout at Toastmasters over some sixty years; his enjoyment of clowning; philosophizing; stained glass work – he restored so many antique windows and developed some beautiful and complicated creations – and creating beautiful oil paintings of outdoor and mining settings.

The days that seemed to make him happiest generally involved a rock pick high in the mountains with family and dogs. He would want you to find your happy place and involve those you love.

Marvin is survived by daughter Sonya (Scott) Rosenthal, son Russ (Kendall), granddaughters Erin (Jake) Eveland with granddaughter Lily, Anita (Peter) Mathews, and Jeana Ratcliff.

In lieu of flowers, please consider sending a memorial gift to the [Shriners Children's Hospital](#) or Algeria Shrine, PO Box 1174, Helena, MT 59624.



Thomas G. Schott

(B.S. Geology, 1990 and MS Mineral Engineering, 1995) Passed away on June 26, 2022 after a determined, admirable, and courageous battle with cancer; he died at home where his entire family was with him.



Thomas was born June 14, 1964 in San Francisco, the only child of Frank H. and Ruth (Hallermann) Schott. Tom lived in California and then in Iran until the Shah was overthrown, with his parents traveling extensively overseas during his pre-college days. Transferring from Diablo Valley College in the Bay Area, Tom graduated from New Mexico Tech with his B.S. and M.S. degrees. Thomas' thesis study in the Superior District of Arizona provided early evidence of a larger orebody in an underexplored part of that district.

Following graduation, Thomas married his college sweetheart, Kim Floyd, and went to work for ASARCO as a mine engineer at the Black Cloud Mine, Leadville, CO. Two years later, their son was born with a rare heart condition, so ASARCO moved them down the mountain to Tucson, AZ, where Thomas began his career as a geologist. A year later, ASARCO transferred Thomas from the Arizona copper mines to Missouri to work at the lead-zinc operations at the Sweetwater Mine. That same year, the Doe Run Company acquired Sweetwater and kept Thomas as a mine geologist before transferring him to the exploration department, where he began a career in passionately exploring the Viburnum Trend for Mississippi Valley Type deposits. It was the best of all worlds for Tom, who wanted to be an exploration geologist but did not want to be away from home and family.

Family was Thomas' life. When Tom settled down in Missouri with his own family, he focused on being husband, dad, Cub Scout leader, coach, bible school teacher. He filled his office, home, and garage with rocks, diamond drill bits, rocks, core samples, and rocks. Tom was a member of Knights of Columbus Council 7501, SME, the Society of Economic Geologists, and a member of the Geology Board at the Missouri University of Science & Technology.

Thomas is survived by his father, Frank H. Schott of Walnut Creek, CA; wife, Kim Schott; children Frank J. Schott, Joseph T. Schott, Emma E. Schott, and David N. Schott. He leaves behind friends who knew he was kind, a dedicated blood donor, and someone who was always willing to give to a good cause: a good man.

Barbara Lynn Williams

(B.S. Petroleum Engineering, 1985) Passed away July 6, 2022, after a long struggle with COPD. Though Barbara was practically a lifelong resident of Farmington, NM, she was born in Springer, NM, on April 1, 1952. The family moved to Farmington in 1955 after the Springer Drug burned on Christmas Eve in 1954.



She graduated with honors from Farmington High School. Her first job was working at the downtown Farmington Drug. Always artistic, she graduated from Cottey College in Nevada, MO, in fine arts.

Barbara resumed her education by 1980 at New Mexico Tech where she graduated in petroleum engineering, and was one of the first female petroleum engineers employed in the San Juan Basin. When talking about her switch from art to engineering, Barbara used to laugh and say she used up all her electives early.

After many happy years working for Dugan Production, Barbara's health began to decline, and she gave up a field and job she loved.

Barbara is survived by her brother, Byrch Williams, his wife, Katie, and her sister, Cyndy Palcich, as well as her stepmother, Ida "Dike" Williams; her niece, Emily Reis and husband Marcello Dos Torres-Reis, and nephews, Daniel, Elliot and partner Baylor Johnson, and Nick and Michelle Williams and their children, Maggie, and Mac, were all especially dear to her.

Helen Emily Torran

(B.S. Biology, 1970), Passed away peacefully in her sleep on February 23, 2022 at her home in Rio Rancho, NM. Helen was born June 6, 1947 in Ashland, OH to Bertha and Cloyd Harman. Her father died when Helen was quite young, and after his death the family moved around the country before they settled in northern New Mexico. After high school she went on to New Mexico Tech, where she met and married Douglas Torhan. She earned her B.S. in Biology in the Winter of 1969 and graduated in Spring 1970.



After college, Helen trained to become a Medical Technician in Phoenix, AZ and worked at various hospitals and clinics in New Mexico. After Doug returned from Vietnam, they moved to Santa Fe and started a family, welcoming two children - April, then Matthew. Over the following decades, Helen was busy working in the community, was active in the New Mexico Dairy Goat Association raising and showing goats and she loved attending church, playing trumpet as a member of the Praise and Worship team;

After her divorce, she entered a new stage in life, moving to Rio Rancho and becoming an Enrolled Agent and working as Tax Preparer for H&R Block. She loved spending time with her dogs and "adopted" grandkids, Raine and Hunter Littlebird, and she served as board member for the non-profit, Hamaasta.

Helen is survived by her children April Torhan and Matthew Torhan; former spouse, Douglas Torhan; and nephews Arlo Harman, Jacob Harman, Brian Harman, and Benjamin Harman and their children; aunt Martha Fowler, as well as many extended family, cousins and friends.



Lukas Henrik Lundin

Lukas H. Lundin, Petroleum Engineering 1981, co-founder and former chairman of Lundin Group, passed away on July 26, 2022 in Geneva, Switzerland at the age of 64 after a two-year battle with brain cancer.

Lukas was introduced to the world of mining and petroleum at a young age, often accompanying his father on business and exploration trips around the world. It was on one of these trips to New Mexico that Lukas stumbled on New Mexico Tech.

During his time at NMT, Lukas formed lifelong memories and friendships. We had the pleasure of meeting with Lukas in December of 2021 and he told us stories of his first visit to campus and meeting Dr. Langdon Taylor, living on “The Ranch” near San Acacia, ski trips to Ruidoso, and riding his motorcycle on campus.

Lukas graduated in 1981 with a B.S. in Petroleum Engineering and went on to lead many successful exploration projects and Lundin Group companies. Under Lukas’s leadership, the Lundin Group grew to a combined market capitalization of \$11 billion. Lukas also founded the Lundin Foundation whose mission is to invest in the people and regions where Lundin Group companies operate.

In the 2022 Winter Gold Pan, Lukas shared a bit of life advice with NMT students and alumni,

■ If you have a good idea, don’t hesitate - step forward! No regrets, no ‘should haves.’ The best decisions can be wrong ones - we learn from our mistakes.

Lukas will be remembered for his driven and risk-taking nature and his positive outlook on life. His impact was far-reaching and he will be missed by many.

The [2022 Winter Issue of Gold Pan](#) highlighted Lukas, sharing stories from his time at NMT, his many career accomplishments, and his impact on the world.



Save the Dates

VOLCANOES OF HAWAII ALUMNI TRIP
MARCH 2023

Key Features:
Snorkeling, Luau, Coffee Tour, Volcanos, South Point, Green Beach, Black Beach, MORE VOLCANOS, Mauna Kea, Observatories, Geological/Volcanic Talks, Local Expert Talk, Culture Talks, and Star Gazing.

What will be included:
Lodging for 7 nights, daily breakfast, Luau social, 1 dinner, 3 lunches, daily transportation from the hotel to group destinations, guided tours and talks, and more.

Hosts:
Nelia Dunbar, Bill McIntosh, Nels Iverson, Dr. Stephen Wells

Costs:
The actual cost will be determined by the number of people attending. Estimated cost \$4,500 for a single and \$6,500 per couple (cost subject to change)

Deposit due:
\$500 per lodging room needed

Contact Sandi Lucero at sandi.lucero@nmt.edu for information

All About Pi(e)

Schedule:

2022 49ers

Just Reflecting on Math
3.14  **PI.E**



Makes me HUNGRY!

2022 49ERS
ALL ABOUT PI!
Save the dates
OCTOBER 13TH - 16TH

MATCHING GIFTS

DOUBLE THE IMPACT

1 you give

2 your employer matches

YOU designate the scholarship, program, or department your gift will benefit.

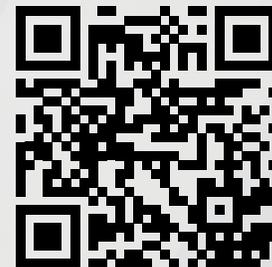
YOUR EMPLOYER'S matching gift will go to the same fund.

Did you know that your employers may double or even triple your gift to New Mexico Tech?

Many employers sponsor matching gift programs and will match most charitable contributions made by their employees. Some even match gifts made by retirees!

Please contact your HR department to learn if your employer supports matching gifts and let us know! If you have trouble finding out, please contact advancement@nmt.edu and we will help you!

Here are some incredible companies that support NMT through matching gifts.



COMMUNITY GARDEN



New Mexico Tech now has a well-established community garden! Samantha Winter from SCOPE (Socorro County Options, Prevention and Education), along with many NMT and Socorro community partners, broke ground on the garden at 905 Bullock Avenue in the Spring of 2022.

Samantha has been in Socorro since 2015. She originally moved from Tennessee with her husband, Kyle Winter, so he could attend Tech for his Masters and Doctorate. Kyle was one of the first candidates in the newly established Explosives Engineering program and received his diploma in May 2022. *[Editor's Note: The reader might recall Kyle Winter's "Last Word" contribution in the Winter 2021 edition of this publication.]* The couple immediately fell in love with New Mexico's abundant natural scenery and decided to permanently settle in the area. They bought a small farm north of Socorro and have recently welcomed a baby girl, Brianna, into their family.

As Kyle was working on his degree, Samantha began a job with the SCOPE Health Council. Her main objective has been to teach Socorro County residents about wellness and to encourage healthy eating. During her time in Socorro, she said one of the most consistent challenges has been food insecurity (limited and uncertain access to available food), which many Socorro County residents, including NMT students, experience. She has addressed this issue in a variety of ways, from donating food grown in the main community garden near Sedillo Park to distributing microgreen kits consisting of a small container with soil, seeds and growing instructions. Samantha's vision is to not only provide healthy food to

residents, but to teach them to grow their own food and how to prepare it.

The NMT Community Garden began when Samantha noticed strong NMT student interest in the main community garden (1002 Ake Avenue), which began in 2018. Many more students wanted to participate on a regular basis, but transportation was an issue, so she decided NMT should be the next location for a community garden and began looking for partners to make it happen. An NMT Garden Club was formed and many stakeholders stepped up to help establish the garden. The New Mexico Tech Foundation donated a parcel of land on Bullock Street across from the Masonic Lodge, NMT Facilities provided gardening supplies and cleared the land, the City of Socorro agreed to donate water and installed a spigot, the Socorro Rotary Club and SCOPE provided grant monies and Acosta's Equipment donated a trencher.

The garden is now established and currently growing four grapevines, eight fruit and nut trees, flowers for pollinators, berries, squash and greens. The Garden Club hosts weekly work days on Wednesdays and Sundays, which are attended by anywhere from 20–40 NMT students, faculty and staff.

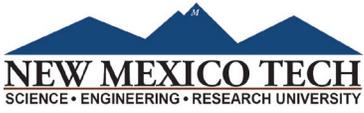
Samantha has big plans for the future of community gardens in Socorro County. Her vision is to build a 'greenway' – a bike path that will connect all of the community gardens and open spaces in Socorro County. She also has more





immediate plans to install community refrigerators throughout the city to give low-income residents better access to healthy food and enable community members to make donations.

The garden will be open during 49'ers and you are invited to take a relaxing break from the crowds to check out the students' hard work. If you would like to get involved or make a donation to the garden, contact Samantha Winter at: coordinator@scopehealthcouncil.com.



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Dr. Kevin Novo-Gradac with JWST mirror

