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Delivering History

AMPP
Actinide Material Processing & Power

NEWSLETTER

November 2019

Message From Stacy:

I am proud to introduce the AMPP Division's fall newsletter, with a focus on "excellence in operations."

AMPP is known for excellence in our NNSA and DOE missions as well as our operations that support those missions. Excellence in mission operations requires the execution of sustained operations that are reliable and responsive to mission needs across all work being performed in AMPP. For all of us here at TA-55, adherence to the Principles of Conduct of Operations is essential to achieving a safe and productive environment that enables excellence across the board. AMPP is a complex organization, with hazards ranging from radiological to electrical to chemical, and a footprint that extends to other areas of the Laboratory outside of TA-55. Excellence in mission operations is essential to the success of all of our programs. Highlights of our outstanding operational work that benefit our ability to deliver on mission are featured in this issue.

Because excellence in mission execution is strongly coupled to operational excellence, the continued cultivation of a safe and healthy culture within AMPP is an imperative. Since actions always speak louder than words AMPP Division hosted its' first Leadership Workshop in September which provide an opportunity for the AMPP management team and peer leaders, that span our entire organization, to provide feedback on where we as a Division need to improve. Based on these results Jack Britt, AMPP's Executive Advisor for Continuous Improvement, will be developing actionable improvements initiatives in three major categories: Human Performance Improvement, Process Improvement, and Employee Development. These new initiatives are meant to build upon the foundation laid last spring when AMPP hosted the Division wide Human Performance Improvement training and kicked off our AMPP Human Performance Toolbox Scorecard and our AMPP Housekeeping Inspection Checklist. Both tools are up on our Division webpage and I encourage every employee within AMPP to utilize these tools. These tools are designed to allow our management team to gather data on *how* we are doing and to allow all of us as employees to reflect on *what* we are doing. To quote Cicero "It is not by muscle, speed, or physical dexterity that great things are achieved, but by reflection, force of character, and judgment." We will not become better without you. Additionally you may have noticed more of the bright yellow AMPP 2-Minute Drill cards in your group offices. Please feel free to take one and attach it to your lanyard. These cards are designed to guide us through an on-site check before starting a job or task. This does not replace the pre-job brief, but allows us to reflect and focus on the job at hand.

HPI is one tool in our "safety toolbox." You may have also noticed your manager attending LANL's LOSA and SAFE activities. LOSA (for Laboratory Operations Supervisors Academy) and SAFE (the Safety Academy for Excellence) comprise intensive, interactive workshops for first-line managers and emerging leaders working with peers across the DOE complex. The ultimate goal is to shape an even stronger-performing, community-based, inclusive working culture across LANL. SAFE and LOSA are founded on eight principles that align our cultural expectations. These principles and the associated behavior, listed at right, form the foundation for a strong, high-performing scientific workforce

In closing, to all of you, for all you have done in support of our vital national security mission, I want to express my sincere thanks and appreciation. Keep up the great work!

-Stacy

LOSA/SAFE Principles

- Everyone is personally responsible for ensuring safe operations.
- Leaders value the safety legacy they create in their discipline.
- Staff raise safety concerns because trust permeates the organization.
- Cutting-edge science requires cutting edge safety.
- A questioning attitude is cultivated.
- Learning never stops.
- Hazards are identified and evaluated for every task, every time.
- A healthy respect is maintained for what can go wrong and what must go right

Service Anniversaries

April 2019

~40 years~
Michael Lopez, AMPP-4

June 2019

~25 years~
Daniel Garcia, AMPP-3

~20 years~
Rene Chavarria, AMPP-2

~15 years~
Edwin Serrano, AMPP-1

~10 years~
Victor Salazar, AMPP-4

~5 years~
Susan Klimowicz, AMPP-3
Kristin Thomas, AMPP-1
Nicholas Wozniak, AMPP-1

August 2019

~25 years~
Chastity Kolar, AMPP-1

~20 years~
Rebecca Martinez, AMPP-1

September 2019

~15 years~
John Brooks, AMPP-2

October 2019

~35 years~
Stanley Pierce, AMPP-2

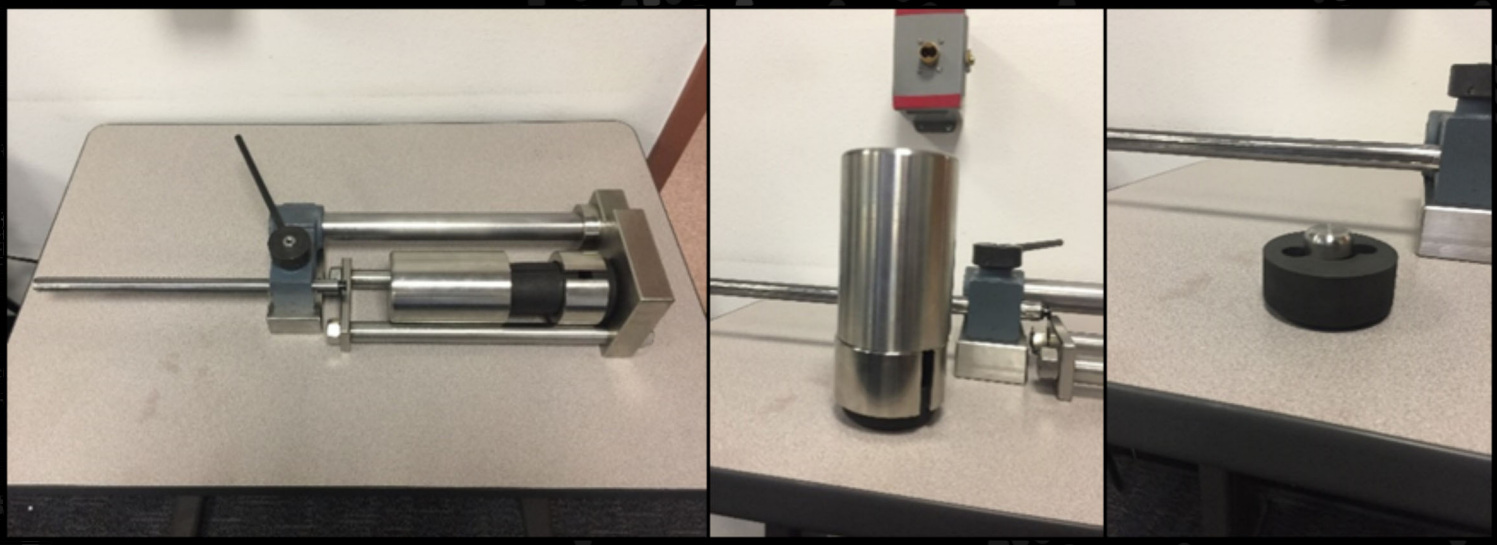
December 2019

~15 years~
Matthew Valencia, AMPP-2

New Method for $^{238}PuO_2$ Pellet Extraction

An unconventional method has been developed for removing newly pressed $^{238}PuO_2$ pellets from the graphite mold used during the fabrication of General Purpose Heat Sources (GPHS). The pellet extraction method used historically pushes the pellet downward out of the graphite mold and into a metal cup padded with graphite felt. This method is less than ideal in several ways. First, it causes physical shock to the fragile pellet when it releases from the graphite mold. Second, it is very difficult for the operator to ensure the pellet has been fully extracted but not crushed due to over extraction. Third, this historic method requires additional handling of the pellet, increasing the chance that the pellet will be damaged. Lastly, and perhaps most importantly, the pellet experiences substantial thermal shock during this extraction process. These disadvantages are either believed to or known to contribute to product loss due to pellet fracture.

The new method of pellet extraction removes the pellet from the die body horizontally, thus eliminating the mechanical shock previously experienced. The fixture fabricated for this task has been designed to precisely extract the pellet, removing the risk of over or under extraction. The pellet is also extracted directly into its graphite transfer container, minimizing manual manipulation of the pellet. Finally, the fixture was designed to allow for thermal equilibrium to be achieved among the pellet, graphite mold, and graphite transfer container prior to extraction, greatly reducing internal stresses created through thermal shock. These improvements



Employee Spotlight

As a new product engineer to Defense Power Systems Build & Testing (AMPP-2), Matt is one of the newest members of the Radioisotopic Power Supply (RPS) Product Realization Team (PRT). The PRT is responsible to ensure consistent and high quality engineering and manufacturing of Radioisotope Thermoelectric Generators (RTG). His role as a PRT member is to work with other team members from various laboratories, LANL program management, and AMPP process and system engineers toward meeting all production milestones.

The PRT uses the NNSA 6.X process toward product manufacturing. This process is used from conception through retirement to certify manufacturing of components and ensure they meet the safety, reliability and performance requirements for the United States nuclear weapons stockpile.

Matt is excited to be part of a new team with a critical weapons stockpile mission. He looks forward to learning more about high quality production and his role in resolving any production issues that may arise. He is also committed to the nuclear emergency response community, currently serving as a deployable member for the Joint Operations Technical Team (JTOT). JTOT is a volunteer program made up of technical and scientific experts ready to deploy at a moment's notice to a nuclear or radiological incident.

"I want to be a key contributor to our mission, no matter where I am or what I do. Working in AMPP-2 provides me with this opportunity every day." – Matt Valencia

Distinguished Performance Awards

RPS MARS 2020 Mission Operations Team

The Los Alamos National Laboratory (LANL) Radioisotope Power Systems (RPS) operations team completed Plutonium oxide (Pu-238) Heat Source production and launch safety testing for NASA's MARS 2020 mission, which is scheduled to launch in the summer of 2020 from the Kennedy Space Center. LANL has been supporting NASA by providing Pu-238 heat sources since the 1990s and executing nuclear impact tests since the 1980s for space missions. LANL successfully provided heat sources and heater units for Cassini, the Mars Exploration Rover, New Horizons, Mars Science Lab, and now MARS 2020.

LANL was tasked by NASA through the Department of Energy's (DOE) Nuclear Energy Office to manufacture 26 "flight quality" Pu-238 fueled clad heat sources (20 for assembly and 6 as spares) by September 2018. The "flight quality" heat sources would then be assembled into a Multi-Mission Radioisotope Thermoelectric Generator (MMRTG) at INL. This mission campaign would be the first space mission since the Mars Science Lab, launched in 2011, that LANL would provide support. This mission is another high visibility effort for our nation. LANL was also tasked to execute a series of impact tests, characterization experiments of the module and heat sources, and collaborate with Sandia National Laboratories (SNL) and Idaho National Laboratory (INL) to support the launch Safety Analysis Report (SAR) that is required to be submitted to the President of the United States' Office for approval prior to launch.

Team Effort:

Production and testing were performed at LANL's Plutonium Facility, and the team executed scope exceptionally well considering some of the constraints and challenges that were faced due to working in a nuclear facility. These production efforts included recovering Russian supplied Pu-238 oxide through aqueous operations, performing fuel processing, manufacturing a ceramic pellet, welding and performing inspections to verify the product met "flight quality" design specifications. In order to ship, all the clads were required to be packaged and welded into a 9516 shipping casket in order to be transferred to INL.

To execute the safety testing and experiments, the team developed new techniques to address technical challenges to support the launch safety analysis. The series of Pu-238 safety tests included a graphite module impact, one Pu-238 fueled Bare Clad Impact (BCI), and a temperature test study using the Isotope Fuels Impact Tester (IFIT). Both module and BCI experiments required forensics and characterization of the iridium (Ir) cladding and Pu-238 ceramic pellet. The temperature test study was to analyze the behavior of the Pu-238 pellet and Ir cladding during heating of the heat source between 450-1100 degrees Celsius (C).

In June 2018 the final safety test and experiment results were formally submitted, and in August 2018 LANL made the last shipment of 26 "flight quality" heat sources ahead of schedule. The final cost of the MARS 2020 mission for production and testing was $8.69 million and well under the 2015 estimate of $12 million.

Notable Achievements:

• Production Rate – The manufacturing yield in the last 12 months was 22 "flight quality" fueled clads which was the highest since the Cassini campaign in the late 1990s. This production rate provided evidence of a strong ramp up trial for the increased production rates planned for LANL's Pu-238 Operations over the next 10 years. • Higher confidence – Due to the successes of LANL, DOE, implementation of Constant Rate Production (CRP) of 10-15 heat sources that would be readily available for future space missions and would reduce risks to NASA • On Time & Under Budget – The completion of production and testing scope, on time and under budget ($3.3M), provided LANL the opportunity to regain NASA and DOE's confidence to execute scope. • Risk Reduction for NASA – This campaign and Team effort also allowed the LANL's heat source production to be taken off the NASA risk register. • Launch Safety Firsts – The results from the safety tests and experiments included many firsts; first module test in the Plutonium Facility and first test since 1980s, and first BCI at lower temperatures. • Technical Analysis – The material behavior analysis was used to calibrate and provide empirical checks to SNL's accident consequence model. • New Pu-238 Oxide– LANL was able to demonstrate on a small scale that newly produced Pu-238 oxide from Oak Ridge National

ADVANCED RECOVERY AND INTEGRATED EXTRACTION SYSTEM (ARIES) CHARACTERIZATION TEAM

The two-man ARIES Characterization Team provided enabling program impacts by resuming the long-suspended physical analysis capability necessary for plutonium oxide certification.

To revive the capability, the team developed an installation and testing plan for the Cilas particle-size analyzer (PSA) that was installed in a TA-55 hot lab during April 2018. The members also developed the PSA's integrated work documents and detailed operating procedures, encapsulating the highly technical operating and maintenance requirements of the equipment for enduring knowledge management and training purposes. Simultaneously, the team uncovered a critical need to replace the existing thermal gravimetric analyzer (TGA), which was showing signs of reaching the end of its life. Team members identified an appropriate replacement—a new TGA with mass spectrometer—and immersed themselves so thoroughly in procurement processes and procedures that they greatly accelerated the timeline for introducing this new equipment. They also led a review of existing laser-induced breakdown spectroscopy (LIBS) and x-ray fluorescence (XRF) technologies and enabled procurement of a handheld unit combining XRF and LIBS. These efforts quickly restored, sustained, and began the upgrade of characterization capabilities within ARIES.

The Characterization Team's accomplishments have been crucial to the continued execution of the ARIES mission. They made a physical analysis capability possible for plutonium characterization operations and furthered the overall characterization capability of the larger ARIES program Site.

URANIUM ELECTROLYTIC DECONTAMINATION TEAM

Before highly enriched uranium from nuclear weapon disassembly can be removed from PF-4 and returned to the weapons program, it must be cleaned of plutonium contamination. Uranium electrolytic decontamination (UED), an electrochemical process, is an elegant way to remove the plutonium, but the UED process was paused in 2013.

A new team assigned to uranium electrolytic decontamination brought the UED process back to life while completing extensive PF-4 and process-specific qualification training. Team members worked through late nights, weekends, and extended workdays to refurbish equipment that was no longer operational, develop a carefully defined operating procedure, and implement a new set of criticality safety controls. They also took the process through the full sequence of Management Self-Assessment, Contractor Readiness Assessment, and Federal Readiness Assessment, ensuring a successful restart in 2019.

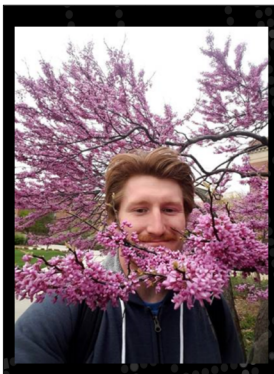
More than 300 articles of highly enriched uranium await decontamination in the PF-4 vault. Once they are cleaned, they will be shipped to the Y-12 National Security Complex, where the uranium can be used to manufacture new weapons components. This team's efforts mean that decontamination and shipment can now go forward, which will also free PF-4 vault space to help Los Alamos better support pit production. In addition, team members' superior performance during the assessment cycle adds support to the NNSA's designation of Los Alamos as an Operational Readiness Center of Excellence.

AMPP Students

Leah Berman is a Post-Bac in AMPP-4 and a recent graduate of Villanova University in Pennsylvania. She has a bachelor's degree in Chemical Engineering with a minor in Chinese. For the past three years Leah has researched on campus for NASA in the development and manufacturing of different instruments used by satellites, telescopes, and balloon flights. Leah grew up in Chicago, Illinois with her twin brother, older sister, and parents. Leah will be attending Colorado School of Mines in the fall to pursue her doctorate degree. While in graduate school Leah will continue to work on projects related to AMPP-4's mission.

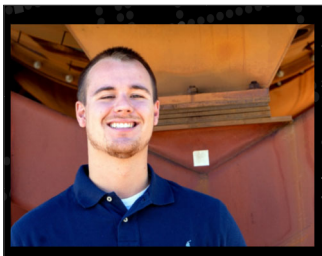
Faith Trujillo is an Undergraduate Student in AMPP-4. She attends college at New Mexico State University in Las Cruces, NM, pursuing her bachelor's degree in Mechanical Engineering. Faith has always been interested in science and mathematics and has found the application of these fields in solving real world problems intriguing. She is grateful to gain the experience and knowledge of designing and drafting from her mentors in AMPP-4. While working with the Science and Engineering team, Faith has learned how important the work we do here at LANL is to the safety and security of our nation.

Kayla Gill is a senior in metallurgical engineering at South Dakota School of Mines and Technology. After her B.S. she will be pursuing a M.S. in materials engineering and should be finished in spring 2020. Kayla hails from Rapid City, SD where when not training to run half marathons or obsessing over wolves she hikes and does some rock climbing. Kayla joined the lab in the summer of 2017 under the mentorship of Brian Berger. In her time at LANL, she has been part of several projects including design of a water recirculation system and work on particle analysis. She is a member of the Omega honor society and regularly makes the dean's list.



Andrew Mason was born and raised in the countryside around Kearney, NE. Andy grew up working in agricultural fields and playing a variety of sports throughout high school. He is currently a senior studying chemical engineering and geology at the University of Nebraska-Lincoln. He has a strong interest in environmental engineering and want to progress towards the renewable energy field in my future career. In college, he is involved in both a variety of extracurricular activities including several design competition teams, progressional engineering organizations, greek life, rock climbing, rugby, and research. His current research project is helping to design and prototype a membrane desalination process.

Fun Facts: Andy is an amateur paleontologist. He loves slacklining. He loves swing dancing. He is a powerlifter in strongman competitions. The only bone he has ever broken in his body was his clavicle when the doctor fumbled him at childbirth. He just ran his first marathon this summer. He has planted over 1000 trees in his life.



Michael Brown joined the lab in the summer of 2016 and is a student intern under the mentorship of Pat Reardon. He graduated from Michigan State University Honors College in spring 2018 with a B.S. degree in Chemical Engineering. He will be attending the University of Michigan in the fall to pursue an M.S. degree in chemical engineering. Michael has a passion for renewable energy and hopes to help take the world into a sustainable and green future. His work at LANL includes assisting with the design of a new type of bioreactor and alteration/testing of legacy RTG units. Michael as a true Michigander enjoys doing anything on the water whether it be boating, swimming, or rafting. He loves dogs and expects to own no less than three (whenever he finally gets done with school that is.) He is currently pursuing his Masters in Chemical Engineering at Michigan.

Fun Fact: He once won a taco eating contest by eating 8 tacos in 90 seconds.

Winter Closure: 2019

4/10 Schedule

Holidays:

- December 25: 2 hours
- January 1: 2 hours

Vacation/Leave Without Pay:

- December 26: 10 hours
- December 30: 10 hours
- December 31: 10 hours

Total: 34 hours

Holidays	○ December 25 ○ January 1
Vacation & Leave With Out Pay	○ December 26 ○ December 30 ○ December 31

9/80A Schedule

Holidays:

- December 25: 1 hour
- January 1: 1 hour

Vacation/Leave Without Pay:

- December 26: 9 hours
- December 30: 9 hours
- December 31: 9 hours

Total: 29 hours

Holidays	○ December 25 ○ January 1
Vacation & Leave With Out Pay	○ December 26 ○ December 30 ○ December 31

Borrowing vacation will be on a strict case by case basis. A solid justification must be presented to both your FLM and GL prior to closure.