



# TRTR

Newsletter

Quarter 1 2019

## TRTR Newsletter Returns!

During the 2018 Annual Meeting it was decided that the TRTR quarterly newsletter should be resumed as a means to provide pertinent information to members

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Cover page: University of Maryland reactor core.  
Want your core photo featured in a future edition?  
Send high-resolution photos to [TRTRnewsletter@isotopictopics.com](mailto:TRTRnewsletter@isotopictopics.com).

## Message from the Chair

Welcome back to the TRTR newsletter. I'd like to start by thanking Amber Johnson, as the new TRTR Secretary, for restarting this important communication tool. Of course we still need our [email listserver](#) (I hope you're subscribed) to have faster information sharing and rapid response but the collection found in the newsletter has always been valuable for more detailed inspection trends, general information and opinions.

TRTR has been around for over 40 years and our membership includes U.S. and international research reactors. TRTR as an organization works more effectively when we are actually organized. Many of our U.S. member reactors operate within a university system supporting teaching and research. As you well know, the Department of Energy (DOE) supports these facilities by providing reactor fuel and grants for infrastructure or instrumentation upgrades.

This year, due to a shift in priorities within limited budgets, the reactor infrastructure budget was cut for FY19. It is very important that university research reactors (URR) coordinate with your nuclear program or department leadership to ensure these important teaching facilities are funded adequately by the university and the government to operate reliably for as long as they're needed.



Sean O'Kelly  
Executive Committee Chair



Amber Johnson, Editor  
University of Maryland

Brenden Heidrich, from INL NSUF, is coordinating a workshop in Idaho July 16 and 17 to collect data on the material condition and equipment needs of the URRs that can be provided to DOE and help inform potential budget needs for the nation's essential nuclear education infrastructure. Please respond to the questionnaire when you receive it and try to attend or have some representative come to the workshop in July. The results of the workshop will help NSUF understand and communicate the URR infrastructure needs to DOE.

Sean O'Kelly  
Associate Laboratory Director,  
Advanced Test Reactor Complex  
Idaho National Laboratory

## TRTR Newsletter Returns

During the 2018 TRTR conference, a side bar meeting was held to discuss the return of the TRTR Newsletter. It has taken a couple of months to produce this first issue of what should continue to be a quarterly report of news relevant to the TRTR community, carrying on in the tradition of the previous newsletter edited by Bill Vernetson.

Began in 1988, the newsletter has covered many important events throughout the years: University of California became the newest research reactor in 1992 and continues to hold that title and in 2000 Michigan and Florida reactors received recognition as ANS National Historic Landmark facilities. The newsletter also plays an important role of keeping the community updated on current

regulatory issues. The implementation of the new 10 CFR Part 20 Radiation Protection Standards received attention in almost every issue from 1993 through 2000. Now we are covering the Non-Production & Utilization Facilities rule making concerning license renewal.

Finally, the newsletter provides a forum for the exchange of general facility information. If you have suggestions for topics to be covered, sections you would like to see, or articles that you would like shared, please send an email to [TRTRnewsletter@isotopictopics.com](mailto:TRTRnewsletter@isotopictopics.com).

Amber Johnson, Editor  
University of Maryland

Luke Gilde, Content Editor

## [DOE Consolidates Its FY 2019 Competitive Research and Development Portfolio and Infrastructure Support to Accelerate Critical Advanced Reactor Technology Development](#)

Funds previously allocated for the FY 2019 Scientific Infrastructure Support FOA will be redirected to research project awards.

## [Aerotest Shuts Down](#)

Aerotest Operations stated in a letter to the NRC [ML18344A049] dated December 6, 2018 that their license would be switched to possession only, their license renewal request would be withdrawn, and they would begin their decommissioning plan. The Aerotest reactor, first licensed in 1965, had not been regularly operated since 2010 due to concerns about ownership.

## [Vermont Yankee Sold](#)

The Vermont Yankee Nuclear Power Station, which shut down in 2014 was sold to NorthStar

Group Services which will decommission the plant. This sale is the first of its kind where ownership and license is transferred for decommissioning.

## [Small Modular Reactors](#)

The Utah Associated Municipal Power Systems project to build a 12 module NuScale plant at Idaho National Laboratory recently entered into an agreement with the DOE to use one of the modules for research and development as part of the Joint Use Modular Plant [JUMP] program and another to provide power for the laboratory.

## [Government Shutdown Effect On Scientists](#)

For scientists, the ripple effects of the government shutdown are still spreading.

## [SHINE Funded](#)

Shine Medical Technologies, a startup that aims to produce medical isotopes using accelerator driven reactors has secured over \$180 million in funding in order to develop their facility.

## [IAEA Helps Vietnam Plan New Reactor](#)

The IAEA has reviewed Vietnam's plans to build a new 15 MW research reactor. The agency made several suggestions for areas where the IAEA could help further progress with the reactor.

## [New Startup to Produce Mo-99](#)

Northwest Medical Isotopes will attempt to commercialize a new method of producing the important medical isotope Mo-99 in research reactors. The method, developed at Oregon State University, involves shipping specially

made targets to reactors for irradiation, and then shipping them back for reprocessing.

## Jamaican Reactor Featured by IAEA

The SLOWPOKE reactor at the University of the West Indies, the only research reactor in the Caribbean, was recently featured in a video by the IAEA about the uses of research reactors.

## SLOWPOKE-2 Reactor Shutting Down

The SLOWPOKE-2 reactor at the Saskatchewan Research Council is being shut down after 37 years of operation. The decommissioning should be completed by next year.

## DOE will Fabricate HALEU Fuel

On January 17, 2019 the DOE announced it had completed the environmental assessment for the use of High-Assay Low-Enriched Uranium [HALEU] left over from the operation of the Experimental Breeder Reactor- II. The assessment concluded that the use of the HALEU in storage at INL will not have a significant environmental impact; it will be used in new fuel for advanced reactor designs.

## NASA Tests New Reactor

NASA successfully tested the Kilopower reactor, a small fission reactor, Stirling engine system designed for use in spacecraft. The reactor, known as KRUSTY [Kilopower Reactor Using Stirling Technology] was run for 28 hours in a simulated mission, and successfully demonstrated its ability to handle multiple failures. Fission reactors are capable of generating far higher powers than the Radioisotope Thermoelectric Generators [RTGs] that are frequently used in spacecraft today.

## NRC Proposes Fine to USGS for Research Reactor Violations

The NRC has proposed a \$7,250 fine for the USGS Reactor for violations associated with staffing and training requirements. The NRC states that there were 2 violations that took place; documentation relating to Reactor Operator training was falsified, and staffing requirements were violated during reactor testing. The fine is being assessed for the falsification of documents, and the staffing violation is being treated as a non-cited violation.

## Green New Deal Proposed

Rep. Alexandria Ocasio-Cortez and Sen. Ed Markey introduced a "Green New Deal" on January 7th which urges a shift away from fossil fuels, the introduction of universal health insurance, and job guarantees in an effort to reshape the US economy. The plan calls for reliance on "clean, renewable, zero-emission sources" which could include nuclear power, paving the way for more advanced plants to be built.

## Neutron Radiography to Detect Pollution In Sea Sponges

A tool for visualizing damage to materials made to withstand the harshest conditions inside a nuclear reactor is now being used to examine some of nature's more delicate species.

## Florida Legislators to Reconsider Disney Nuke Law

Disney and nuclear power have been a hot topic of discussion recently among some state legislators from Central Florida, some who want to strip the company of the right to build a nuclear power plant at Walt Disney World.

# NRC Inspections

## Reed Research Reactor

November 5-13 2018

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An inspection of the Reed Research Reactor [RRR] was carried out from November 5-13, 2018. The inspection included a review of organization and staffing, operations logs and records, procedures, re-qualification training, surveillance and limiting conditions for operation, experiments, design changes, committees, audits and reviews, emergency planning, maintenance logs and records, and, fuel handling logs and records. No violations were found. The complete inspection report is ML18323A159.

## NIST Center For Neutron Research

October 15-18 2018

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On October 15-18, 2018 the NRC carried out a routine inspection of the NIST Center for Neutron Research reactor [NBSR]. Operator licenses, re-qualification, and medical examinations, experiments, organization and operations and maintenance activities, review and audit and design change functions, procedures, fuel movement, surveillances, transportation activities, and emergency preparedness were reviewed. No violations were identified. The complete inspection report is ML18302A058.

## Massachusetts Institute of Technology Research Reactor

November 6-8 2018

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An inspection of the Massachusetts Institute of Technology Research Reactor [MITR] was performed from November 6-8, 2018. MIT's organization and staffing, review, audit and design change functions, radiation protection program, effluent and environmental monitoring, and transportation of radioactive materials was reviewed. No violations were found. The complete inspection report is ML18324A858.

## University of Missouri-Columbia Research Reactor

October 14-18 2018

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The University of Missouri-Columbia Research Reactor [MURR] was inspected by the NRC on October 14-18, 2018. Operator licenses, re-qualification, and medical examinations, organization and operations and maintenance activities, review and audit and design change functions, procedures, fuel movement, surveillances, and emergency preparedness were reviewed. Two Non-Cited Severity Level IV violations were identified: failure to comply with TS 3.6.a which requires the emergency electrical power system to be operable during reactor operation, and failure to comply with TS 3.2.a which requires all control blades to be operable during reactor operation. The complete inspection report is ML18296A658.





**TRTR 2018 Annual  
Conference  
Hosted by RINSC**

# Conference Report

The 2018 TRTR conference was hosted by Dr. Cameron Goodwin and the wonderful staff of the Rhode Island Nuclear Science Center (RINSC). The conference took place from October 28th through November 1st in Newport. Over 100 attendees representing national labs, industry, and research and test reactors were in attendance. The schedule included the annual meeting of the Executive Committee, 3 days of presentations by TRTR facilities and 1 day of presentations by the NRC. Tour day included visits to the reactor, the Marine Science Research Center, and the Marine Geological Samples Laboratory.

Sarah Stevenson was awarded the 2018 Tawfik

Raby Memorial at the 2018 TRTR Annual meeting. Sarah, now a graduate student in Nuclear Engineering at UC Berkely, was given the award for her work on the Design, Fabrication, and Testing of Micro-Pocket Fission Detectors at Kansas State University and Idaho National Laboratory.

Al Adams of the NRC was honored with the Carter Award for his many years of service to the TRTR community.

The banquet concluded with a presentation given by the NRC historian, Tom Wellock, titled "The First Temple of the Atom: The AEC & the Raleigh RR".



Sarah Stevenson receives the Tawfik Raby Memorial Scholarship



Above: Tour of the Rhode Island Nuclear Science Center  
Right: Al Adams receives Carter award from Sean O'Kelly





# Tawfik M. Raby Memorial Scholarship

[Application acceptance](#) begins March 1, 2019. The inaugural scholarship [was awarded](#) at the 2018 TRTR conference to Sarah Stevenson.

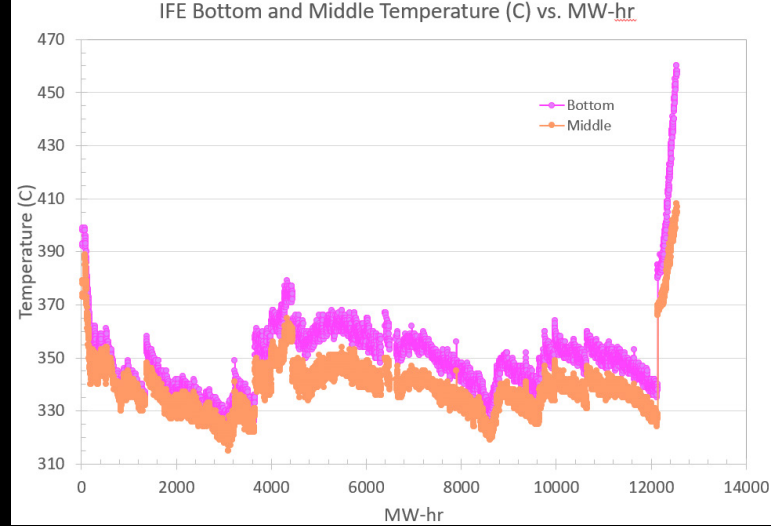
## Update on Oregon State University's Increasing IFE Temperature

Oregon State University's reactor developed a problem with its instrumented fuel element (IFE) following a pulse in May of 2018; the IFE began reading higher and higher temperatures each day and threatened to shut the reactor down when it reached 510 C. Robert Schickler, Assistant Director/Reactor Administrator, presented on the issue at TRTR in October.

OSU was pursuing parallel paths to continued operation: running the reactor without an IFE [ML19009A091], but precluding pulsing, or adding a 20/20 IFE to their 30/20 core. Both of these solutions would have required a license amendment [ML18312A061]. Since then, OSU has acquired a 30/20 IFE from Penn State and withdrawn their LAR [ML18334A100 ] to use 20/20 Fuel.

In an update provided by Robert, "The IFE temperature appears to have stopped increasing and has stabilized between 460-470 C on the hot channel [see chart top right]. We're not sure why that is but we are happy about it. We have

[Cross sectional views of the IFE showing the radial \[left\] and vertical \[right\] placement of the thermocouples.](#)



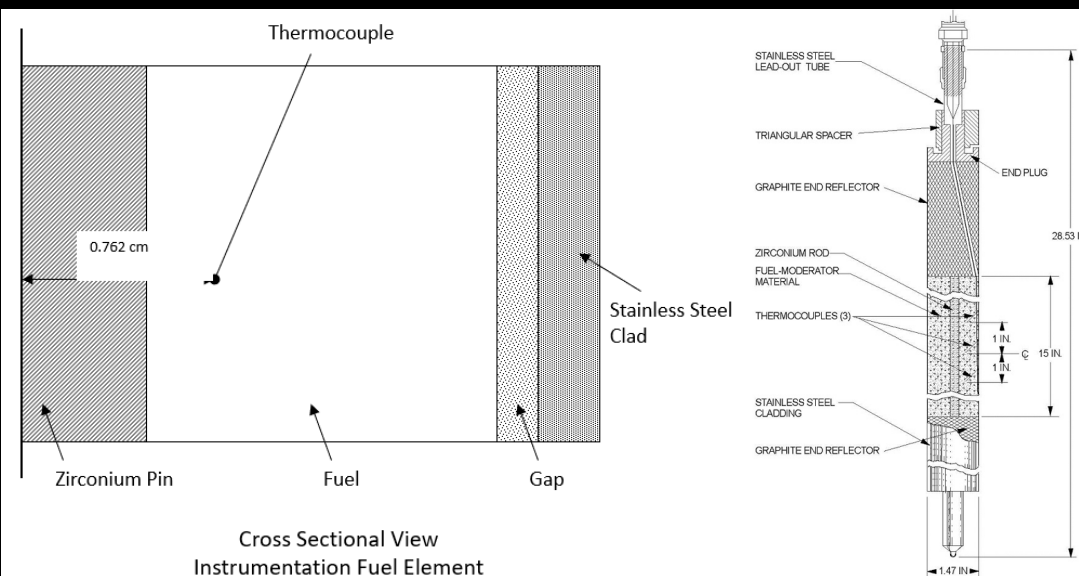
Above: A plot of the IFE temperature over time, showing the rapidly increasing trend following the pulse

received a fresh IFE from Penn State University but have not yet installed it since our original IFE has stabilized. We are currently working with the NRC on a license amendment to operate without an IFE, which would involve revising our Limiting Safety System Setting from fuel temperature to power level”

## NRC Slides from 2018 TRTR Annual Meeting

[Oversight Activities](#) included updated operator application forms 396 and 398. There was a reminder that ANSI 15.4 Standard, "Selection and Training of Personnel for Research Reactors" section 7 forms the basis for the RTR medical professional assessments and NRC medical review officer recommendations. A reactive inspection concerning the [Safety Conscious Work Environment](#) [SCWE] was conducted. Reactor Licensing Activities included descriptions of accomplishments, renewal status, NPUF rule making, and staffing. A discussion of the requirements for [License Amendment Requests](#) was presented. [Rulemakings](#) of potential interest

to the RTR community were introduced. A panel comprised of [security experts](#) from the NRC, FBI, and DHS gave an overview of document transmission, the DHS Non-Power Reactor Sub-council, and counter intelligence strategy.



Status of the [medical isotope production facility](#) application reviews and construction inspections was covered.

## NRC Public Meeting

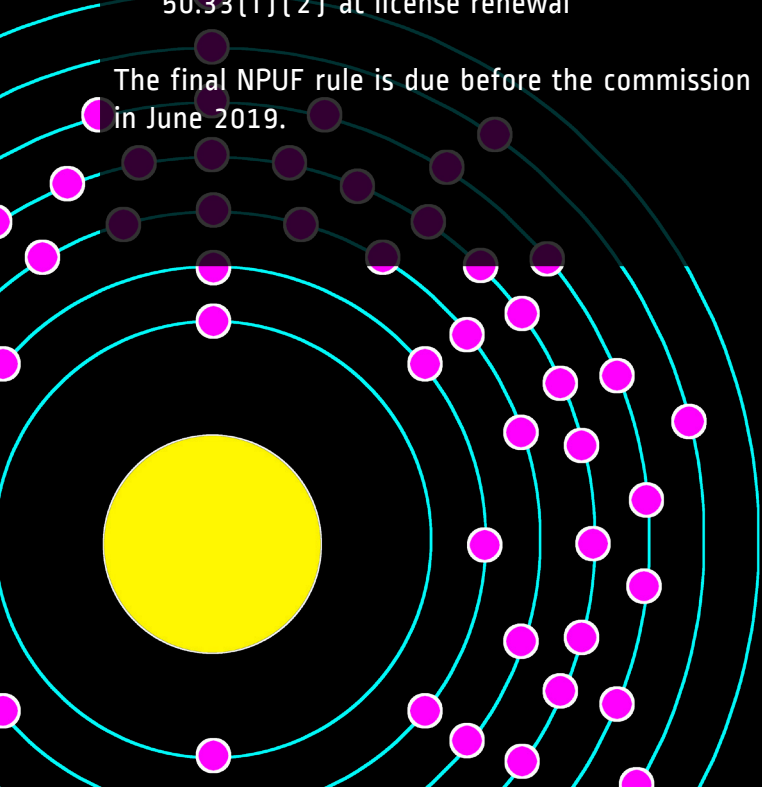
The NRC Advisory Committee on Reactor Safeguards hosted a public meeting on February 6, 2019 to discuss the rule changes regarding the licensing of Non-Power Utilization Facilities (NPUFs). Slides from the presentation can be found by searching ML19031A001 on ADAMS. Nine proposed rule changes were discussed:

- Revise definitions for “non-power reactor,” “research reactor,” and “testing facility” in response to public comment and make conforming changes
  - Recommended definitions now refer to the proposed accident dose criterion (0.01 Sv)
- Eliminate license terms
- Define the license renewal process for testing facilities and NPUFs in 10 CFR 50.135
- FSAR updates will be required
  - Reg Guide 2.7 will provide guidance
- Maintain the timely renewal provision for certain facilities
- Revise the accident dose criterion in 10 CFR 50.34
- Extend 10 CFR 50.59 to NPUFs regardless of decommissioning status
- Add clarification for environmental reports to 10 CFR 51.56
- Eliminate the financial requirement 10 CFR 50.33[f][2] at license renewal

The final NPUF rule is due before the commission in June 2019.

## Publications

- [Transient Reactor Test Facility \(TREAT\) Low Enriched Uranium \(LEU\) Conversion Progress](#)
- [Radiation resilient fiber Bragg grating sensors for sensing applications in nuclear reactor cores](#)
- [Design and Irradiation of a Molten Salt Corrosion Experiment in The Ohio State University Research Reactor](#)
- [Advanced Instrumentation for Transient Reactor Testing](#)
- [Precision Determination of Absolute Neutron Flux](#)
- [MeV photon imaging with robotic sample positioning at a research reactor](#)





# Events

**March 12-14 2019**

[NRC Regulatory Information Conference](#)

Bethesda, MD

**March 25-29 2019**

[Nuclear Innovation Week](#)

Washington, D.C.

**April 4-6 2019**

[2019 ANS Student Conference](#)

Richmond, VA

**June 3-5 2019**

[NEI Nuclear Energy Assembly](#)

Washington, D.C.

**June 9-13 2019**

[2019 ANS Annual Meeting](#)

Minneapolis, MN

**July 28-31 2019**

[U.S. Women in Nuclear](#)

Chicago, IL

**September 22-26 2019**

[TRTR Annual meeting](#)

Idaho Falls, ID

**October 6-10 2019**

[Inaugural Materials in Nuclear Energy Systems \(MiNES\) conference](#)

Baltimore, MD

**November 25-29 2019**

[IAEA International Conference on Research Reactors: Addressing Challenges and Opportunities to Ensure Effectiveness and Sustainability](#)

Buenos Aires, Argentina

# Know More Nukes

*With so many reactors to visit and so little time and travel funds, we are making it easier to get to know another facility with this section. We've sent around a questionnaire with what we think are the most important things to know about every reactor. We look forward to featuring your reactor!!*

## UCI Nuclear Reactor Facility

located at the University of California Irvine in Irvine, CA is our [featured facility](#) in this edition of Know More Nukes. Jonathan Wallick, a Nuclear Science Laboratory Engineer/Associate Reactor Supervisor at the UCI Nuclear Reactor Facility, has provided the responses to our questions.

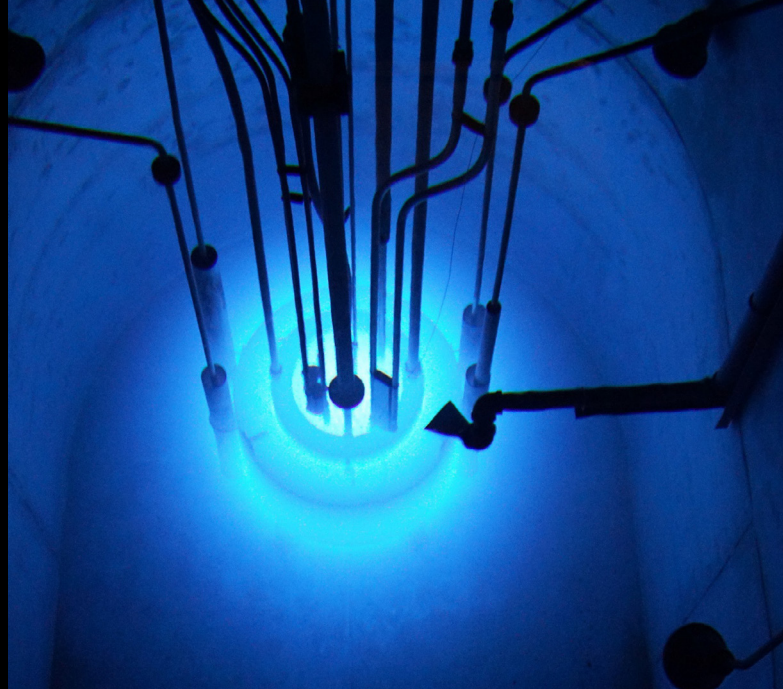
**What year did your reactor first go critical?** First criticality was on November 25th, 1969 at 1552 by Dr. George Miller, then and current Reactor Supervisor.

**What is the reactor license number? Power level?** Our reactor license number is R116, rating us at a steady state power level of 250 kW.

**Have any major changes/modifications been done?** Over the course of our history, several experimental facilities have been constructed and removed, but our core is unchanged.

**What is a unique feature of your reactor?** Well, we're not the typical showcase that many research reactors are for unique and interesting features, like neutron beams, positron sources, or ultra-cold neutrons, but I'd have to say that we're extremely flexible in what we will do and allow at our facility. Since we are a smaller facility, we are quick to adapt to new ideas and try them out rather than spend years reviewing proposed experiments, we'd rather take a more empirical approach and see what happens.

**What is a fun fact about your reactor?** Wait, this is supposed to be fun? One and only one person has ever been swimming in our pool. Prior to initial core loading and criticality, an item was dropped into the pool and was unable to be retrieved via other means. So a staff member in the department, an experienced free diver in



UCI Nuclear Reactor Core

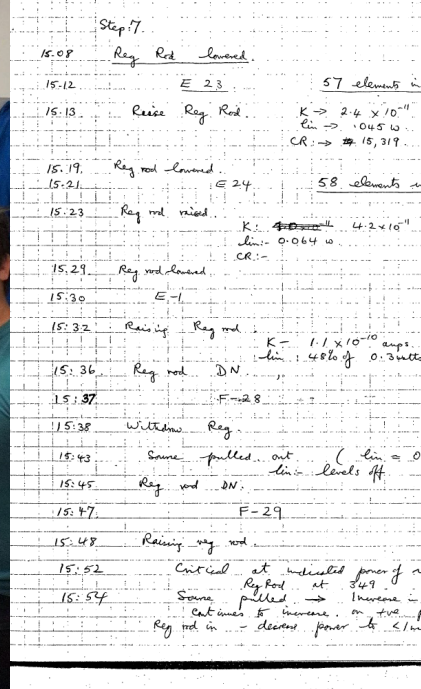
his own right, dove to the bottom of the pool and retrieved the item. He is the world's most interesting man.

**What is the biggest challenge facing your reactor?** Utilization and publicity. Our program just has shrunk largely in the last six months due to the departure of our primary on campus researcher leaving those who remain in a strategically challenging position. Work is being done to bring several programs on-line to increase usage in our main thrusts of training, education, research, and finance.

**What is the most unusual request someone has had to use your reactor?** The strangest request I've personally taken was to irradiate milk that was several years old to check for arsenic that an individual had kept, which he suspected was used to poison a loved one. It turned out to contain no detectable arsenic, but was interesting none the less. Then, of course, our facility's claim to fame has been performing the analysis of the bullets that killed President Kennedy back in the early 1970s, work by Dr. Vincent Guinn and Dr. George Miller.

**What drew you to your current position?** I've had an innate desire to work in nuclear research from middle school, where my 8th grade science teacher commented on nuclear physics, stating that it was challenging, difficult, and it makes





Left: UC Irvine summer students, Right: Log entry from November 25th, 1969 showing first criticality  
Bottom: What do you mean this isn't for swimming?

a lot of money. What 13 year old wouldn't find appeal in that?

**What has been your favorite project?** Really, it's more a class of projects: automation. Making automated sample changers for HPGe units and removers for the core irradiation facilities are my favorites. The biggest project is this facility, though. It is truly in and of itself challenging to keep it going and improve it.

**Before working at your reactor, what was the most unusual or interesting job you've ever had?** There's little else I'd consider more interesting or challenging than being in the Navy as a nuke. Looking back on it, serving on Nimitz wasn't the worst thing ever, also wasn't the best, but I'd do it again. Oh, and I also worked for a week at Fry's Electronics in college, until I figured out it was awful. Then I joined the Navy as a nuke electrician and figured out how wrong I was.

**What do you find the most challenging about your job?** Progressing necessary projects while maintaining an active user base. Professors and students tend to set fires, sometimes literally, as quickly as they can be put out, leaving little time to advance critical items needed to sustain the operation of the facility. Also, everything being nearly 50 years old doesn't really help matters.

**What advice would you give to new reactor operators?** There are two basic, negative characteristics inherent to people: selfish and lazy. Overcoming these is a constant battle, but if you are able to keep the proper mentality, that will make you a good and productive person.

**What are some career lessons you've learned thus far?** By putting forth careful, thoughtful effort, you can accomplish any task set before you. Keep moving forward on projects as much as you can, because if you stop, it's all the harder to start again.

**Anything else???** Running these facilities is a hard job, and I'm proud to be a member of this community. It's a field that would have disappeared even more over the past several decades if we weren't here to continue it. We'd be somewhere else, making a lot more money...

Want your facility featured in a future edition of Know More Nukes? Tell us more via our [on-line form!](#)

