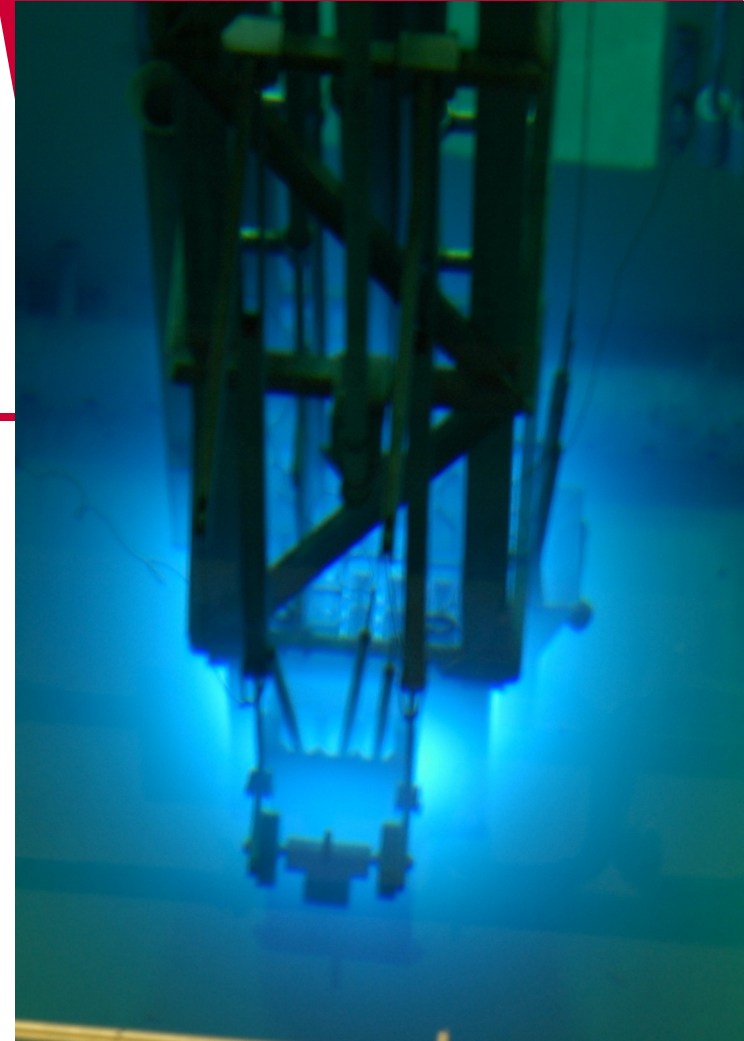


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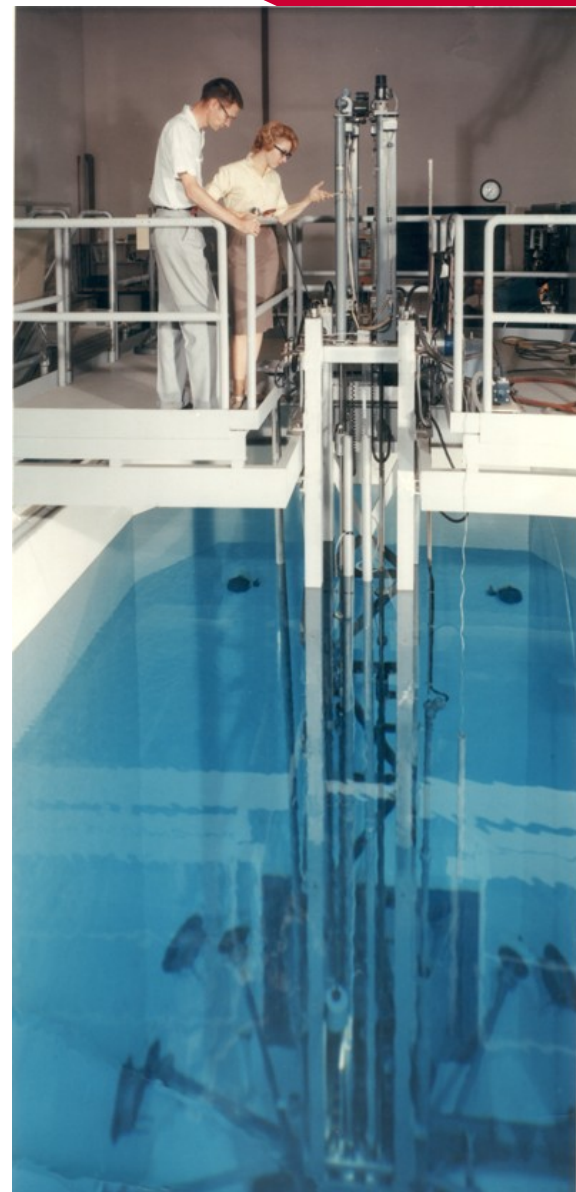
UPGRADE OF THE WIDE RANGE REACTOR INSTRUMENTATION

www.wsu.edu/nrc



A BRIEF OVERVIEW

- **Completed in 1961**
 - **Reactor first went online on March 18th, 1961.**
- **Upgraded in power from 1kW to 1 MW in 1967 via a TRIGA conversion**
- **Research, Iridium production and Silicon Disk Analysis**
- **United States Transuranium and Uranium Registries (USTUR)**



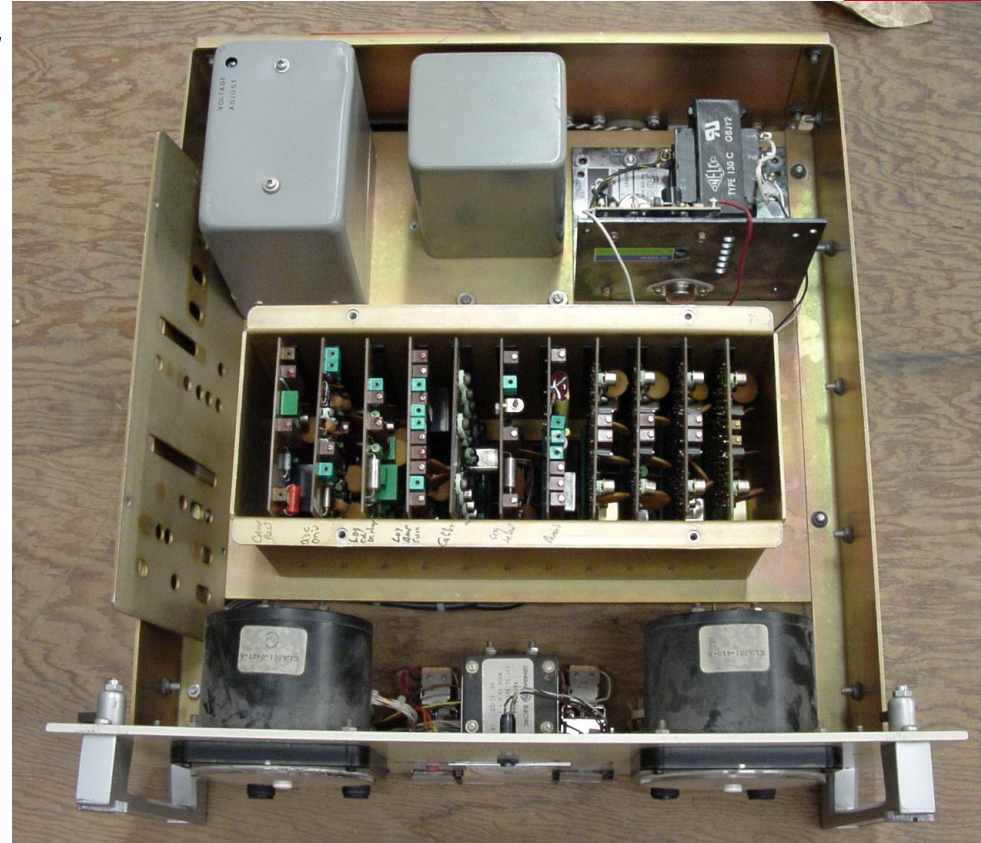
OLD EQUIPMENT

- Original General Atomics (GA) NLW-2 Wide Range Channel
- Replacement parts/components unavailable
 - “Vintage Electronics”
- Had numerous “in house” repairs and upgrades
 - Far too many deviations from original specs
- Far too much knowledge lost to the ages



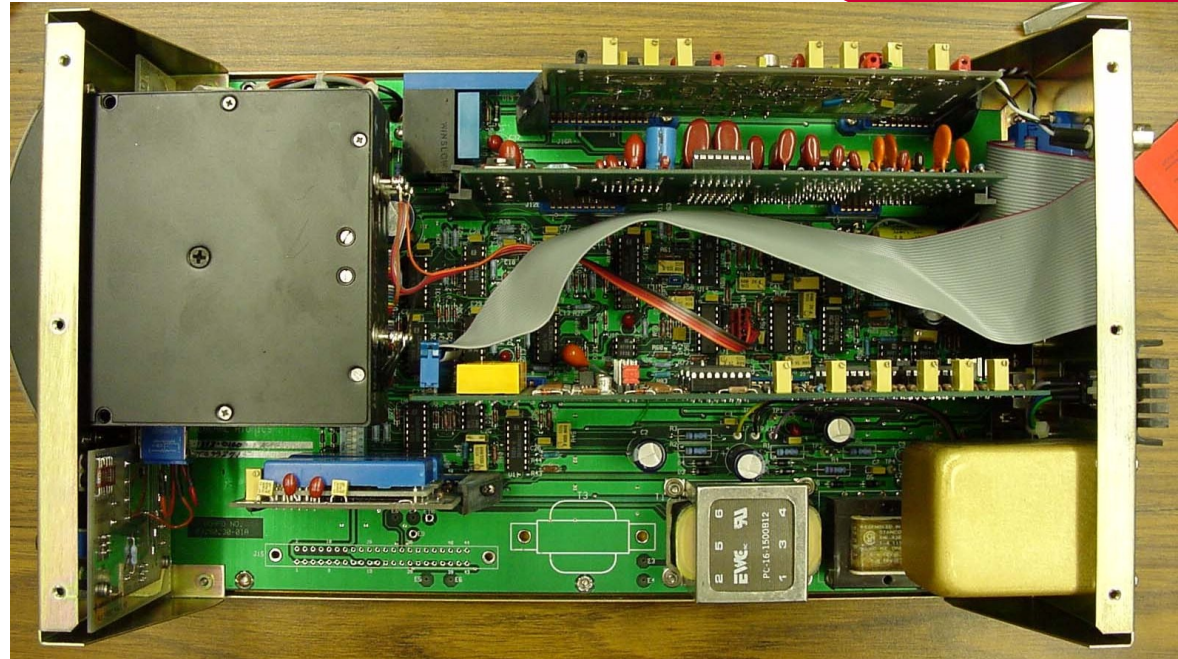
THE FAILURE

- NLW-2 failed intermediate, no key event
- Near simultaneous failure of the associated fission chamber (initially undetected)
- Troubleshooting continued for 4 days
- Both the NLW-2 and fission chamber original to facility (44+ years in service)



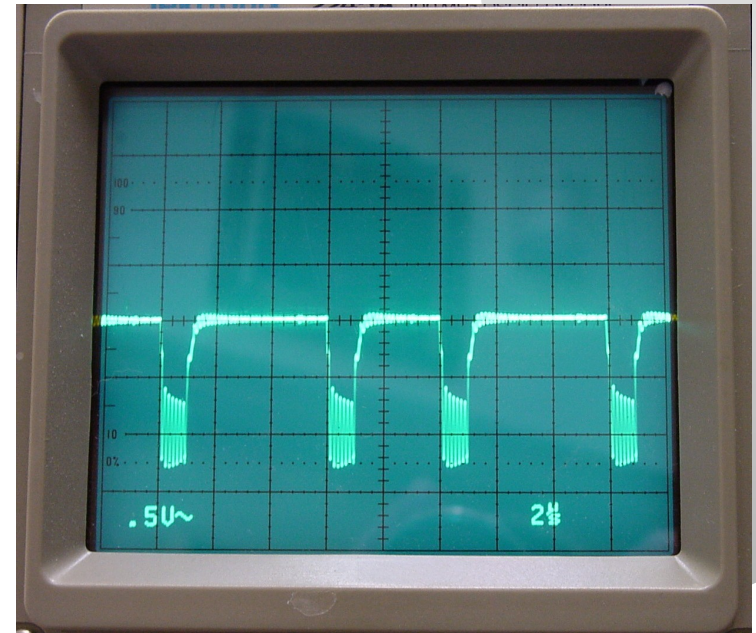
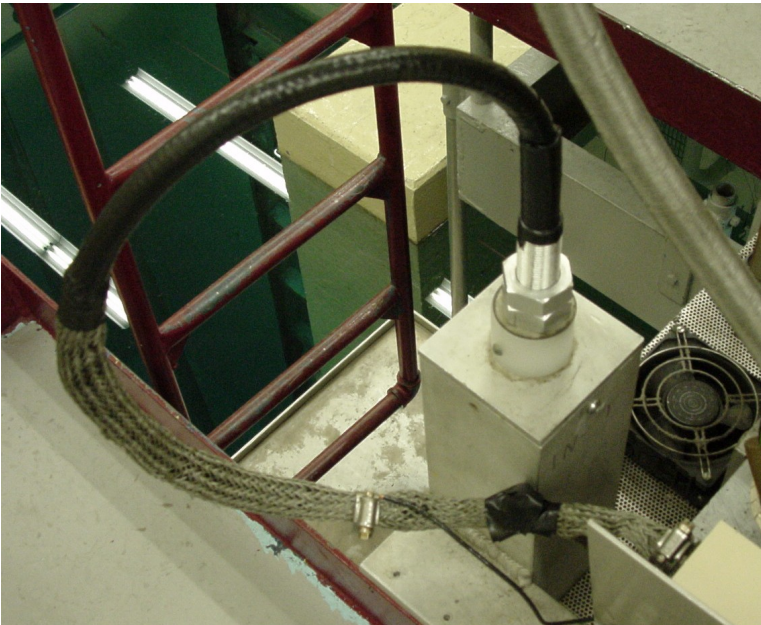
THE UPGRADE

- New G.A. NLW-1000 channel on hand since 1992
- New fission chamber purchased at same time
- New Preamp (PA-1000)



INSTALLATION PROBLEMS

- Severe noise from reactor bridge (~24 MHz)
 - Careful attention to grounding and isolation
- Supplied schematics wrong
 - Keep *your* documentation current!
- Heavily modified NLW-2: NO “turn key” installation



AFTER

- NLW-1000 is far more reliable
- Streamlined operations via integrated electronics
- Full compliment of G.A. channels
- NLW-1000, NMP-1000 & NPP-1000



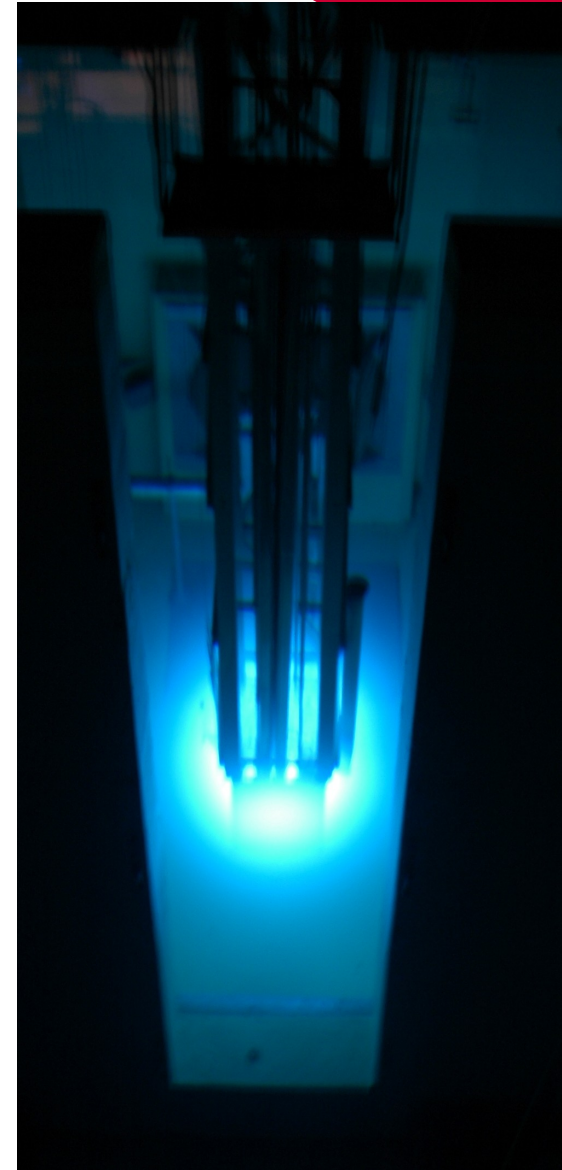
ONGOING PROBLEMS



- Pulsing
- Electrical Noise
- Bringing all maintenance items and paperwork up to speed.
- Training the staff
- Rewriting procedures

CONCLUSION

- **Two weeks down time**
- **An upgrade that was better than fifteen years in planning is almost complete.**
- **The reactor console and power instrumentation are in the best condition they have been in over twenty years.**
- **More knowledgeable operators**
- **More accurate diagrams and drawings**



Director, Nuclear Radiation Center, Washington State University

Washington State University invites applications for the Director of the Nuclear Radiation Center (NRC), a non-tenure track, permanent, Research Faculty (Associate Research Professor or Research Professor) position that will be available October 10th, 2005. The successful candidate will provide visionary leadership for the NRC, while assuring that the facility is operated in compliance with applicable State and Federal requirements.