

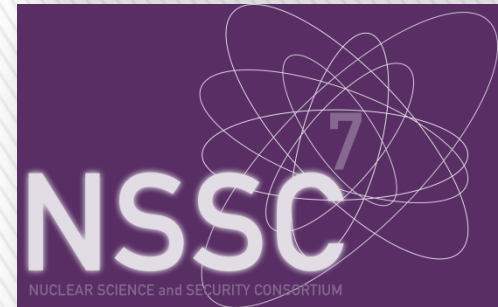
Renaissance Upgrades at the UC Irvine TRIGA Reactor



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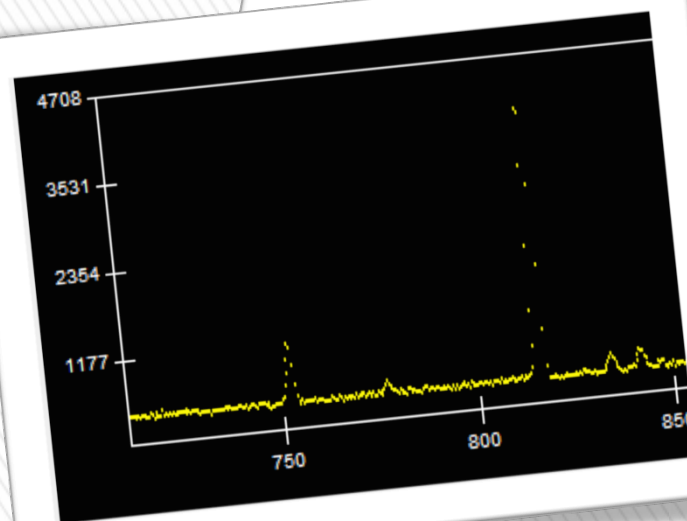
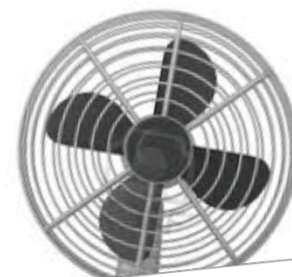
UCI Collaborations

- » Local and national collaborations.
- » Professor Shaka, Chemistry
 - > Interest in Thorium reactors.
- » Professor Nilsson, Chemical Engineering
 - > Fuel reprocessing, separations
- » Professor Mecartney, Material Science
 - > Fuel materials, ceramics



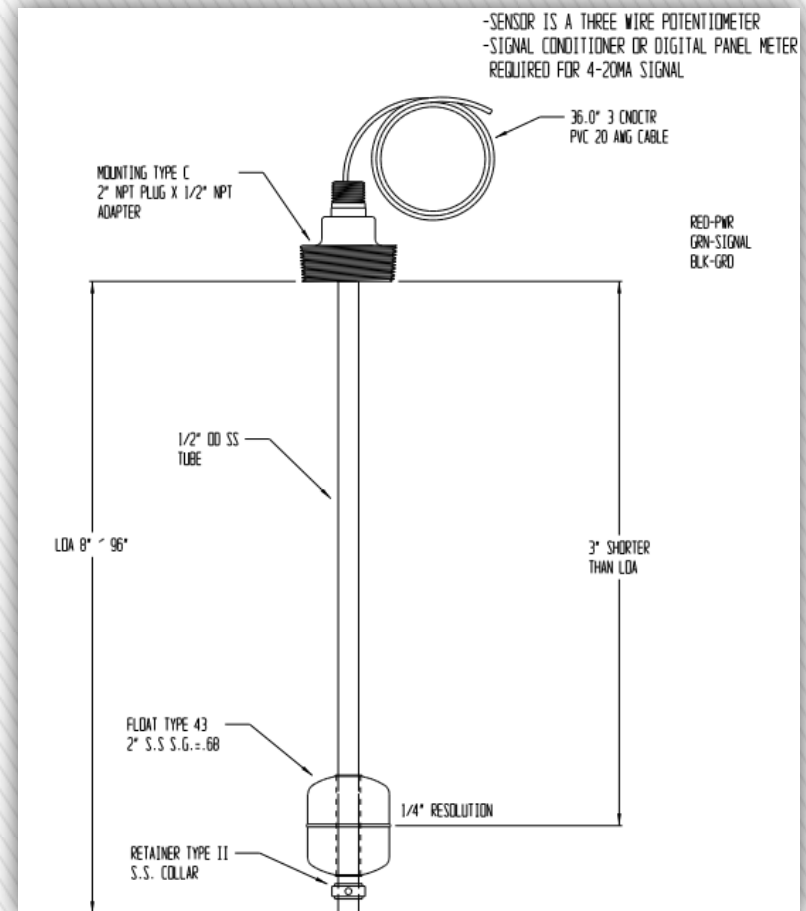
List of Upgrades

- » Pool water level channel
- » Ground water pumping system
- » Radiation monitoring system
- » Ventilation system
- » Fast transfer system
- » Heavy water tank
- » Seismic detector
- » Compton suppression system
- » Flow loop terminus



Pool Water Level

- » New float style detector
 - > Three wire potentiometer providing current output
- » Digital panel located on console
 - > Processes signal from detector to give level indication
 - > Provides alarm relays for notification.



Ground Water Pump



- » New well dug to evacuate water from around pool.
 - > 35 ft deep, 9 ft from pool
- » Water around the pool promotes corrosion of tank.
- » Pump – Grundfos 5DQE-90
- » Controller – Pump Saver Plus
- » Indication – ProVu PD6000
- » Operates every 30 minutes to pump well dry.

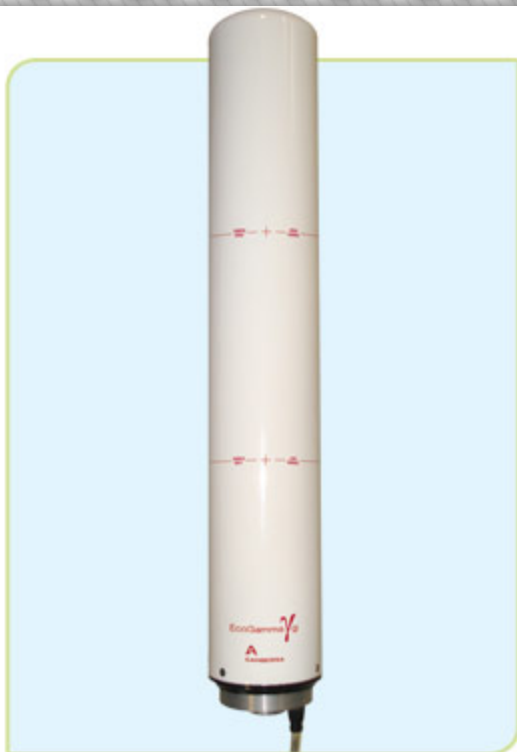


Radiation Area Monitors

- » Computer driven system.
- » Eight detectors total in facility.
- » Six EcoGammas.
- » Two iR7040s.
 - > Local indication
- » Continuous operation with history.

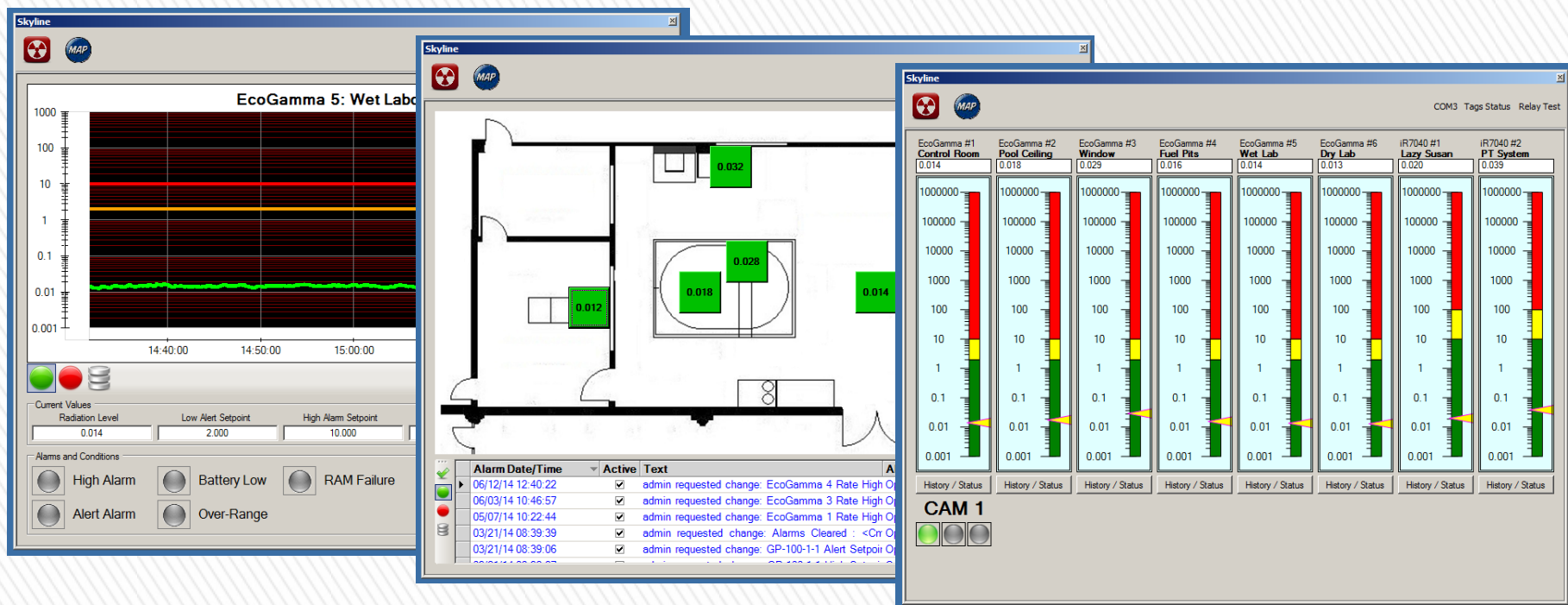
» Monitors:

- > Control Room, Reactor Pool, Hallway, Fuel Storage, Wet Laboratory, Dry Laboratory, Lazy Susan Port, Pneumatic Transfer Station.



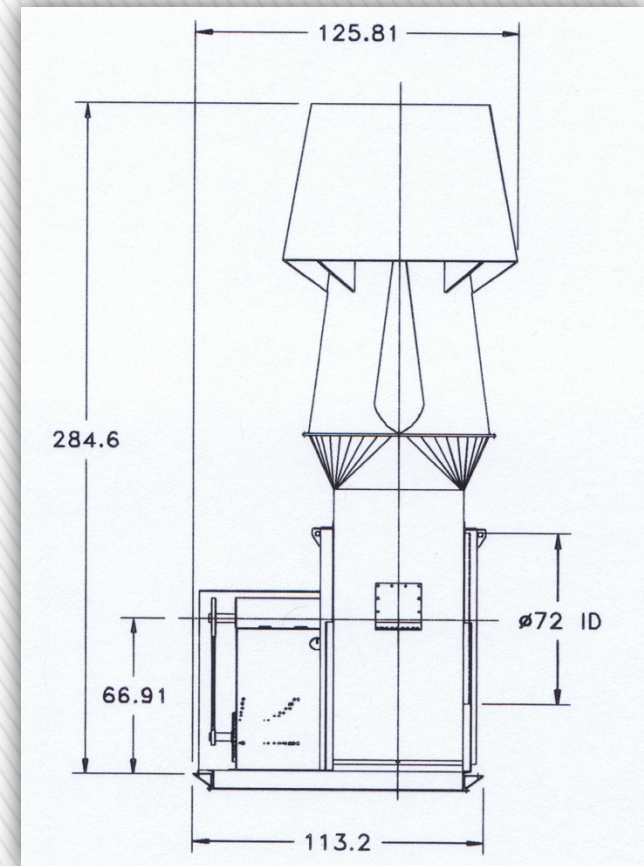
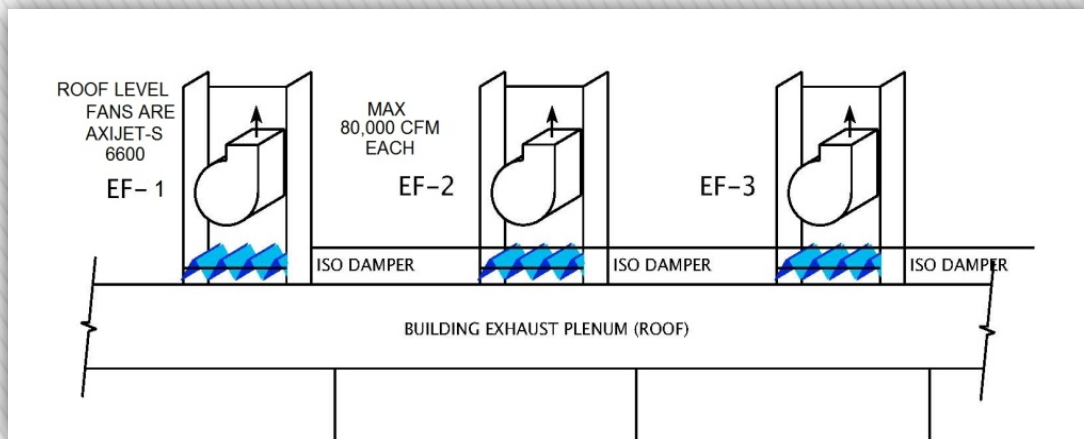
Radiation Area Monitors

- » Custom interface to display information and controls.
- » Shows all meters, individual meter, map of facility.
- » Very reliable operation and ease of use for operators and trainees.

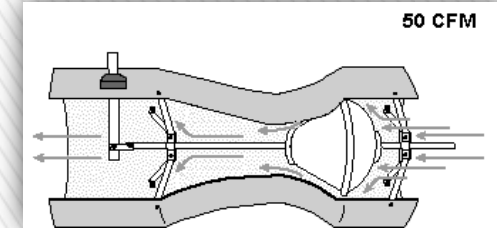
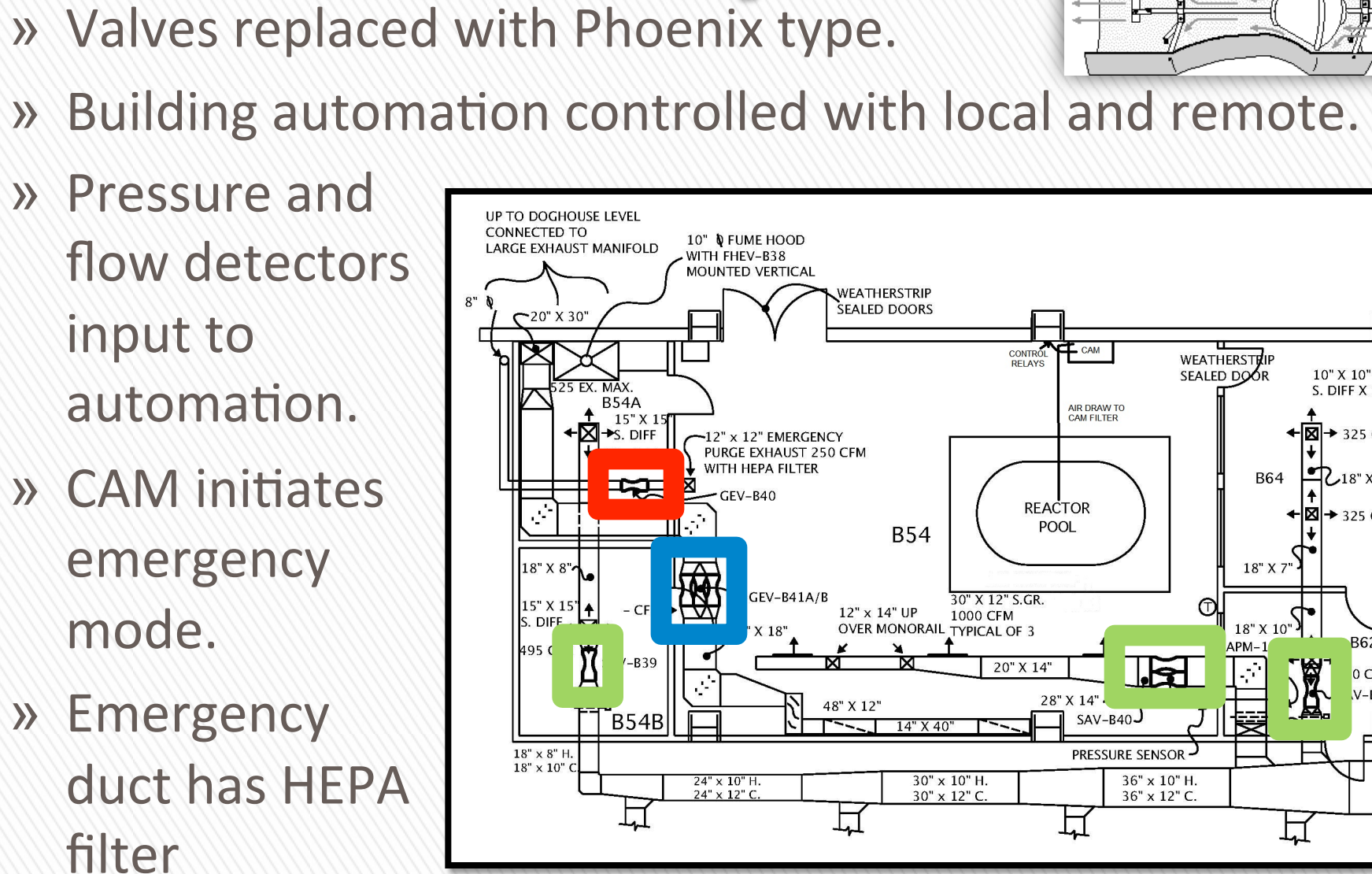


Ventilation System

- » Rooftop fans replaced with Axijet-S 6600
- » Three operate in parallel from common plenum
- » Achieve plume height 100 ft above rooftop.
- » Capable of 80,000+ CFM.



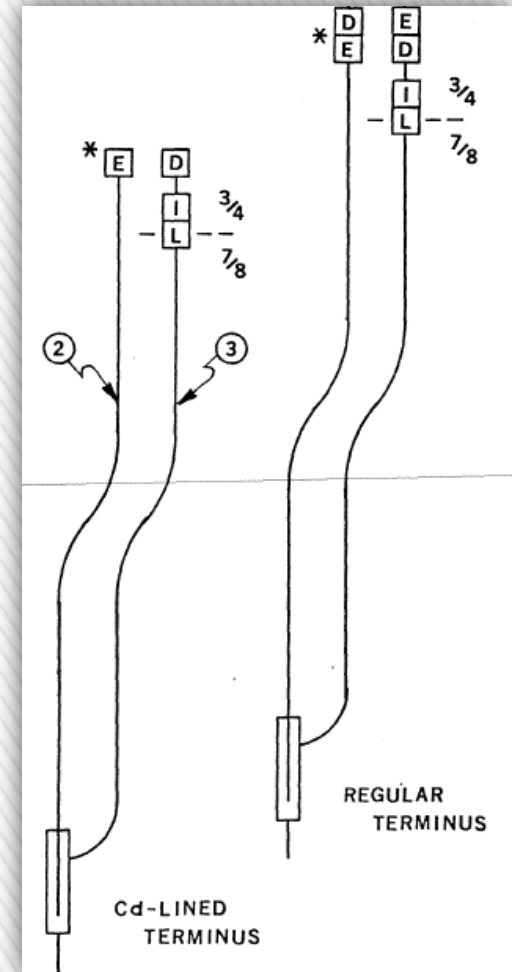
Ventilation System



Fast Transfer System



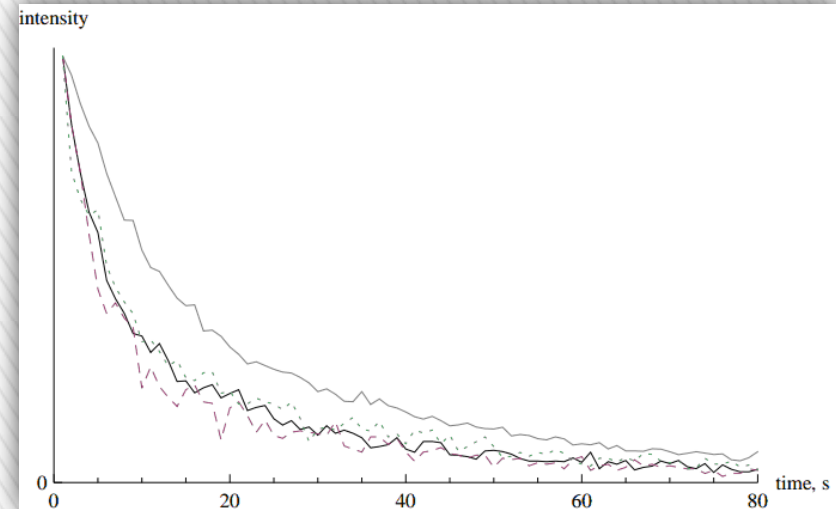
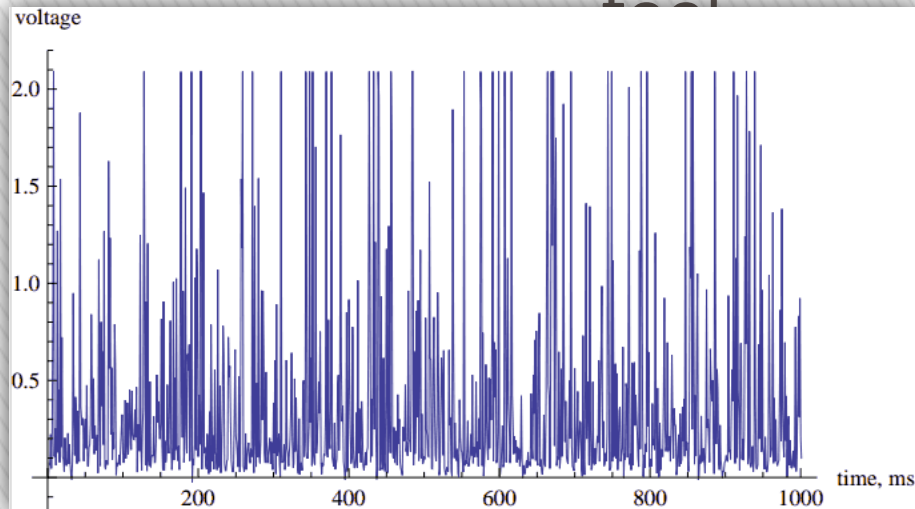
- » Cadmium and normal terminuses replaced.
- » He-3 Neutron detectors make up counting station.
- » Transfer times of >1 second.
- » Fissionable materials tested currently.



FTS Electronics

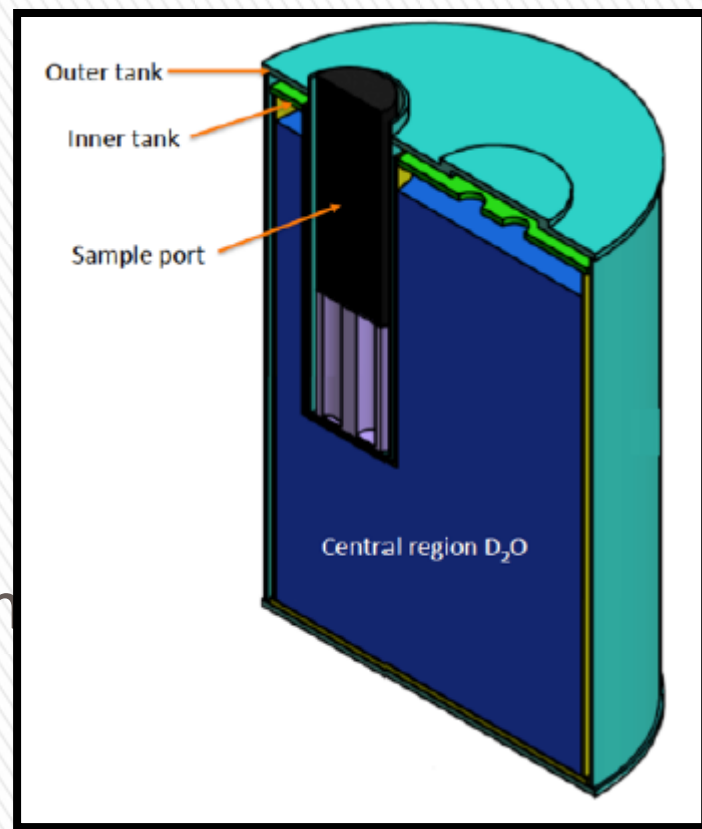


- » Raul Ocampo, Shaka group, has revamped FTS electronics.
- » Replaced complicated, troublesome system.
- » Automated sample handling.
- » Analog to digital processing via NI



D2O Tank

- » Created by Svoboda Physics group at UC Davis.
- » Mani Tripathi, Christopher Grant, Jeremy Mock.
- » Made of two concentric cylinders.
 - > Inner tank holds D₂O.
 - > Outer tank for containment.
- » Sample port
 - > Graphite insert holds samples and provides additional moderation.
- » Created for extreme moderation for purely thermal activation of samples.



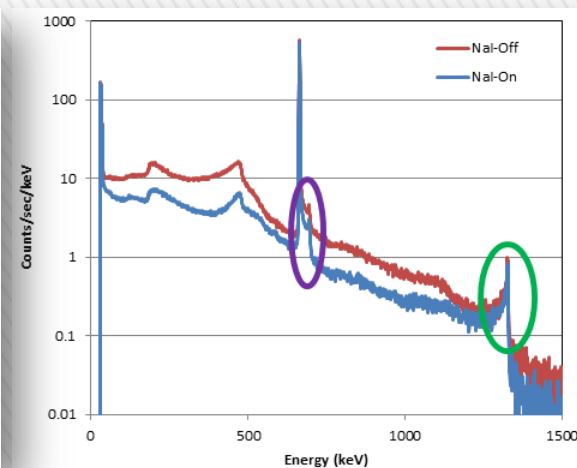
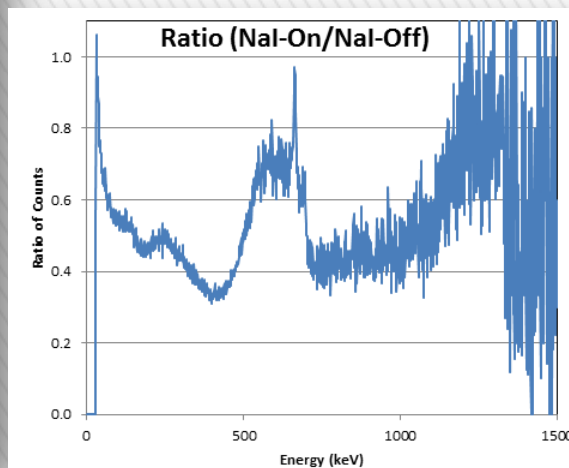
Seismic Detection

- » New three-axis, micro accelerometer replaced the traditional two-axis.
- » Sensitive down to 0.025 g (0.24 m/sec^2).
- » Triggers three internal relays to initiate SCRAM.
- » Serial port communications for retrieving seismic history.
- » Also detects impacts on loading dock wall (attempted intrusion).
- » Only requires $\sim 1\text{W}$ power.



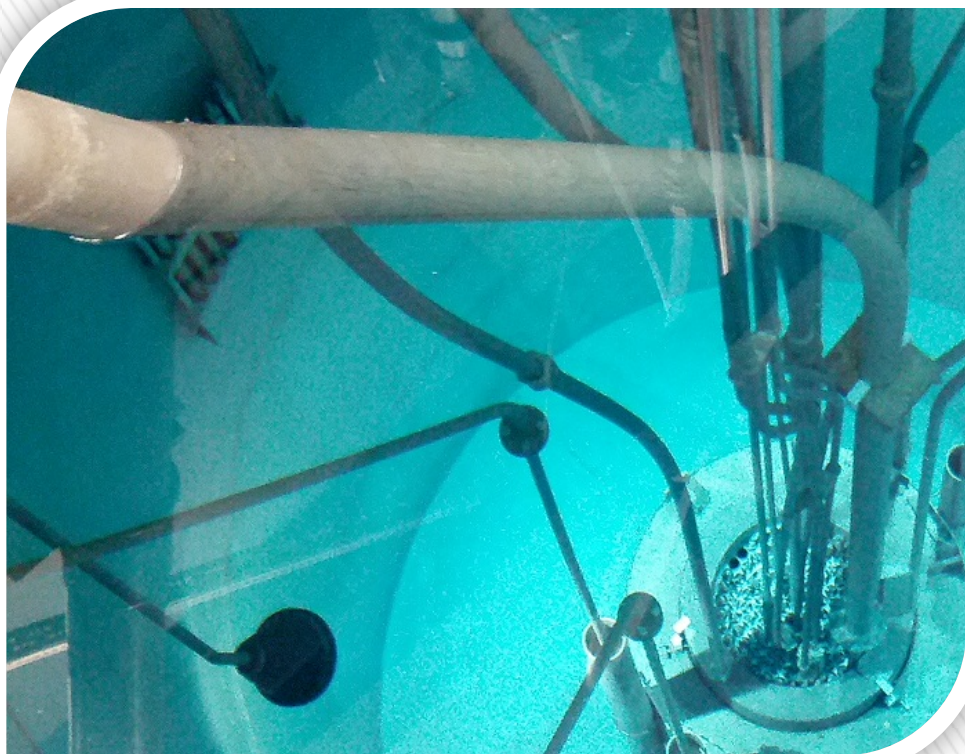
Compton Suppression

- » 30% HPGe Coaxial gamma ray detector.
- » NaI Annulus and plug provide surrounding geometry.
- » Located in pre-WWII steel room, low background.
- » Suppression of over 60% of Compton events.
- » Peak suppression of $< 5\%$.

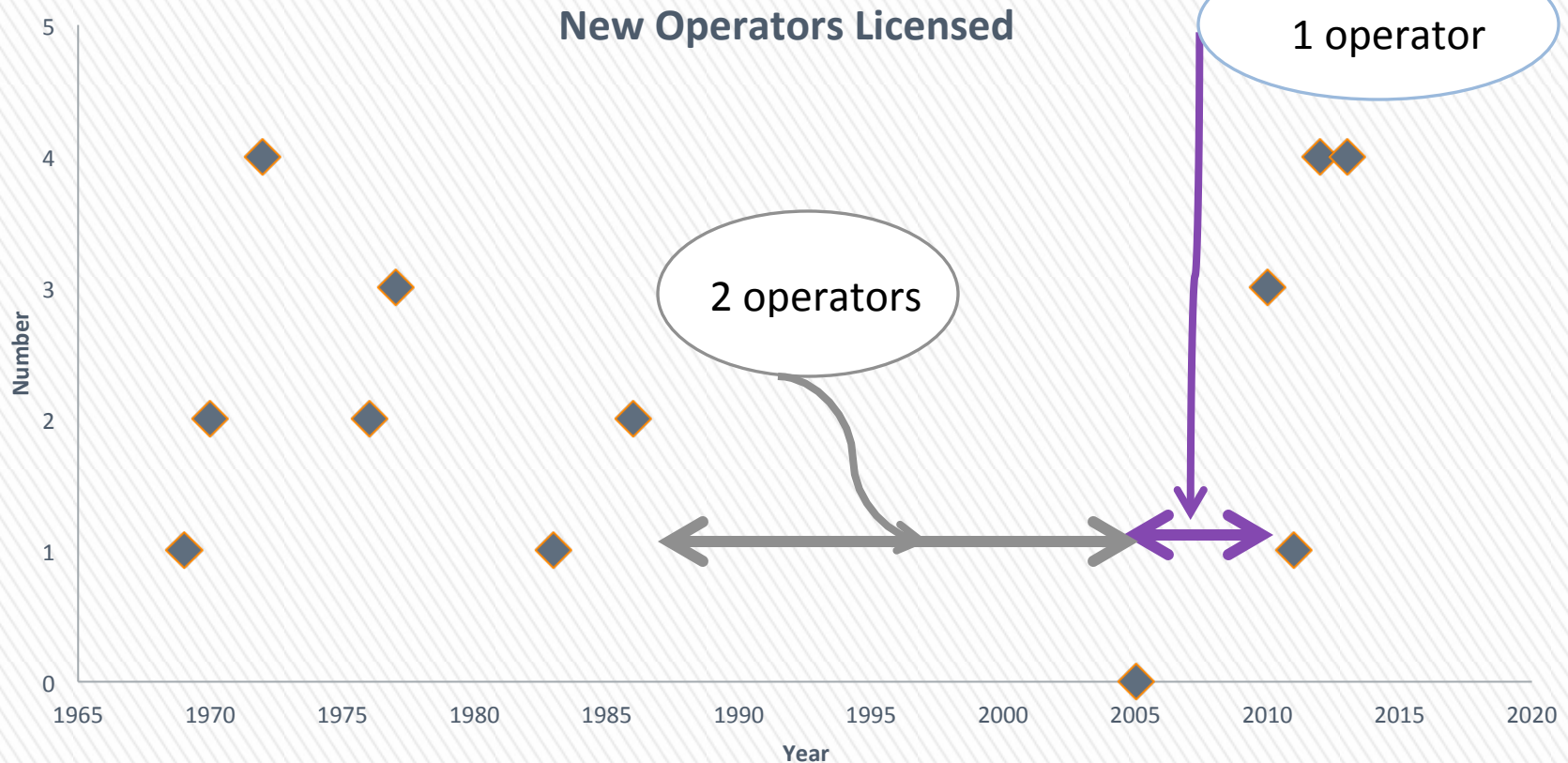


Flow Loop Terminus

- » Previously a cryogenic irradiation facility.
- » Remachined terminus
- » Pumping / collection station located next to pool.
- » Pump is high pressure, continuous flow model.
- » Used for Silzard-Chalmers reaction, medical isotope production research.
- » Gamma spectrometry to determine effectiveness.

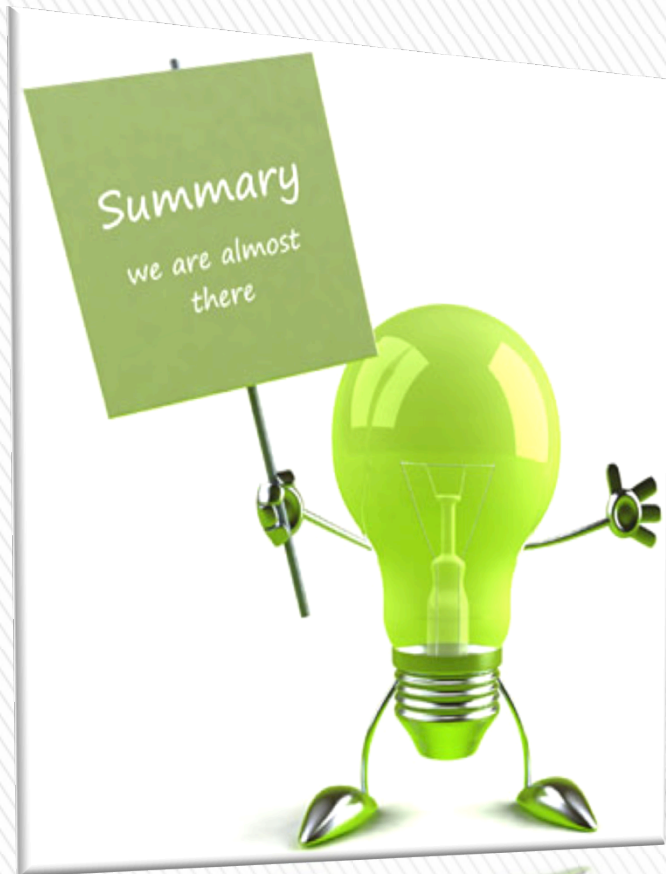


Operator Licensing



- » Major lull from 1985 to 2009 with only 2 operators.
- » Surge in operators since 2010:
 - > 4 SROs, 6 ROs

Summary



- » Pool water level channel
- » Ground water pumping system
- » Radiation monitoring system
- » Ventilation system
- » Fast transfer system
- » Heavy water tank
- » Seismic detector
- » Compton suppression system
- » Flow loop terminus



Thank you for attending

» Special thanks to our funding providers:

- > NSSC
- > NNSA
- > NEUP
- > University of California



» Have fun in Portland and enjoy the rest of the conference!



Questions?

