



Completion of Irradiation of Sensors in ATRC Milestone

March 2021

Changing the World's Energy Future

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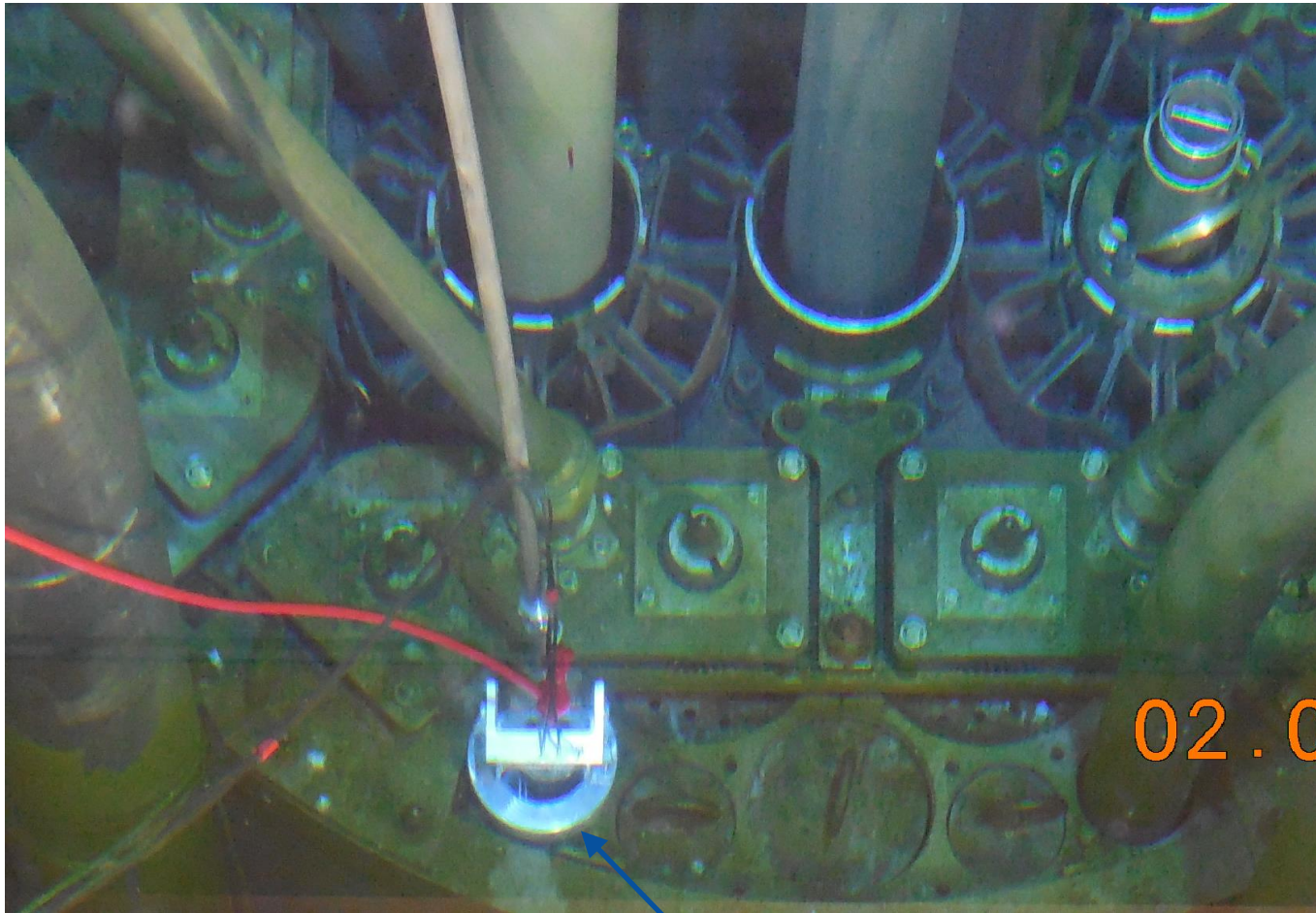
**Completion of M2CT-21IN0702023:
*Perform test of neutron flux sensors in
the Advanced Test Reactor Critical
Facility***



This instrumentation experiment in ATRC represents a crucial step forward for:

- **Testing instruments in representative environments for reactor developers**
- **Developing key domestic expertise for in-pile instrumentation**
- **Supporting characterization of test positions required to fill testing capabilities lost from the closure of the Halden reactor.**

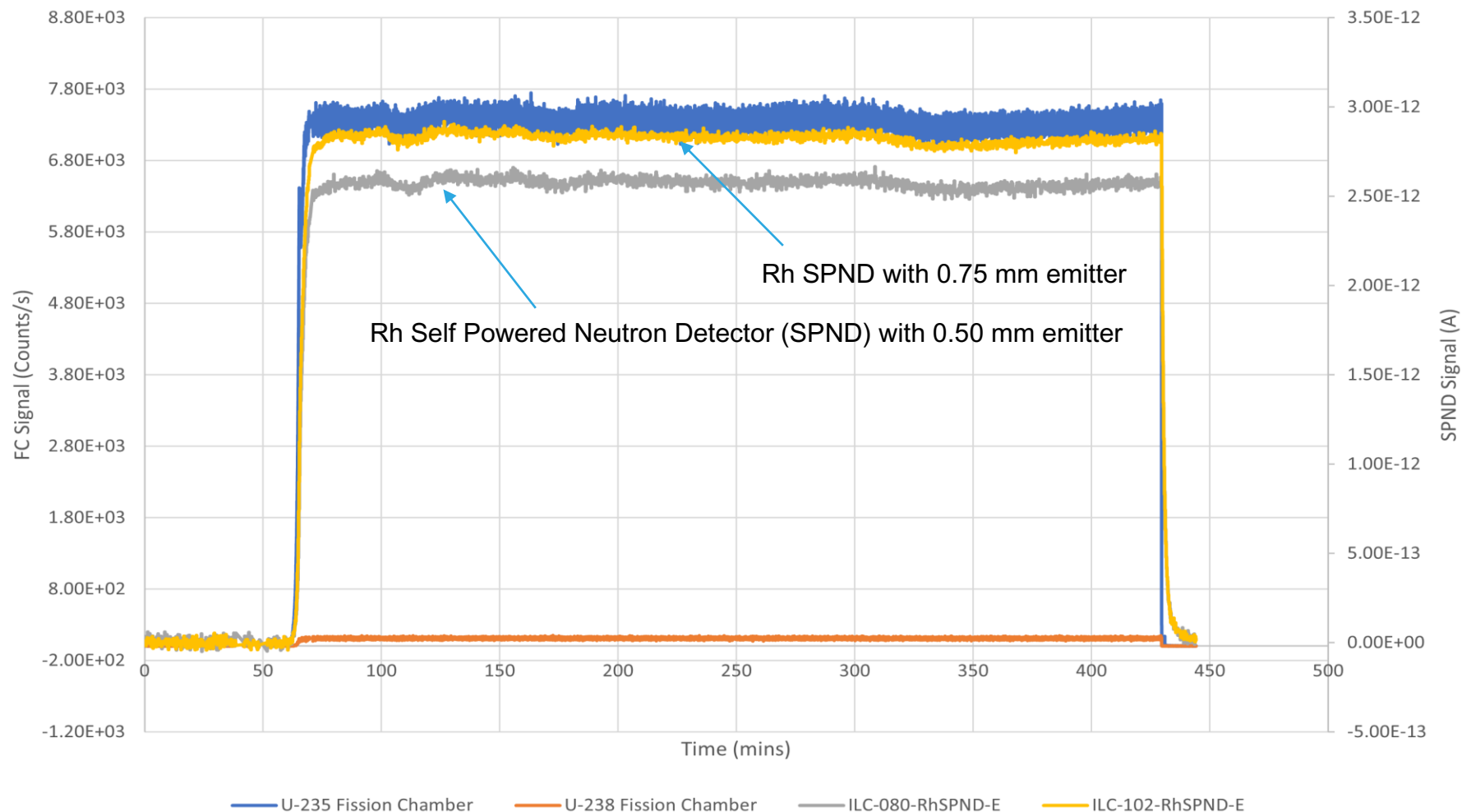
Installation of instrumentation test rig in ATRC reactor



Test rig was installed in ATRC I-13 position on 2/11/2021 and irradiated for 6 hours. See following slide for data summary.

Active sensor data from 6-hour run

Demonstration of Self-Powered Neutron Detectors and Fission Chambers in ATRC



Observations from 6-hour run

- All neutron flux sensors performed as expected
- Considering the very low neutron flux in this position of ATRC, the signal-to-noise ratios were remarkably good
- The output of all sensors closely followed the same trends (i.e., as there were slight variations in reactor power, all sensors tracked them)
- As expected, the Rh detector with the larger emitter diameter produced a larger current
- Fission chambers showed instantaneous response to reactor power changes
- First-order response of Rh detectors corresponded to half-lives of dominant isotopes

Passive dosimetry was also irradiated along with the active sensors. Data from these wires will be available in coming weeks and compared to the active sensors. A report covering this comparison will be part of milestone M3CT-21IN0702014, due 9/30/2021.