

Tritium Focus Group - INEL

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Experience:

Nuclear Power, Combustion Engineering – 1979

Radiation Science, Inc. – 1986

Schlumberger - 2004

Tritium Monitoring at PTC

What We Do at PTC

Description of the Manufacturing Process

Pathways to Tritium Release

Monitoring

Hardware and Software

User Interface

- MNTR is EAR Controlled Technology
- Classified as a Dual Use Device

What We Do

- Princeton Technology Center is an R&D and manufacturing center for Schlumberger, an oil field services company
- We manufacture detectors and neutron generators which are installed in well logging equipment for oil and gas exploration and recovery
- Neutrons are generated by a DT fusion reaction inside the “minitron” and interact with the well formations
- Radiations from these interactions are detected by detectors in the tool, subsequently diagnosed, and produce the proprietary reports on which our business is founded



The Manufacturing Process

- “Clean” tubes are manufactured under closely controlled processes by the “front-end”
- Tritium is introduced into the empty tubes in the Minitron Process Building (MPB)
- Air-flow in the building is once-through, including HVAC



- Transfer of Tritium is through manifold systems in ventilated hoods
- Exhaust is through a common Stack

Pathways to Tritium Release

- Containment of the Tritium is provided by the manifold system
- Tritium is vented to the atmosphere by pumping systems that maintain the vacuum inside the manifold
- There is no secondary containment surrounding the manifold
- Potential for inadvertent release is “limited” by design



Monitoring

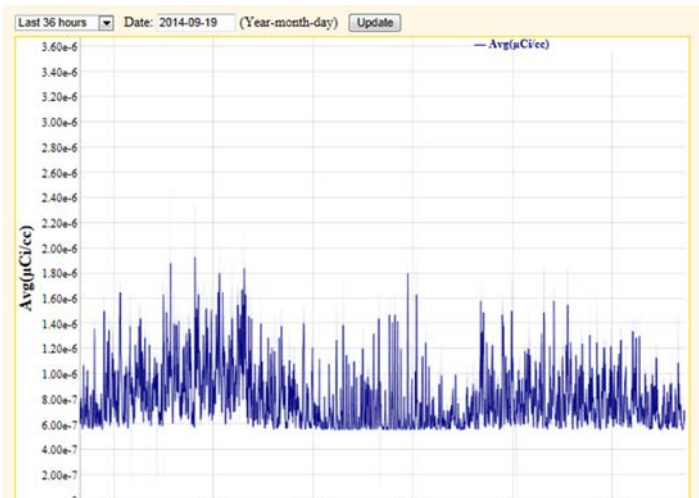
- Stack and Room Air Tritium concentration is continuously sampled by digital flow-through ion chambers
- Tritium concentration ($\mu\text{Ci}/\text{cc}$) is determined and logged every six (6) seconds



- Tritium concentration is displayed as a “strip chart” in near real time
- The data file is updated and backed-up on the server

Hardware / Software

- Commercially available ion chambers (Canberra TAM100)
- SLB software running as a “Service” on Windows for data collection, analysis, and display
- Dailey release is calculated automatically as the product of the integral concentration and the constant stack flow rate
- “Peak” analysis is currently performed separately in excel



Available monitors

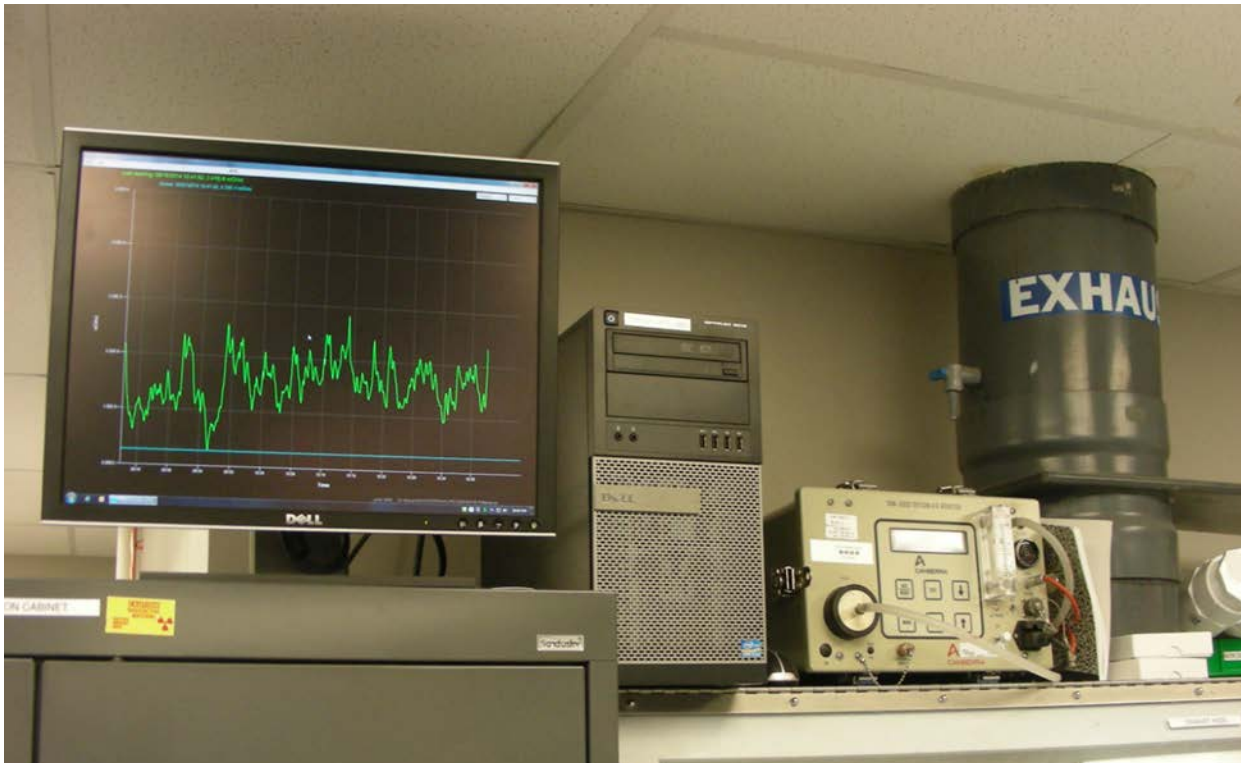
#	Location	Status	Value	Updated
Background radiation monitors				
1	Cedar brook background monitor	healthy	107.4 CPS	now
Tritium release monitors				
1	R&E bunker tritium monitor	healthy	1.92e-6 µCi/cc	59 seconds ago
2	R&E bunker stack tritium monitor	healthy	2.1e-6 µCi/cc	59 seconds ago
3	ATL bunker tritium monitor	healthy	1.93e-6 µCi/cc	59 seconds ago
4	Minitron processing room tritium monitor	healthy	5.94e-7 µCi/cc	59 seconds ago
5	Minitron processing stack tritium monitor	healthy	2.77e-6 µCi/cc	59 seconds ago

[Tritium release report](#)

Princeton Technology Center (PTC)

User Interface

- “User Friendly” Display suitable for a “manufacturing” environment



- Data analysis and retention for compliance

Software Details

- PTC Tritium Monitoring.docx

QUESTIONS