



Successes and Challenges in 5 Decades of Neutron Activation Analysis at the Dow TRIGA Research Reactor (DTRR)

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**Challenges and Successes in 5
Decades of *Running only*
Neutron Activation Analysis **cost**
effectively at an *NRC regulated*
and *Privately Owned* Dow
TRIGA Research Reactor (DTRR)**



History

TRIGA Mark I, built in 1966, Reached Criticality at the Midland Home in June, 1967

Amendment 1	1967	SNM Possession
Amendment 2	1968	Neutron Source
Amendment 3	1977	License Renewal, Console Upgrade
Amendment 4	1979	Security Plan
Amendment 5	1989	License Renewal (100kW to 300kW)
Amendment 6	1990	Tech. Spec.
Amendment 7	1999	Hard Drive Upgrade
Amendment 8	1999	Tech. Spec.
Amendment 9	2014	License Renewal (2034)

Facility Modifications Through 50-59 Changes

1. Minor Console Upgrade
 2. Heat Exchanger Upgrade
 3. Continuous Air Monitor Upgrade
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Successes at the DTRR

Safety and Regulatory Compliance

- Safety and Security are Integral to the Dow Chemical Company Culture
 - Well Established Emergency Services and Security (ES&S) for the Plant (Chemical)
 - The DTRR is a Designated cGMP and GLP Facility by Dow Analytical Sciences
 - Logging of Usage, Maintenance and Calibration Records are Mandatory
 - Subject to EPA Plant Oversight and Inspection
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Successes at the DTRR Contd.

NAA ID	Year	MW days	Hours of operation	# of Experiments
1	1994	1.3	301	5000
2	1995	2.1	348	5140
3	1996	1.9	360	5560
4	1997	1.9	392	6090
5	1998	1.9	354	6650
6	1999	1.8	330	6990
7	2000	1.8	362	8360
8	2001	2.6	418	9470
9	2002	1.9	315	8510
10	2003	2.0	400	9340
11	2004	1.8	300	7380
12	2005	1.9	300	6470
13	2006	1.3	314	5440
14	2007	2.0	405	8810
15	2008	1.9	380	7820
16	2009	1.9	446	9140
17	2010	1.8	400	9390
18	2011	1.7	350	8380
19	2012	1.5	305	8050
20	2013	1.7	307	6160
21	2014	1.4	318	7260
22	2015	1.4	284	7170





Successes at the DTRR contd.

- Low Number of Equipment Maintenance
- Increased Future Investments for the DTRR

NAA ID	Year	Number of Preventive or Corrective Maintenance
#1	2008	19
#2	2009	15
#3	2010	8
#4	2011	9
#5	2012	13
#6	2013	11
#7	2014	22
#8	2015	9

- License Renewal 2009 to 2014
- Console Upgrade in Progress (a Multi-Year and Multi-Phase Project)
- Staff Training and Retention

Tecktronix Monitor
Eberline Area Monitor

DTRR is Used as an Analytical Tool; Part of a Larger Analytical Establishment with other Material Characterization Capabilities (ICP, XRF, IC, IR, NMR, HPLC, SMX, etc.)

Challenges at the DTRR

- Maintenance of Aging Equipment
 - Staff Training and Retention
 - Making Facility Changes
 - Conducting New Experiments
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Acknowledgments

- Paul O'Connor
 - DTRR Facility Director
 - Bryan Haskins
 - DTRR Assistant Reactor Supervisor
 - Tim Debey
 - USGS Reactor Manager
 - Andrew Smolinski
 - NRAD Reactor Systems Engineer
 - Mark Trump
 - Associate Director, Breazeale Nuclear Reactor
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Questions?

