INL/EXP-20-59278-Revision-0

Transformer Yard Testing

August 2020

Chance Glenn Russell

Changing the World's Energy Future

INL is a U.S. Department of Energy National Laboratory operated by Battelle Energy Alliance, LLC

INL/EXP-20-59278-Revision-0

Transformer Yard Testing

Chance Glenn Russell

August 2020

Idaho National Laboratory
Idaho Falls, Idaho 83415

http://www.inl.gov

Prepared for the
U.S. Department of Energy
Under DOE Idaho Operations Office
Contract DE-AC07-05ID14517

New Transformer Testing Approach Reduces Reactor Down Time

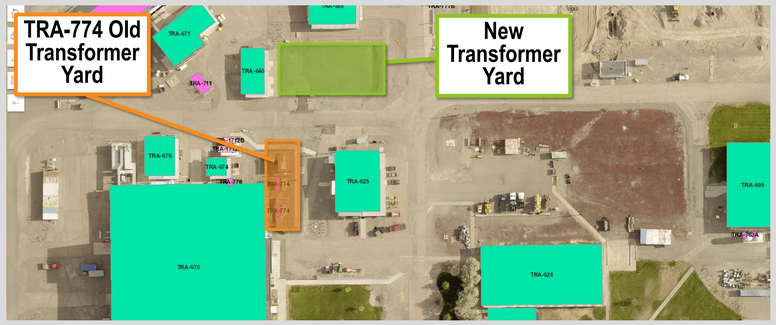
New transformers will ensure uninterrupted power for INL's Advanced Test Reactor Complex

WHAT'S THE PROBLEM?

All power to ATR feeds through the ATR-774 transformer yard, which has been in service for 57 years. It is in degraded material condition and quickly reaching end of life. Current shortcomings of these transformers include:

- Oil Leaks
- Lack of oil containment system
- No lighting protection
- Inadequate fire protection
- Radiant energy shields in disrepair
- Failing pressure alarms

On top of this, the redundancy provided by the original two-transformer design has been lost due to years of increasing loads.



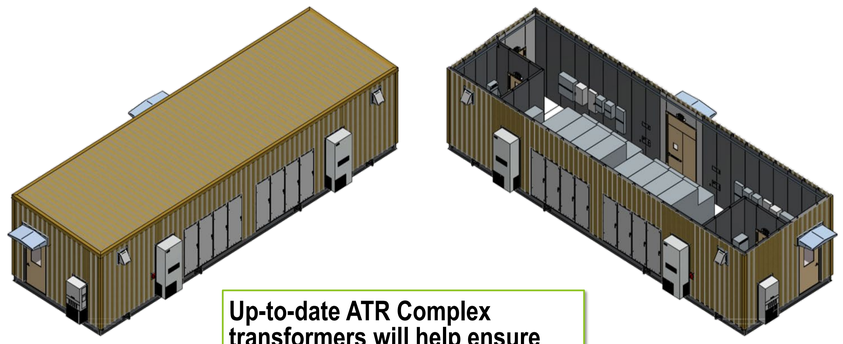
WHAT IS OUR SOLUTION?

To combat these problems, ATR has elected to construct a new transformer yard, and replace the existing 7.5 KVA transformers with two new 12.5 KVA transformers. The new transformer yard will provide:

- An oil containment system
- Lighting protection w/ underground dispersion pad
- Adequate fire protection
- New radiant energy shields
- Microprocessor system for temperature, pressure, and fluid level monitoring
- Seismic protection
- New conductors
- Pre-engineered Electrical Building

The new transformers will reincorporate redundancy and meet ATR's power needs.

Incoming power from Montana, Wyoming, and Nevada → 138 kV → TRA-657 Central Station Transformer → 13.8 kV → TRA-774 Transformer Yard → 4.16 kV → Distribution to ATR



A new transformer yard requires testing

Testing a transformer yard can be broken down into 8 different subsections, based on when and where the testing will be done. Dividing tests helps manage time, and coordinate efforts with the vendor.

- Manufacturer testing
- Receipt testing
- Pre-Installation
- Post-Installation
- CC Testing
- QA Verification
- SO Testing
- Turnover

What tests need to be performed?

Thanks to organizations like IEEE, ANSI, and NEMA, standards on transformer testing have already been written. It is our responsibility to determine which standards are applicable and ensure that the procedures are followed.

- NETA ATS-2017 Acceptance Testing Specifications
- NETA ECS-2015 Electrical Commissioning Specifications
- NETA MTS-2015 Maintenance Testing Specifications

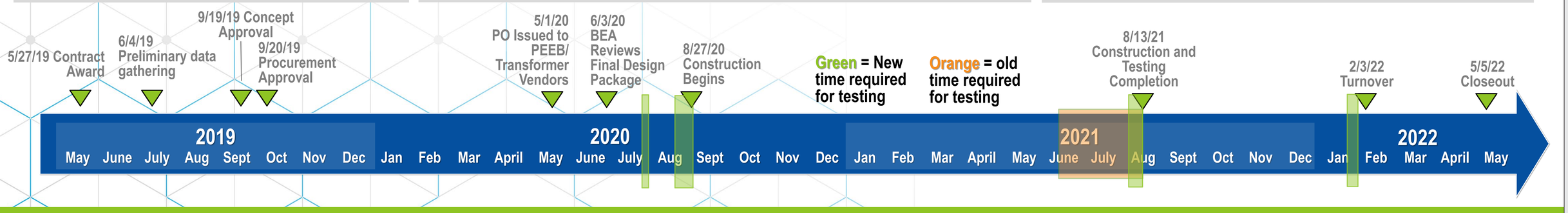
IEEE · NEMA · ANSI · NETA · ICEA · NFPA

Time is a constraint

Our mission is to reduce our impact on the CIC outage, through efficient planning and time management. By organizing the tests by time and location, we were able to cut back on time and cost.

What have we saved?

By organizing and categorizing these tests, we have reduced our impact to the CIC outage from 2 months to just a few weeks. Maximizing efficiency cuts down on cost.



www.inl.gov

Idaho National Laboratory