# *TREAT Conversion Program Summary*

TREAT IRP Meeting

November 7, 2017

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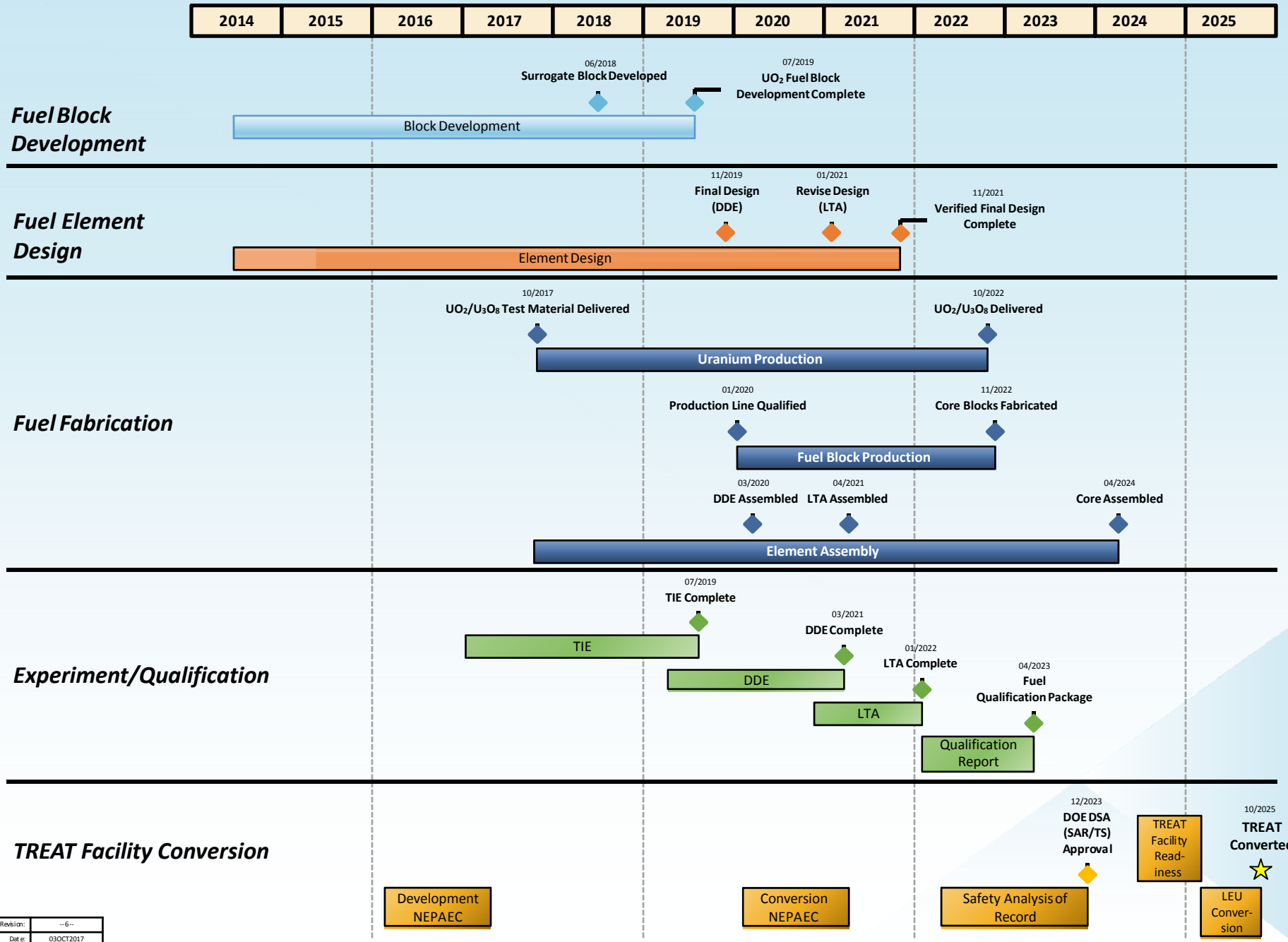
Idaho National Laboratory

# Integrated TREAT LEU Conversion Program Road Map

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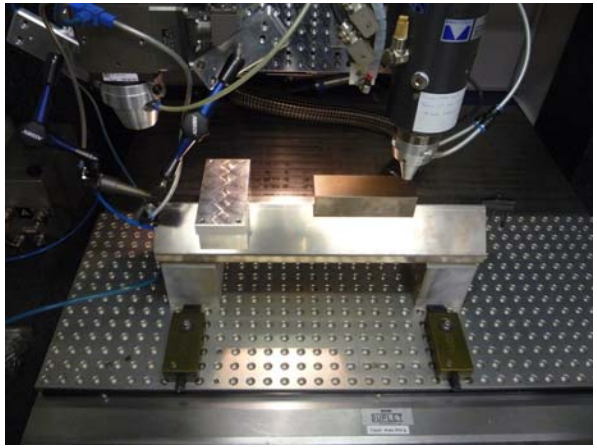
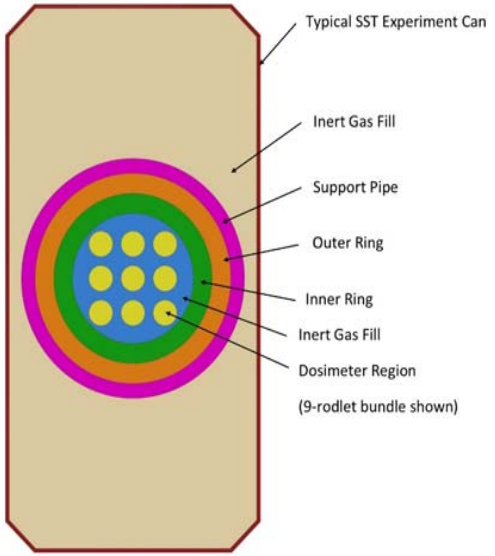
| Revision: | --6-- |
| Date | 03OCT2017 |
| Changed by: | DDI |

TREAT Irradiation Experiment (TIE); Lead Test Assembly (LTA); Design Demonstration Element (DDE)

# Accomplishments Over the Past Six Months

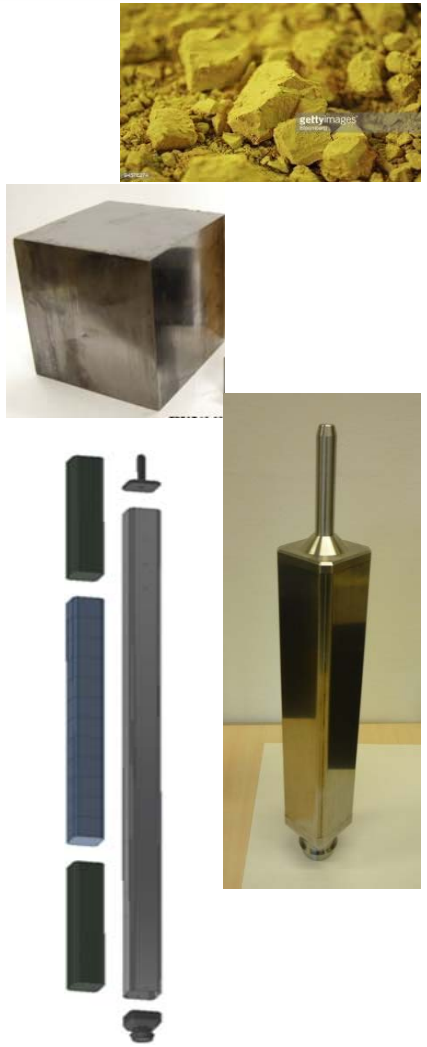
- Three more surrogate block pressing campaigns are complete and a fourth is being planned
- Preparations for the TREAT Irradiation Experiment (TIE) are underway
- UO2 and U3O8 have been produced to support TIE
- Detailed cost estimates for fuel element assembly, cladding fabrication, fabrication facility preparation, and uranium oxide production have been developed
- Numerous technical analyses including LEU to HEU comparisons, sensitivity studies, and TIE support calculations have been developed
- Cladding corrosion studies are continuing
- QAPD developed, QAPP drafted, MSA process implemented
- Program requirements are being clarified
- Independent technical review nearing completion
- Conceptualizing 9-pin test





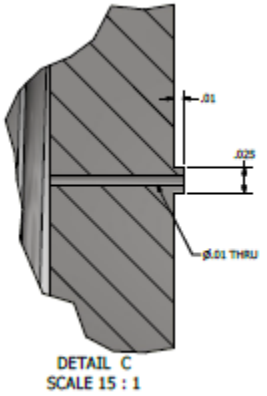
# Fuel Element Production Options

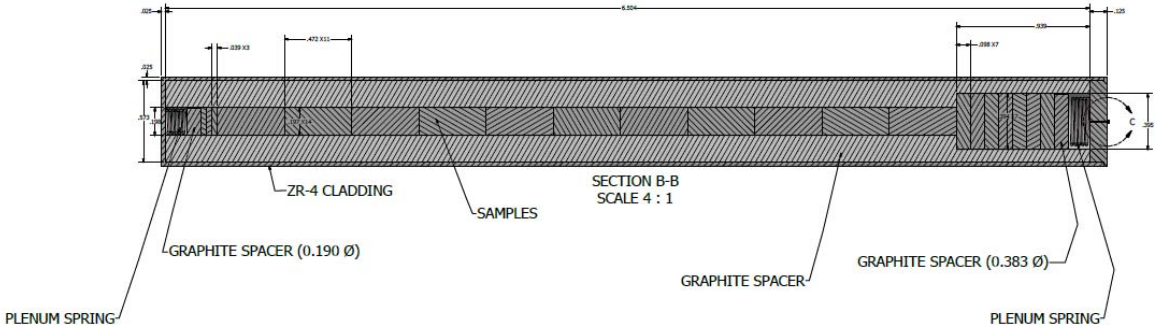
| | | |
|---|---|---|
| **Uranium** | $UO_2$ | Technically somewhat better behavior than $U_3O_8$ |
| | $U_3O_8$ | Easier to produce |
| **Fuel Block Manufacturing** | BWXT | Experienced fuel fabricator; requires significant facility D&D |
| | LANL | Fabricated last TREAT core elements; requires facility modification/construction |
| **Cladding** | Material | Zircalloy or specialty alloy |
| | Location | Bid process |
| **Fuel Element Assembly** | MFC | Close to TREAT; requires capital construction |
| | AREVA (WA) | Experienced in fuel production; requires NRC license modification |
| | Eames (ISU) | Facility and license available; need stakeholder approvals |

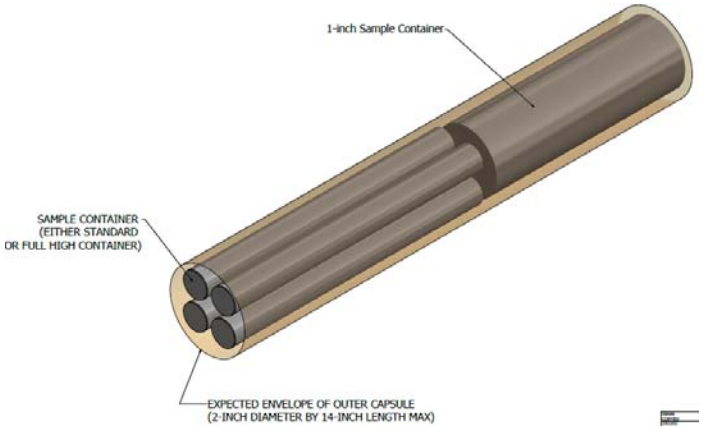


# TREAT LEU Fuel Irradiation Experiment 1 (TIE)

- **Purpose/Objective**: Determine lifetime equivalent irradiation effects on thermomechanical properties of LEU-fueled graphite specimens to support future TREAT LEU conversion fuel qualification efforts.
- Steady state Irradiation will be performed in the MIT Reactor
- 5 double encapsulated sample sets (A, B, C, D, and E) that contain graphite/uranium-oxide fueled specimens. The sample capsules must be sized to fit in the GASSR system at MFC to measure fission gas release (<0.875”).
- Majority of samples range from 5 – 10 mm in diameter, but four will be 1” cubes



# FY 18 Priorities

- TIE Irradiation campaign
- Block fabrication process development
- HEU model validation and LEU predicted performance reports
- 9-pin analysis report and physics testing plan
- Uranium oxide production preparations
- Fuel production facility preparations
- Cladding down selection
- Special element production plan
- Safety analysis development plan
- External review closeout