Profile LFR-90

LOBO LOOP

USA

GENERAL INFORMATION

NAME OF THE FACILITY: Lobo Lead Loop
ACRONYM: Lobo Loop
MEDIUM (COOLANT(S)) OF THE FACILITY: Lead
LOCATION (address): Department of Nuclear Engineering, University of New Mexico
OPERATOR: University of New Mexico
CONTACT PERSON(S): Osman Anderoglu, Department of Nuclear Engineering, MSC01 1120 University of New Mexico, Albuquerque, NM 87131
(name, address, institute, function, telephone, email): +1 (505) 277-0667, oanderoglu@unm.edu

STATUS OF THE FACILITY: In operation
Start of operation (date): 2019

MAIN RESEARCH FIELD(S)
☐ Zero power facility for V&V and licensing purposes
☐ Design Basis Accidents (DBA) and Design Extended Conditions (DEC)
☒ Thermal-hydraulics
☒ Coolant chemistry
☒ Materials
☐ Systems and components
☒ Instrumentation & ISI&R

TECHNICAL DESCRIPTION

Description of the facility
Lobo loop was designed to study the long-term corrosion and erosion effects of molten lead (Pb) on structural materials at temperatures up to 700°C. Lobo loop supports corrosion, erosion, instrumentation, radioisotope retention and thermal-hydraulic studies in liquid Pb for lead cooled fast reactor (LFR), accelerator systems, and spallation target designs.
Pb velocity in the 34 mm pipe section is up to 1 m/s while in the specimen holder cans the velocity can reach more than 3 m/s depending on the number of specimen holder cans stacked.3
While the loop is made out of an FeCrAl based ODS alloy MA956, melt and secondary melt tanks are made out of SS316 and APMT respectively. The secondary melt tank is designed to perform stagnant testing at comparable temperatures as the loop.

Acceptance of radioactive material
No
Fig 1. Schematic of the Lobo Loop with dimensions

Fig 2. Actual Lobo Loop showing testing sections
### Parameters table

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medium (Coolant) inventory</td>
<td>Lead</td>
</tr>
<tr>
<td>Power</td>
<td>48 kW</td>
</tr>
</tbody>
</table>

### Test sections

<table>
<thead>
<tr>
<th>Section</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>TS #1</td>
<td><strong>Characteristic dimensions</strong></td>
</tr>
<tr>
<td></td>
<td>34 mm diameter, 1.5 m length</td>
</tr>
<tr>
<td></td>
<td><strong>Static/dynamic experiment</strong></td>
</tr>
<tr>
<td></td>
<td>Dynamic (and Static in the secondary melt tank)</td>
</tr>
<tr>
<td></td>
<td><strong>Temperature range in the test section (Delta T)</strong></td>
</tr>
<tr>
<td></td>
<td>100°C</td>
</tr>
<tr>
<td></td>
<td><strong>Operating pressure and design pressure</strong></td>
</tr>
<tr>
<td></td>
<td>5 (expansion tank) and 50 psi (main melt tank)</td>
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<tr>
<td></td>
<td><strong>Flow range (mass, velocity, etc.)</strong></td>
</tr>
<tr>
<td></td>
<td>Up to 1 m/s in the pipe and 3 m/s in the specimen holders</td>
</tr>
</tbody>
</table>

### Medium (Coolant) chemistry measurement and control (active or not, measured parameters)

Active oxygen control: Oxygen concentration (wt%) is measured real time in the melt and expansion tanks. Voltage is measured and converted to oxygen concentration in wt%. Oxygen is controlled using Ar + H₂ gas injection at the melt tank-loop connection port.

### Instrumentation

Level sensors, oxygen sensors, thermocouples and pressure transducers in the melt and expansion tanks. Thermocouples at several locations. Flow meter for water circulating the heat exchanger. Pb flow is measured through the heat loss at the calorimeter (heat exchanger).

### COMPLETED EXPERIMENTAL CAMPAIGNS: MAIN RESULTS AND ACHIEVEMENTS

About 600 lbs of Pb was melted and oxygen control studies in stagnant lead has been completed using Ar + H₂ mixture gas injection. Initial performance test has been started.

CFD simulations of the Pb flow in the experimental section and expansion tank has been completed and pressure drop has been calculated across the electromagnetic pump.

### PLANNED EXPERIMENTS (including time schedule)

**Corrosion testing of several alloys** (austenitic steels, ferritic steels, ODS steels, welded sections, HEAs, 3D printed alloys, etc.) at 500°C up to 3 m/s: Sep-Dec 2019

**Stagnant corrosion testing of several alloys** (austenitic steels, ferritic steels, ODS steels, welded sections, HEAs, 3D printed alloys, etc.) at 500°C: Sep-Dec 2019

**Stagnant corrosion testing of selected alloys** at 700°C: May-Sep 2020

**Corrosion testing of selected alloys** at 700°C up to 3 m/s: May-Sep 2020

**Radioisotope (using non-rad isotopes) retention studies in flowing lead**: Feb-May 2021
TRAINING ACTIVITIES
Oxygen control and general training in loop system and procedures including safety. LabView software upgrade and software alterations, computer hardware upgrade, etc.

REFERENCES (specification of availability and language)
