**Profile LFR-84**

**CRDM**

**CHINA**

**GENERAL INFORMATION**

<table>
<thead>
<tr>
<th>NAME OF THE FACILITY</th>
<th>Validation Device of Control Rod Drive Mechanism of Lead based Reactor</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACRONYM</td>
<td>CRDM</td>
</tr>
<tr>
<td>COOLANT(S) OF THE FACILITY</td>
<td>Lead-bismuth, lead</td>
</tr>
<tr>
<td>LOCATION (address):</td>
<td>China, Institute of Nuclear Energy Safety Technology, Chinese Academy of Sciences</td>
</tr>
<tr>
<td>OPERATOR</td>
<td>INEST</td>
</tr>
<tr>
<td>CONTACT PERSON</td>
<td>Chao Liu, FDS Team, No.350 Shushanhu Road, Hefei, Anhui, China, INEST, CAS, +86 551 65593681, <a href="mailto:clear@fds.org.cn">clear@fds.org.cn</a>;</td>
</tr>
</tbody>
</table>

**STATUS OF THE FACILITY**

| In operation |
| Start of operation (date): | 2017 |

**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**

Validation Device of Control Rod Drive Mechanism (CRDM) of Lead based reactor is a full-scale test platform for Control Rod Drive Mechanisms applied in China Lead-based Research Reactor (CLEAR-I). The effect of lead-based on CRDM performances could be validated based on the device with lead-based alloy.

The CRDM validation device would carry out a variety of tests, which mainly focus on the following objectives:

- Tests of CRDM motion performance in lead-based alloy, such as rod drop time, scram mechanism, dropping rod buffering, etc.
- Research and validation of high accuracy measurement and control technology for rod position.
• Tests of CRDM life in lead-based alloy, evaluated by the rod drop times and accumulative stroke.
• Obtain the experiment data to support the design and manufacture license of CLEAR-I CRDM.

Acceptance of radioactive material
No

Scheme/diagram

3D drawing/photo
### Parameters table

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coolant inventory</td>
<td>~3 ton LBE</td>
</tr>
<tr>
<td>Power</td>
<td>~200 KW</td>
</tr>
</tbody>
</table>

### Test sections

#### TS #1

- **Characteristic dimensions**
  - Dimensions of Testing vessel:
    - Diameter: ~355 mm; Height: ~7.5m

- **Static/dynamic experiment**
  - Stastic

- **Temperature range in the test section (Delta T)**
  - 200-400 °C

- **Operating pressure and design pressure**
  - 0.7MPa/1MPa

- **Flow range (mass, velocity, etc.)**
  - NONE

### Prototype component test

- ✓ Tests of CRDM motion performance
  - Rod drop time
  - Scram mechanism
  - Dropping rod buffering
  - Other tests

- ✓ Tests of CRDM life
  - Continuous Rod drop
  - Continuous Rod moving

### Instrumentation

- Rod Position Measuring Devices

### COMPLETED EXPERIMENTAL CAMPAIGNS: MAIN RESULTS AND ACHIEVEMENTS

Rod dropping time was measured to be less than 1.1 s with the full stroke of 900 mm

Electromechanical delay time was 77 ms
Measuring accuracy of rod position was ±0.14 mm

- PLANNED EXPERIMENTS (including time schedule)
- 2019.01-2019.12:
  ✓ Continuous testing on rod drop
  ✓ Continuous testing on rod moving
  ✓ Testing on sealing performance

TRAINING ACTIVITIES
Training activities can be agreed with INEST for the operation of the experimental campaign under the supervision of INEST qualified staff.

REFERENCES (specification of availability and language)
No