Profile LFR-91
IVFH
CHINA

GENERAL INFORMATION
NAME OF THE FACILITY: Validation Device of In-vessel Fuel Handling System of Lead-based Reactor
ACRONYM: IVFH
COOLANT(S) OF THE FACILITY: Lead-bismuth, Lead
LOCATION (address): China, Institute of Nuclear Energy Safety Technology, Chinese Academy of Sciences
OPERATOR: INEST
CONTACT PERSON: Zhenzhen Zheng, FDS Team, No.350 Shushanhu Road, Hefei, Anhui, China, INEST, CAS, +86 551 65593681, clear@fds.org.cn;

STATUS OF THE FACILITY: In operation
Start of operation (date): 2016

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 In-vessel Fuel Handling (IVFH) System of Lead based Reactor is a full-scale test platform for IVFH applied in China Lead-based Research Reactor (CLEAR-I). The effect of Lead-bismuth eutectic (LBE) on IVFH performances could be validated based on the device with LBE.

The IVFH validation device would carry out a variety of tests for separation or coupling integration of equipment based on the needs of different experiments, which mainly focuses on the following objectives:
- Test and validation of the LBE reactor refuelling system performance in the pool-type LBE environment
- Research and validation of key non-nuclear technology
- Obtain the experiment data to support the construction and operation license of CLEAR-I.

Acceptance of radioactive material
No

Scheme/diagram

3D drawing/photo

Parameters table

<table>
<thead>
<tr>
<th>Parameters table</th>
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</thead>
<tbody>
<tr>
<td>Coolant inventory</td>
<td>~20 ton LBE</td>
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<tr>
<td>Test sections</td>
<td></td>
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<tr>
<td>TS #1</td>
<td>Characteristic dimensions</td>
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<td></td>
<td>Dimensions of Main vessel:</td>
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<tr>
<td></td>
<td>Diameter:~1m; Height:~10m</td>
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<td>Static/dynamic experiment</td>
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Stastic

Temperature range in the test section (Delta T)
20-400 °C

Operating pressure and design pressure
1MPa

Repeatable positioning accuracy
1mm

Lifting load
≥ 200kg

Maximum stroke
1600mm

Prototype component test
✓ Structural design soundness verification
● Special material properties and corrosion test
● Control and detection technology verification
● Overall test

Instrumentation
Thermocouples;
Pressure gauge;
Temperature sensor;
Displacement sensor
Gravity sensor
Gear transmission mechanism
Wire rod drive mechanism

COMPLETED EXPERIMENTAL CAMPAIGNS: MAIN RESULTS AND ACHIEVEMENTS
✓ Refuelling experiment in LBE
✓ Experiment on reliability of grip
✓ Experiment on the corrosion of grab
✓ Overall control experiment

PLANNED EXPERIMENTS (including time schedule)
● 2019.01-2019.12:
  ✓ High temperature dynamic performance
  ✓ High temperature reliability test

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