

Profile SFR-47

AtheNa

JAPAN

GENERAL INFORMATION

NAME OF THE FACILITY AtheNa
ACRONYM Advanced TecHnology Experiment Sodium(Na) facility
COOLANT(S) OF THE FACILITY Sodium
LOCATION (address): Oarai Research and Development Institute,
Japan Atomic Energy Agency (JAEA),
4002 Narita, Oarai-machi, Ibaraki-ken, 311-1393, Japan
OPERATOR JAEA
CONTACT PERSON Shuji OHNO,
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STATUS OF THE FACILITY Under Construction

Start of operation (date):

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

Advanced Technology Experiment Sodium Facility (AtheNa) is the test facility for sodium experiments applied to demonstration scale sodium components and the cooling systems. The aims of this facility are to confirm the safe and stable operations of innovative components and

to obtain quantitative data for the detailed design. Development of advanced measurement technologies is also significant issues in AtheNa facility.

AtheNa facility has large sodium inventory of 240t, thermal output of 60MW, and building of 55m height. It has flexibility in the configuration and schedule. AtheNa will be very useful facility for the next generation SFR development programs.

Concept of AtheNa facility is shown below.

Flexible configuration and schedule for experimental demand

- Shared utilities:

- Common utilities, “Mother loop” + several test rigs, “Daughter loops” in each facility, concept
 - “Daughter” test loops are independent of each other
 - Several experiment at same time
 - Construction and maintenance schedule of test loop is on demand
 - Low construction and operation cost

Flexible use for sodium test demands

- Another “daughter loop” can be constructed and “Mother loop can supply sodium to them

AtheNa facility building construction was completed in January 2012. However, original plan is suspended due to the Fukushima 1 NPP accident.

Acceptance of radioactive material

No

Scheme/diagram

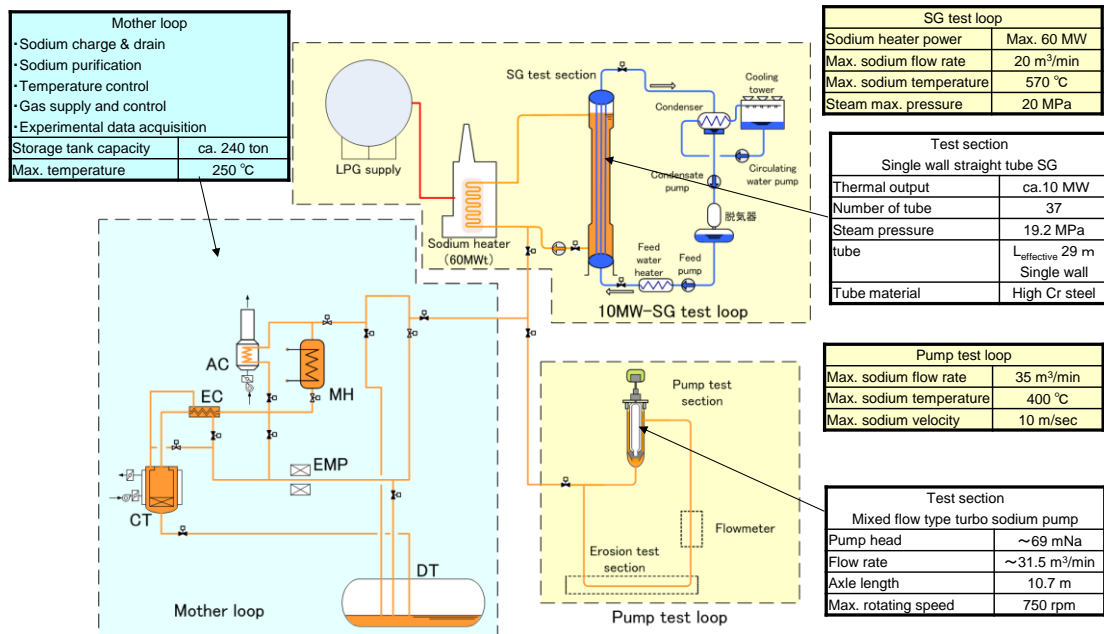


FIG. 1. Scheme of the AtheNa facility and specification of the facility. Component development test (Original plan)

3D drawing/photo

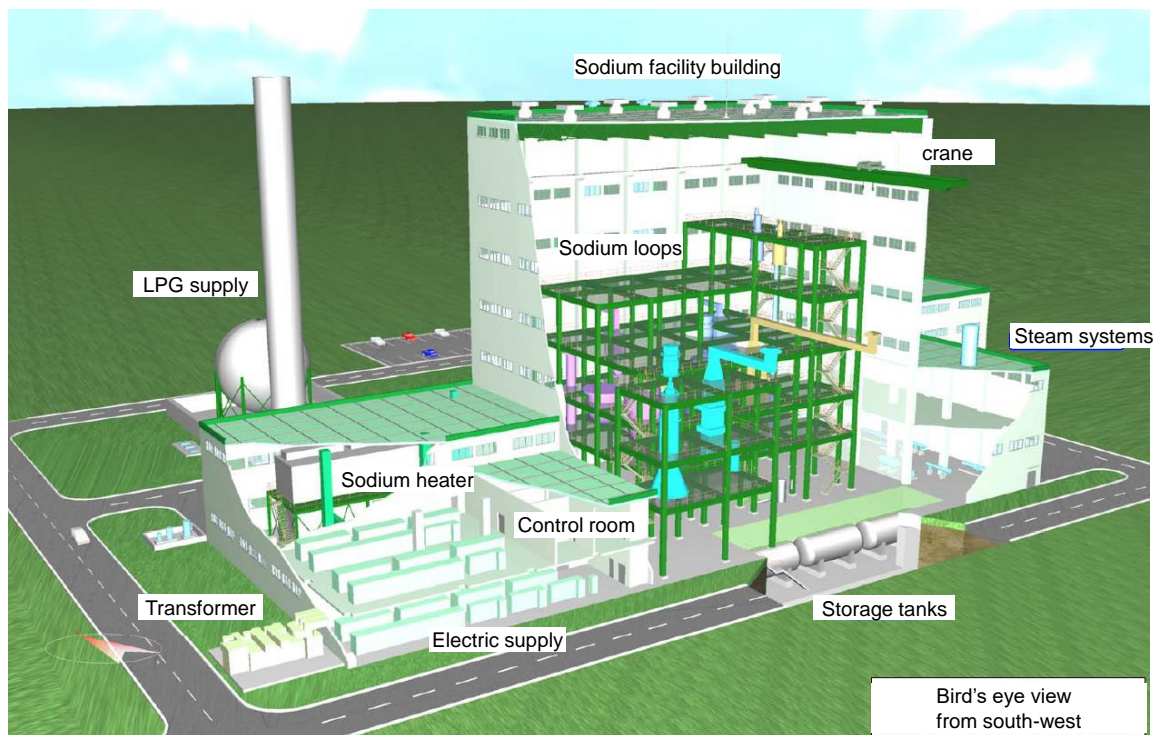


FIG. 2. View of the AtheNa facility

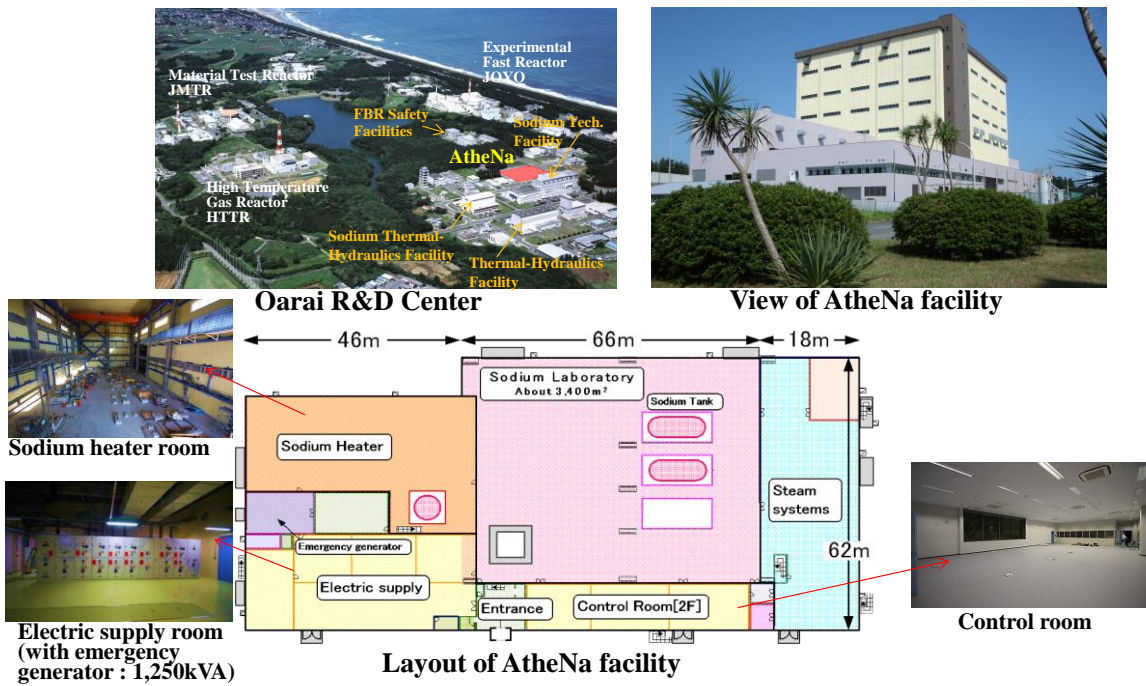


FIG. 3. View of the AtheNa facility and its current status. Building completed in Jan. 2012

Parameters table

Coolant inventory	Approx. 240 tons
Power	Approx. 60 MWt
Test sections	
TS #1 (Steam Generator)	<u>Characteristic dimensions</u> $L_{\text{effective}}$: 29m Number of tube: 37 Tube: Single wall tube Tube material: High Cr steel
	<u>Static/dynamic experiment</u> Both conditions
	<u>Temperature range in the test section (ΔT)</u> Steam temp.(IN/OUT) 240/497 degree C, 19.1MPa Sodium temp.(IN/OUT) 517/332 degree C
	<u>Operating pressure and design pressure</u> Steam max pressure: 20MPa
	<u>Flow range (mass, velocity, etc.)</u> Maximum flow rate: 20 m ³ /min
Coolant chemistry measurement and control (active or not, measured parameters)	None
Instrumentation	Thermocouples, pressure transducer, flow meter.

COMPLETED EXPERIMENTAL CAMPAIGNS: MAIN RESULTS AND ACHIEVEMENTS

No

PLANNED EXPERIMENTS (including time schedule)

Conceptual design and related R&D on Japan Sodium-cooled Fast Reactor (JSFR) have been carried out since JFY 2006 in Japan. Several innovative designs of sodium components were established in these design studies and R&D. The development plan of JSFR includes large-scale sodium experiments of such sodium components and system demonstrations.

International cooperation is especially important after the 1F accident, since safety design criteria/measures should be confirmed with objectivity and crosscheck. An international R&D cooperation on decay heat removal system under severe situations has been proposed and discussed in GIF framework and other international cooperation scheme is being investigated for utilization of AtheNa facility. The JAEA AtheNa facility can serve as an experimental test bed for various cooling system and components performance tests using large sodium loops.

TRAINING ACTIVITIES

No

REFERENCES (*specification of availability and language*)

- 1) H. Hayafune, S. Futagami, M. Shimazaki, et al., "Sodium Test Plan and Facility for JSFR developments", International Conference on Fast Reactors and Related Fuel Cycles: Challenges and Opportunities FR09, IAEA-CN-176-09-11P, Kyoto, Japan, December 7-11, 2009. (En)
- 2) S. Futagami, "Advanced Technology Experiment Sodium Facility (AtheNa) and related R&D activities", Technical Meeting on Existing and Proposed Experimental Facilities for Fast Neutron Systems, IAEA Headquarters, Vienna, Austria, June 10-12, 2013. (En)