Experience on Information Disclosure Activity during Decommissioning

November, 2016

The Japan Atomic Power Co.
Established: November 1, 1957

Business Objective:
We conduct the following operations to develop civilian nuclear power generation business. We may contract to conduct surveys, designing, construction supervision, construction operation and other relevant engineering assistance relating to nuclear power plants.

Capital: ¥120,000 million

Number of employees: about 1,150

Owned Plant:
- Tokai-Ⅱ (Electric Power: 1,100MW, Commercial Operation Start: Nov. 1978)
- Tsuruga Unit 3&4 (Electric Power: 1,538MW × 2unit, Under Construction Preparation)

Under Decommissioning
- Tokai-Ⅰ

Preparation for decommissioning
- Tsuruga unit 1
JAPC activities on Decommissioning

- Cooperation for Fukushima-daiichi decommissioning project
  - Dispatch employees of JAPC and subsidiary to TEPCO as staffs for Fukushima-daiichi decommissioning project
  - Undertake work and operational management necessary for Fukushima-daiichi decommissioning from TEPCO
  - Collaborate with TEPCO in addressing plan, operational management relate to Fukushima-daiichi decommissioning
  - Cooperate incineration work at outside of the NPP

- Decommissioning business in Japan
  - Supporting Japanese Power utilities, who are preparing decommissioning, and develop assisting business

- Collaboration with EnergySolutions
  - Contribute effective NPP decommissioning in Japan
Outline of Tokai-1 Power station

Capacity: 166 MWe
Reactor Type: Gas Cooled Reactor
Fuel: Metal Natural Uranium with Magnox Cladding
Moderator: Graphite
Coolant: Carbon dioxide Gas

《Actual result》
Cumulative outputs: 29 tera-Wh
Average availability factor: 77.5%
Average capacity factor: 62.9%

Jul.1966 Commercial operation starts
Mar.1998 Permanent Shutdown (32 years operation)
May 1998-Mar.2001 Defueling
Jun..2001 The last shipment of Spent Fuel
Oct. 2001 Submitted the notification of decommissioning plan
Dec..2001 Started Decommissioning work
Mar. 2006 Preparatory work completed
Jun. 2006 Decommissioning plan approved
Sep. 2006 Clearance (CL) measuring and judgment method approved
Jun. 2007 CL material first shipment
Sep. 2008 Non Radioactive material first shipment
Jul. 2010 Notification of change for Decommissioning plan is submitted
Sep.2013 No.2 SRU dismantling is completed
Dec. 2013 Notification of change for Decommissioning plan (5 year delay)
### Tokai-1 Decommissioning Project Schedule

#### Project Timeline

<table>
<thead>
<tr>
<th>Year</th>
<th>JFY 2001</th>
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<tbody>
<tr>
<td>02</td>
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#### Key Activities
- **Safe-Storage of Reactor Area**
- **Remove Facilities except Reactor Area**
- **Remove SRUs**
- **Remove Facilities from each Building**
- **Reactor Area Dismantling**
- **Buildings Demolition**

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Tsuruga Power Station Unit 1 is the first nuclear power plant with a light water reactor in Japan.

- Thermal output: 1,064,000kW
- Electric output: 357,000kW
- Start of commercial operation: March 14, 1970
- Total electric energy generated: 84.7 billion kWh
- Days generate electricity: 10,365 days
- Average Capacity Factor: 60.1%
- Permanent Shutdown: Apr. 27, 2015 (45 years operation)
- Submit Decommissioning Plan: Feb. 12, 2016
# Tsuruga-1 Decommissioning Schedule

<table>
<thead>
<tr>
<th>Preparatory phase for reactor dismantling</th>
<th>Reactor dismantling phase</th>
<th>Building dismantling phase</th>
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<tbody>
<tr>
<td>1  2  3  4  5  6  7  8  9</td>
<td>10  11  12  13  14  15  16  17  18</td>
<td>19  20  21  22  23  24</td>
</tr>
</tbody>
</table>

### Preparatory phase for reactor dismantling
- **Object:** Equipment interrupt reactor dismantling of the followings
  - Suppression changer in containment vessel
  - Water feed system etc.

### Fuel shipment from No.1 reactor building

### Radioactive decay at reactor (safe storage)

### Reactor dismantling phase
- **Object:** Contaminated material of followings
  - Core support structure (Except steam separator & dryer)
  - Reactor vessel (except lid)
  - External wall of reactor vessel
  - Dry well of containment vessel (except lid)
  - External wall of dry well (except lid)

### Building dismantling phase
- **Object:** Reactor building
  - Turbine building
  - Service building
  - Waste treatment building etc.

- **Dismantle auxiliary machine**
- **Remove contamination by nuclear fuel material**
- **Dispose of material contaminated material by nuclear fuel material**
Attitude to decommissioning in Japan

It is important to undertake the decommissioning of nuclear facilities, on the major premise of safety assurance, under the responsibility of the installer, based on the amended Nuclear Reactor Regulation Law and under the safety regulations of the Government, while gaining the understanding and cooperation of the local community.

Nuclear Safety Agreement
Multiple safety protections are implemented to commercial power reactor. And monitored strictly by regulator based on regulation through construction and plant operation. Nuclear safety agreement is concluded for local governments, who have responsibility to securing the safety of the local residents, to confirm security and status of nuclear operator from local resident’s point of view. Nuclear operator conclude the agreement with local prefecture, municipal located NPP and neighboring municipalities. Include “Responsibility for quick contact and report in case of abnormality” and “The prior consent by local government for established, extended or altered of facilities.”
Understanding by Stake Holder for Treatment of Dismantle Materials

- L3 disposal facility
- Clearance material
Waste arose from decommissioning

Inside of Control Area

Low Level Radioactive Waste

NR (Non Radioactive waste)
- No radioactive contamination
- No attached or penetrated contamination

Clearance Material

L1: Relatively high radioactive waste
L2: Relatively low radioactive waste
L3: Very low level waste

Non Radioactive Waste

Outside of Control Area

General Decommissioning Waste

L1: Relatively high radioactive waste
L2: Relatively low radioactive waste
L3: Very low level waste

Clearance material: Clearance level for each Nuclide laid down by Ministeral Ordinance based on IAEA RS-G-1.7
# For Tokai L3 disposal

1998.3 Tokai-1 shutdown

<table>
<thead>
<tr>
<th>Term</th>
<th>Contents</th>
<th>Targets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jun. 2000-</td>
<td>Explain Decommissioning plan include L3 on site disposal</td>
<td>Former MITI, Tokai village,</td>
</tr>
<tr>
<td>Oct. 2003-</td>
<td>Explain Preliminary research for on site disposal facility</td>
<td>METI, Tokai village, Ibaraki pref., neighboring community</td>
</tr>
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<td></td>
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<tr>
<td>Preliminary investigation: 2004</td>
<td></td>
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<tr>
<td>Full scale investigation: 2005-2007</td>
<td></td>
<td></td>
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<tr>
<td>Jul. 2014-</td>
<td>Gain the understanding necessity of L3 disposal facility</td>
<td>Mayor of Tokai village, village council, Fishery cooperation</td>
</tr>
<tr>
<td>Jul. 2015</td>
<td>Apply the approval for the facility</td>
<td>NRA, Tokai village, Ibaraki pref.</td>
</tr>
<tr>
<td>-Oct. 2016</td>
<td>Continuing review for approval</td>
<td>NRA</td>
</tr>
</tbody>
</table>

*Specify in “The outline of business plan” which is submitted to local government every year, based upon nuclear safety agreement.*
Why inside Tokai site?

- L3 wastes are raised in short period, and total amount is relatively high. Therefore, they have a great influence on transport of LLW.
- L3 wastes are raised from the early period of decommissioning, so it is necessary earlier timing compared with L1 and L2.
- L3 disposal site can be constructed without any artificial barrier.
- Institutional control period is 30-50 years, so even utilities can manage by themselves.
- Other utilities will make decision case by case bases, where L3 wastes will be disposed of.
L3 disposal facility (JPDR result and Tokai-1 plan)

Plan for Tokai-1

- Monitoring hole
- Flood prevention tent
- Partition (Concrete)

South
North

约80m
约100m
# L3 Waste disposal schedule

<table>
<thead>
<tr>
<th>Year</th>
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<tbody>
<tr>
<td>2015</td>
<td>2016</td>
<td>2017</td>
<td>2018</td>
<td>...</td>
<td>Approx. 50 years later</td>
</tr>
</tbody>
</table>

- **Application for approval**
  - Permit (Assumption)
- **Safety examination**
- **Construction**
- **Beginning of operation**
- **Disposal**
- **Disposal complete**

The radiation control period (Approx. 50 years)

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Briefing session on L3 for local inhabitant (in 2016)

Briefing session for local inhabitant are planned from 14th Oct. to 30th Nov 2016.

- Number of briefing: 26
- Targets: Tokai village and 14 neighboring municipalities.

Contents:
- Tokai-1 decommissioning status (include L3)
- Tokai-2 situation of examination of the compatibility confirmation to new regulation standard and safety measures

Questions and Comments
- Concerned radioactive discharge and affect to farmland
- Trench is rough. It should be manage as same as L2. It should be disposed with container, not unlined facility.
- Natural radiation cannot be helped but I want to avoid artificial radiation even a small amount
The final target is free release, however a step by step approach is necessary to obtain public acceptance.

To achieve public acceptance, The Federation of Electric Power Companies in Japan pledged, the first step will be to utilize clearance material inside nuclear or electric power facilities.

Aiming for future free release, improve results of controlled recycling continuously in a transparent manner.
Clearance Material Recycle

Biological shielding iron block (for J-PARC)

- Size: 100 × 50 × 20 cm
- Weight: 700 kg

Interlocking paver blocks

- Weight: 10 kg/1 block

Defence block for PP

- Weight: 1.6 ton

Benches

- Weight: 40～50 kg

Plate for clearance product
First shipment (June 2007)  
At Tokai NPP

First shipment (June 2007)  
At the foundry in Tokai village

Publication of foundry products (October 2007)  
At Tokai NPP

Publication of shield delivery (October 2007)  
At J-PARK (under construction) in Tokai village
Public acceptance

- Transparent manner
  - PR on Newspaper
  - JAPC home page
  - Exhibition in our PR building
- Open to mass-media
  - First transshipment to casting manufacturer
  - First transshipment of shielding to J-PARC
  - Reported by local TV and newspaper as neutral position
Decommissioning
- Waste treatment & disposal
- Clearance system
- Decommissioning in the world
- Public acceptance

Tokai-1
- NPP Outline
- Plan
- Schedule
- Result
- Fuel element
- Waste treatment & disposal
- L3 disposal
- Clearance

Tsuruga-1
- NPP Outline
- Plan
- Schedule
- Result
- Fuel element
- Waste treatment & disposal
Briefing session on Tsuruga-1 decommissioning plan

- Local society concern about reduce the amount of orders during decommissioning compared with operational duration of Tsuruga-1.
- To increase possibilities of receiving orders with respect to decommissioning work, briefing session was held for companies located in Fukui Pref., and more than 200 companies were attended.

[Contents]
- Outline of Decommissioning plan
- Plan for coming three years
- Technologies required for decommissioning project
CONCLUSION

- Important issues to be solved for proceeding decommissioning are to commence the operation of SF and LLW interim storage /disposal facilities.
- Those are sitting problem, therefore communication with stake holder to obtain understanding shall be continued.
- For this purpose, Japanese nuclear operators always try to keep good relationship with stake holders such as local government and residents, using various media and occasion.
Thank you very much for your attention

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Decommissioning Project Department

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