The Nuclear Power Revival in Japan

December 14, 2017

The Federation of Electric Power Companies of Japan
Chairperson, Nuclear Power Development and Policy Committee
Hideki Toyomatsu
1. Status of Nuclear Power Stations in Japan

- Status of restart
- Challenges for nuclear power generation
Status of restart (1)

- 26 plants (16 PWRs and 10 BWRs) applied for the installation license to meet the new regulatory requirement.
- 12 Plants (PWR) passed the review of the installation license.
- 3 units licensed to extend operation over 40 years (PWR)

<table>
<thead>
<tr>
<th>Status of review of installation license</th>
<th>PWR (●)</th>
<th>BWR (○)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passed (●)</td>
<td>12</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>Applied (○)</td>
<td>4</td>
<td>10</td>
<td>14</td>
</tr>
<tr>
<td>Not applied yet</td>
<td>4</td>
<td>15</td>
<td>19</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td>25</td>
<td>45</td>
</tr>
</tbody>
</table>

Three plants under construction are included.

<table>
<thead>
<tr>
<th>Status of Decommission</th>
<th>PWR</th>
<th>BWR</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decommission (○)</td>
<td>4</td>
<td>10</td>
<td>14</td>
</tr>
</tbody>
</table>

* : Licensed to extend operation over 40 years
Status of restart (2)

- Reviews of BWR are delayed, especially it takes time in the reviews of earthquake and tsunami.

Applications of permit by operators

1. Review of Reactor Installation Permit
   - Review of earthquakes and tsunami [Design basis earthquake ground motion (Ss)]
   - Review of plant facilities

2. Review of Construction Plan

3. Review of Operational Safety Program

Preparation for start-up

Pre-service Inspection

Approval

Application

Approval

Obtain the local community’s consent (before restart)

Start-up

Tsuruga 2
Tomari 1,2,3
Higashidori1
Shika2
Hamaoka3,4
Onagawa 2

Tahama 1,2
Mihama3
Takahama
Ohi 3,4
Genkai 3,4

Sendai 1,2
Ikata 3
Takahama

Blue: PWR
Green: BWR
Restart, operation extension beyond its 40 years and replacement are essential to achieve and maintain nuclear power’s share of 20 to 22% in Energy Mix as national policy.
Challenges requiring action:

1. Significant delays in the review of the conformity to new regulatory requirements (BWR in particular)

2. Dialogue with the Nuclear Regulation Authority
   Summarizing industry-wide actions in a single voice (Japanese NEI)

3. Nuclear lawsuit

4. The road to replacement

5. Maintaining human resources and technology
2. Restoring the society’s trust in nuclear power generation
   (The nuclear power revival)

- Utilizing JANSI
- Utilizing NRRC
- Strengthening functions of the nuclear industry
  (Japanese NEI)
- Cooperation between Japanese and U.S. nuclear operators
Structure of the nuclear industry in the U.S. and Japan

U.S. nuclear industry
- NEI
  - Represents the nuclear industry to take action for business/technical challenges
- INPO
  - Promotes improvement of safety for nuclear operators
- EPRI
  - Electric business related R&D

Japanese nuclear industry
- FEPC
  - Founded in 1952
  - 210 staff
  - Represents utilities
- JANSI
  - Founded in 2012
  - 200 staff
  - Promotes improvement of safety for nuclear operators
- CRIEPI
  - Founded in 1952
  - 720 staff
  - Electric business related R&D
- NRRC
  - Founded in 2014
  - 130 staff
  - Hub for R&D to improve safety for nuclear operators

New organization
- Under consideration of the establishment of a new organization to strengthen functions of the nuclear industry
(1) Evaluation/providing suggestions/recommendations and support for nuclear facilities

① Conducting peer reviews
   Quadrennial peer review of Power stations
② Strengthening support activities
③ Comprehensive evaluation of power stations
   Reviewing a rating system
④ Safety culture assessment

(2) Base activities

① Cultivating safety culture
② Evaluating from the perspective of defense in depth
   Proposing action for improving safety based on good practices worldwide
③ Structuring a human resource cultivation system
Utilizing the Nuclear Risk Research Center (NRRC)

Executive Advisor to the Center
Dr. R. A. Meserve
(Former Chairman of the Nuclear Regulatory Commission)
(Visits to Japan: approx. 1 week × 4 times/year)

Head of the Center
Dr. G. Apostolakis
(Former member of the Nuclear Regulatory Commission)
(Visits to Japan: approx. 2 weeks × 4-5 times/year)

Technical Advisory Committee
(Chairman: Mr. John W. Stetkar)
(Held: approx. 1 week × 8 times)

Dialogue with Presidents (CEO)

Chief Nuclear Officer Conference

Technical Conference
- Working group 1
  (Risk assessment team)
- Working group 2
  (External natural event team)

(1) Establishing a foundation to structure a good PRA
- Supporting pilot projects
  (Shikoku Electric Ikata Unit 3 (PWR), TEPCO HD Kashiwazaki Kariwa Units 6, 7 (BWR))
- Conducting PRA peer review
- Promoting establishment of PRA database

(2) R&D to improve safety
Assess: Ground fault, seismic impact, tsunami impact, tornado impact,
volcano impact, fire protection, flooding, fire impact, severe accident
Strengthening functions of the nuclear industry (Japanese NEI)

FEPC

Society

New organization

- Steering meeting (utilities’ CNO, relevant institutions and representatives from manufacturers)
- Management meeting (utilities relevant institutions and manufacturers)
- Working Groups (Engineers from utilities, CRIEPI, NRRC, manufacturers)

Create technical report and present information

Review strategy to present information linked with the review of technical challenges

Summarize the direction of actions taken to address technical challenges to improve safety industry-wide, and make efforts so that measures to improve on-site safety are implemented.

NRA Dialogue

Points for strengthening functions>

1. Solve common challenges for the nuclear industry
2. Have dialogue with the NRA representing the nuclear industry
3. Present information to society
Commenced the Japan-U.S. CNO conference in 2013 as a part of the activity to improve safety by learning from the world. Japanese/U.S. CNO are conducting exchange activities by pairing utilities and also activities by subcommittees regarding PRA implementation and support for restart of operation.

<Conferences held between Japanese and U.S. CEO>
- Sept. 2013 First Japan/U.S. CNO conference (Tokyo)
- Sept. 2014 Second Japan/U.S. CNO conference (Arizona)
- Sept. 2015 Held with eight U.S. staff at the timing of the new CNO training in the U.S. (Tokyo)
- Mar. 2016 Held with six U.S. staff at the timing of the Fukushima Forum IV(Tokyo)
- Apr. 2016 Four Japanese staff participated in the U.S. INPO CNO conference (Atlanta)
- Sept. 2017 Held with four U.S. staff at the timing of the new CNO training in the U.S. (Tokyo)

U.S. survey and exchanging opinion regarding implementation of ROP
In reviewing the Japanese inspection system, opinions are being exchanged between FEPC/utilities and NRC/relevant industry staff to understand the principle of implementing ROP in the U.S. and identifying skills and tools required by utilities in the future.
- May 2017 Visited NEI, NRC
- Nov. 2017 Visited NRC
- Dec. 2017 Visited Duke Energy