

OVERVIEW

1. Introduction

This is a report on the peer review of Electric Power Development Co. Ltd. (J-Power). The peer reviews of Japan Nuclear Technology Institute (JANTI) are conducted by review teams comprising JANTI experts and JANTI members. The review team visits the facilities of JANTI members to identify the issues and good practices of the members, which are beneficial for other members, by reviewing the activities related to nuclear safety with their full knowledge and experience. The goal of JANTI's peer review activity is to improve the safety culture of the whole nuclear power industry.

2. Overview of the Organization Reviewed

J-Power was established as a special company in September 1952 based on the "Electric Power Development Promotion Law" in order to resolve the nationwide electric power shortage. As of the end of June 2007, J-Power operates 67 hydro and thermal electric power stations that have capacity to generate 16,380,000 kW and has a total length of power transmission lines of 2,400 kilometers in Japan. The said law was abolished on October 2, 2003, and in October of 2004 the company was listed on the first section of the Tokyo Stock Exchange, thus completing the privatization of the company.

Also, the nickname "J-Power" was adopted as of April 1, 2002. The name "J-Power" incorporates the ideas of "To expand the business worldwide by focusing on "energy" and "environment" and, to supply "power" to the universe for the future of this planet using the experiences and technology developed through the worldwide business over fifty years".

The company has set up the Oma Nuclear Power Station Construction Preparation Office in Oma-machi, Shimokita-gun, Aomori Prefecture and has its Aomori Office in Aomori City, and the preparations for the construction of Oma Nuclear Power Station are making progress.

This review was applied to only the Nuclear Power Division of the head office because the principal construction of the station has not been started yet. As of January 2008, 162 employees and 24 loan employees from other companies are working for the Nuclear Power Division of the head office. Also, the Oma Nuclear Power Station Construction Preparation office has 60 employees and the Aomori office has five employees. The Nuclear Power

Division is in charge of the design and engineering development of Oma Nuclear Power Station as well as licensing safety review of nuclear facilities.

3. Review Viewpoint

J-Power plans to build a 13,830,000 kW Advanced Boiling Water Reactor (ABWR) nuclear power station in Oma-machi, Shimokita-gun, Aomori Prefecture and is making endeavors in preparation for commencement of operation in 2012.

At first the company had planned to build an Advanced Thermal Reactor (ATR) demonstration reactor, but in August 1995 the Atomic Energy Commission decided to scrap the plan for constructing the demonstration reactor on the grounds of economic efficiency of the ATR. Instead, it was decided to build one ABWR (Full MOX-ABWR) which is able to fully load MOX fuel assemblies (uranium and plutonium mixed oxide fuel).

The Full MOX-ABWR plan characterized as the way to make the flexibility of Japan's plan to expend plutonium as fuels in Light Water Reactors widely, and is being promoted by the national government and electric power companies.

An establishment permit was applied for in September 1998, but the location plan was revised and so a new application was submitted in March 2004. The second public hearing was held in October 2005, but there was subsequently a revision to the anti-earthquake review guideline, and at the present time the government's second licensing safety review is still in progress.

Based on the current situation of Oma Nuclear Power Station being in the construction preparation stage, the review focuses attention on the following points.

- Endeavors in promoting safety cultures
- Permeation of the Nuclear Power Division Senior Manager's policy plan in engineering development and other tasks
- Obtaining technology attained from experience with previously built plants
- Training of engineers in preparation for the design, construction, and operation of Oma Nuclear Power Station
- Maintenance and improvement of the motivation of managers and members

Specific review areas were "organization & management," "training," and "design management" and three important issues which were "comprehensive inspection of generating facilities," "reflection on plan of construction and operational experience," and "design evaluation of newly designed items."

4. Conducting the Review

(1) Review dates

From Tuesday, January 29 to Friday, February 1 , 2008

(2) Composition of review team

Team leader: JANTI NSnet Division

Team members: team leader and five others

(One from Chugoku Electric Power Company, one from Chubu Electric Power Company and three of JANTI NSnet Division)

(3) Responsibilities of review groups

Group A: organization and management, comprehensive inspection of power generation facilities

Group B: training, reflection on plan of construction and operation experience

Group C: design management, design evaluation of newly designed items

5. Review Schedule

The Review was carried out over a period of four days, with the schedule for each of the groups as shown below.

Review Schedule

		Group A (organization and management, comprehensive inspection of power generation facilities)			Group B (training, reflection on plan of construction and operation experience)			Group C (design management, design evaluation of newly designed items)		
Tue. Jan 29	AM	opening (greetings & introduction of members)								
		interview with senior manager								
	1 organization / management	general	documents	2 training	general	documents	3 design management	state of implementing design changes	documents	
	PM	1 organization / management	managers and staff classes	interviews	2 training 4.2 operation experience	group meeting	event observation	4.3 new design	design review	interview
						managers class	interview			
study using CAI equipment						event observation				
personnel with ABWR construction experience	interview									
host executive office meeting	check of review results check of the schedule		host executive office meeting	check of review results, check of schedule, etc.		host executive office meeting	check of review results, check of schedule, etc.			
Wed. Jan	AM	group meeting	event observation	2 training 4.2 operation experience	investigative commission	event observation	3 design management	managers and staff classes	interview	
					personnel with ABWR	interview				

30		1 organization / management	managers and staff classes	interviews		construction experience				
	PM	1 organization / management	managers and staff classes	interviews	2 training 4.2 operation experience	personnel with ABWR trial run experience	interview	3 design management	managers and staff classes	interview
		host executive office meeting	check of review results check of the schedule		host executive office meeting	check of review results, check of schedule, etc.		host executive office meeting	check of review results, check of schedule, etc.	
Thu. Jan 31	AM	1 organization / management	staff class	interviews	2 training 4.2 operation experience	personnel with ABWR operation experience	interview	3 design management	managers and staff classes	interview
		4.1 comprehensive inspection	state of progress of action program	documents and interviews						
	PM		YG activities	event observation		YG activities	event observation		YG activities	event observation
		4.1 comprehensive inspection	managers and staff classes	interviews	2 training 4.2 operation experience	personnel with ABWR maintenance experience	interview	3 design management 4.3 new design	follow-up	interview
check of review results development of closing report coordination with host check of schedule, etc.										
Fri. Feb 1	AM	final coordination with host / final revision of closing report								
	PM	preparation for closing								
		closing (explanation of results, etc.)								

6. Review Method and Organization of Review Results

6.1 Review Method

(1) Document review

The Review was carried out after an explanation and presentation of the documents concerned as well as types of regulations and work objectives for each individual review item.

(2) Interviews

Interviews on the theme of "endeavors in nuclear safety" were carried out with a total of approximately 60 persons including the executives, who are the Nuclear Power Division Senior Manager and managers and members. Also, whenever there were any uncertainties while documents were being examined, it was investigated through interviews.

(3) Observation

In this review, work performance in the Nuclear Power Division was observed in relation to the results in document reviews and interviews.

In addition, the review team suggested information and examples such as best practices in the nuclear industry which were possibly help the Nuclear Power Division during document reviews, interviews and observations in order to reach mutual understanding.

6.2 Organization of Review Results

Strengths and Area for Improvements were identified for each specific review areas based on document reviews, interviews and observations.

The definition of "Strength" is "an outstanding practice or process in the Division which results good performance with accuracy, effectiveness and originality. And, it should be shared not only with other JANTI members, but also nuclear industry wide".

"Area for Improvement" is "suggestions for further improvement in activities to enhance

nuclear safety in the Division in contrast with best practice in nuclear industry in order to attain the ultimate level”.

7. Summary of Interview with Senior Manager of Nuclear Power Division

In order to understand the policies of the Nuclear Power Division, the review team interviewed the Nuclear Power Division Senior Manager, who expressed his thoughts as follow.

(1) Initiatives to promote safety culture

In the endeavors of promoting safety culture, it is not enough to simply organize and make rules, but it is also important to adhere to those rules. J-Power is embarking upon the construction of a nuclear power station. Accordingly, the Senior Manager believes now is the time that safety culture needs to be established and improvements made. The campaign for promoting safety culture is not a one-time affair, to the contrary, but it is essential to repeat the actions again and again while checking and making improvements. Even though one may understand this in theory, unless one actually puts this into practice physically, it cannot be considered to be in effect.

Since the company has not yet reached the stage of actual construction and operation of a nuclear power station, no actual claim can be made that good results have been attained in organizing for the promotion of safety culture. Whether the current structure is good or not, or where the important issues lie, it is still too early to say. The issue is that until the power station goes into operation and they can ascertain these matters for themselves, it is not really possible to verify in the true sense.

Another thing is the state of mind. It is not enough to say merely abiding by the structure and rules falls to promote safety culture. One must possess the will to abide by structure and rules, be motivated, take pride in his work, and it is also important to feel that one is making contributions to society.

In the true sense of nuclear safety, it is important to carry out routine activities adequately not to arise concerns about environmental preservation, industrial safety, disaster prevention as well as radiation effect not only residents, but also station workers so that local residents are able to trust the station and express understanding.

(2) Communication of Senior Manager of Nuclear Power Division's policies to the worksite

As the Senior Manager of the Nuclear Power Division, he seizes the opportunity of weekly meetings attended by group leader class and above and other opportunities to convey his ideas. Also, last year the Nuclear Power Division Senior Manager, Oma Nuclear Power Station Construction Preparation Office Director, and Aomori Office Director jointly signed a Declaration of Compliance, and renewed their appeal to all employees in their capacity as the leaders of the organization. However, the most important points are recurrence preventions measures, and the willingness to carry out generic implications. When mistakes are made, strict reprimands are to be expected, but at such times, the parties who erred are very much in a state of being open to advice and suggestions. Accordingly, he takes such opportunities to reach the workers in the effort to instill in them a sense of taking pride in their work.

(3) A culture of reporting (If various problems in the field are reported)

Conventional advice has always been to strictly enforce "report / inform / consult." The important thing is how to implement this effectively. It is difficult to check on whether or not reporting has actually been carried out or whether understanding is attained on a regular basis. Thinking back to the non-conformities that have happened during this past one year, even though time is of the essence, dealing with the matter is too slow, and the reporting takes too much time to begin with. When we checked on the reasons for the delays, the reason given was that it requires time to prepare the documents, but when there are some problems the important thing is for the leader of the organization to attain a prompt understanding of the situation. If the leader of the organization does not have a clear understanding, the issue is not being dealt with by the organization in the true sense.

In regard to the point that the number of non-conformities is small, it is believed that the basis for the number of cases lies within the definition for determining what constitutes a non-conformity. The number of non-conformities cases depends on the criteria of what is considered a non-conformity.

(4) Areas of the Nuclear Power Division's expertise and directly confronting issues

J-Power's strength is its willingness to tackle new challenges. Additionally, the Nuclear Power Division is not bound by the constraints that others are, and the atmosphere is one

where one is able to paint a picture starting with a clean slate. Thus the division has the strength of being able to proceed with the construction and operation of the power plant that sufficiently reflects the knowledge of predecessors while at the same time taking in new expertise.

On the other hand, what is seen as a good point of having the willingness to take positive action, conversely leads to neglect when it comes to abiding by rules, and this can easily lead to a tendency to do things in an arbitrary manner. Furthermore, at the present stage, due to lack of experience, many of the checks are merely theoretical and so the question is whether or not the main points have been pinned down.

(5) What is expected of administrators (Deputy Senior Managers, Group Leaders, Managers, and so on)

The way of dealing with the current situation only becomes clear only once the situation is correctly understood. It is hoped that administrators will grasp an understanding of the actual circumstances not only in a timely manner but also with accuracy. Also it is hoped that they will be aware of reality and the dangers that lurk in the practical affairs, and make constant effort to understand the problematic points.

(6) Endeavors in the passing down of skills

At the present time, it is not a question of passing technological skills down to the next generation, but rather, of acquiring such skills. J-Power is concentrating its energies on the acquisition of new skills and training engineers. They have not yet reached the stage of formulating a clear-cut program for passing down the already acquired skills, but are making efforts at brushing up the skills of their engineers. The company is making efforts to maintain and improve skills of the engineers while considering the careers of each individual employee by having them gain experience at both our their thermal power plants as well as the nuclear power stations owned by other companies.

(7) Expectations for the peer review

Due to the lack of first-hand experience within the J-Power Nuclear Power Division in the actual construction & operation of a nuclear power station, the "how to" of implementing effective improvements cannot be seen in the true sense. They are looking forward to receiving advice aimed at improvement activities that will yield effective good results.

8. Overview of the Review Results

The Nuclear Power Division of J-Power is endeavoring in the design and preparation for constructing Oma Nuclear Power Station from a policy stance of "broadening the flexibility of the plan to use plutonium in light water reactors."

The J-Power's strength when it comes to nuclear power is that as a late-comer to the field of nuclear energy, it is in a position of being able to make use of the experience of predecessor nuclear power stations. Up to now, the company has dispatched many of its employees to the likes of "Fugen," "Monju," and "nuclear power stations belonging to companies operating BWRs." In addition to each of these employees making use in the design of the power station of the knowledge and experience they have thus acquired, they are moving forward with the construction preparations with the strong sentiment that they are instrumental in the advancement of the plutonium-thermal MOX fuel project.

It is believed that deliberations that transcend departmental barriers as well as discussions within the departments leads to the promotion of safety culture, and efforts are being made to prevent falling into the trap of being a closed organization through "J-Power Summits" and "YG activities (small-group free open discussions and hands-on practice)." In order to make use of the knowledge and experience acquired at the design stage in the construction and operation of the plant, straightforward endeavors are being made to reflect the accumulation of design basis and the latest expertise of existing ABWR power stations in the design.

In this way, the review team came to understand that the employees are making efforts on an on-going daily basis to improve safety, quality, and skills through the observation of "YG activities" and "trouble report deliberation meetings" as well as through interviews with managers and members.

Note, however, that room for improvement was seen as far as the speeding up of studies of troubles at other companies in advance of the day when construction actually begins, and the formulation and implementation of education plans with a view to construction and operation.

In the following section, concrete results of the review will be discussed, drawing out three good practices and five proposals for improvement.

Further note that of the proposals for improvement, these matters are not items requiring

immediate rectification from the standpoint of nuclear safety.

8.1 Strengths

(Organization and Management)

● Endeavors in Promoting Safety Culture Through J-Power Summit and YG Activities

The second "J-Power Summit" was held in November 2007 as a companywide endeavor with all executives, department directors, and station director and others all meeting under one roof for the purpose of top management of the company voluntarily setting an example for promoting compliance. Participants at the summit broke up into small groups and had group discussions. Themes of the discussion were, "how to encourage being observant," "making it easy to speak up," "taking responsibility and setting examples by administrators and managers," and the like. Group leader class personnel also joined in each group as assistants and were given the chance to speak. In the dividing up into groups, consideration was given to achieving a balance among the departments within the groups so that department-barrier-free deliberations could be carried out.

Also, as one of the endeavors by the Nuclear Power Division, all employees of the rank of group leader and below engaged in group discussions known as "YG Activities" to discuss past nuclear scandal events going beyond group boundaries. The activities were carried out twice in FY 2007, the first time in September and the second time from January to February. Part of this time was during the Peer Review period.

These activities lead to the promotion of safety culture in the sense of preventing the pitfall of becoming an insular organization, which is one of the causes of past examples of nuclear scandals at other companies.

(Training)

Nothing special

(Design management)

● Making use of checksheets for design review

When reviewing design documents submitted by contractors, checksheets used by each group are determined depending on the area of expertise of the group. The matters

considered by the member in charge in regard to design documents, and the reviewer's comments regarding the member's conclusions are noted on each checksheet. The checksheets are a type of tool for quickly and accurately reviewing design documents, and have been used in more than 7,000 cases up to now. The checksheets continue to be accumulated in the document management system that handles overall document management, and are being digitized into a database that comprises the basis of design review while keeping in mind the passing down of skills.

(Important Issues)

- **Reflecting technological knowledge in designs**

Since the Nuclear Power Division decided on the policy of constructing a Full MOX-ABWR, by grasping and understanding of long-term trends in the nuclear power industry, endeavors at incorporating the latest technological knowledge into designs have been continuous. For example, when setting up concrete test coupons for monitoring the aging of structures over the years, the plan is moving forward based on understanding of the track records of existing plants. The required research is also being carried out on the policies to be adopted based on operating experience of previously existing ABWRs on the installation of filters to prevent foreign materials intrusion into fuel assemblies.

8.2 Areas for Improvement

(Organization & Management)

- **Effective Utilization of Cases that are Not Handled as Non-conformities**

Recurrence prevention is applied for the cases below the criteria of non-conformities as well as non-conformities. However, no efforts are being made to share or digitize these cases into database form when they are not handled as non-conformities.

Such cases that are not handled as non-conformities are nevertheless valuable for improving quality in the future construction and operation of the power station, and so in recognition that "even cases that are not handled as non-conformities provide the seeds for continued improvement," it is desirable to make use of these improvement examples, including the backdrop and results of the interactions.

(Training)

- **The specifics of training policies and its implementation**

At present, the training needed in order to execute the design work centers primarily on carrying out OJT. The training items for securing the expertise needed at the work site for construction work, trial runs and commercial operation have already been determined. When considering the actual on-site construction work that will start, it is desirable that the contents of training items and method of implementation should be decided on and systematically carried out at an early date. It is also desirable to take into account the utilization of the experience and knowledge of those staff members who have been dispatched to previously existing plants up to now when implementing training programs.

(Design Management)

- **Making active use of design review**

The "Design Review Committee" has been set up in order to confirm the design review, but the object of deliberations is limited to the questions concerning major design changes of existing reactors having to do with MOX fuel, but in the past few years there have been very few meetings held. Examinations are carried out in the process of drawing up "Technical Investigative Documents," but for those matters that are of great importance, it is desirable that minutes be kept at meetings and the sequence of examinations and basis for decisions should be documented and the process of dealing with pending matters visualized, and thus improve the effectiveness of the design review even all the more.

(Important Issues)

- **Effective implementation of recurrence prevention action program based on comprehensive inspections of power generation facilities**

J-Power is in the process of expanding its recurrence prevention action program based on comprehensive inspections of power generating facilities. The Nuclear Power Division has never possessed any facilities and is therefore not subject to comprehensive inspection, but it has nevertheless voluntarily decided on an action program that includes recurrence prevention measures taken by other nuclear power companies. The action program currently being pursued consists of recurrence prevention measures worked out from cause-analysis coming from other departments within the company, and it is sometimes difficult for those in the Nuclear Power Department to understand the purpose of the measures, and some of the measures may not necessarily be effective as countermeasures.

Therefore, in the implementation of the program that has been decided on, it is desirable to cultivate a better understanding of the objectives and implement accordingly.

- **Systematic deliberations on trouble reports from other companies**

As of January 29, 2008, of the approximately 350 reports of troubles that have occurred at other companies that are subject to consideration of whether or not they should be reflected on in the Oma plant, about 250 of them have been given consideration. However, 104 trouble reports are currently being considered by the parties in charge but deliberations are not complete yet. There is the possibility that down the road from now when the construction work actually starts, work duties will increase and it may not be possible to give these matters sufficient consideration, or, the said items may not have been given consideration by the time when they will be needed. These yet-to-be considered matters and the trouble reports that come in hereafter need to be systematically considered while keeping in mind the importance of the information and the construction schedule.