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Summary Report of Peer Review

(Provisional Translation)

Place of Review:	Kobe Shipyard & Machinery Works, Mitsubishi Heavy Industries, Ltd. (Kobe-shi, Hyogo Prefecture)
Date of Review:	Jun 19-21, 2002
Publisher:	Nuclear Safety Network

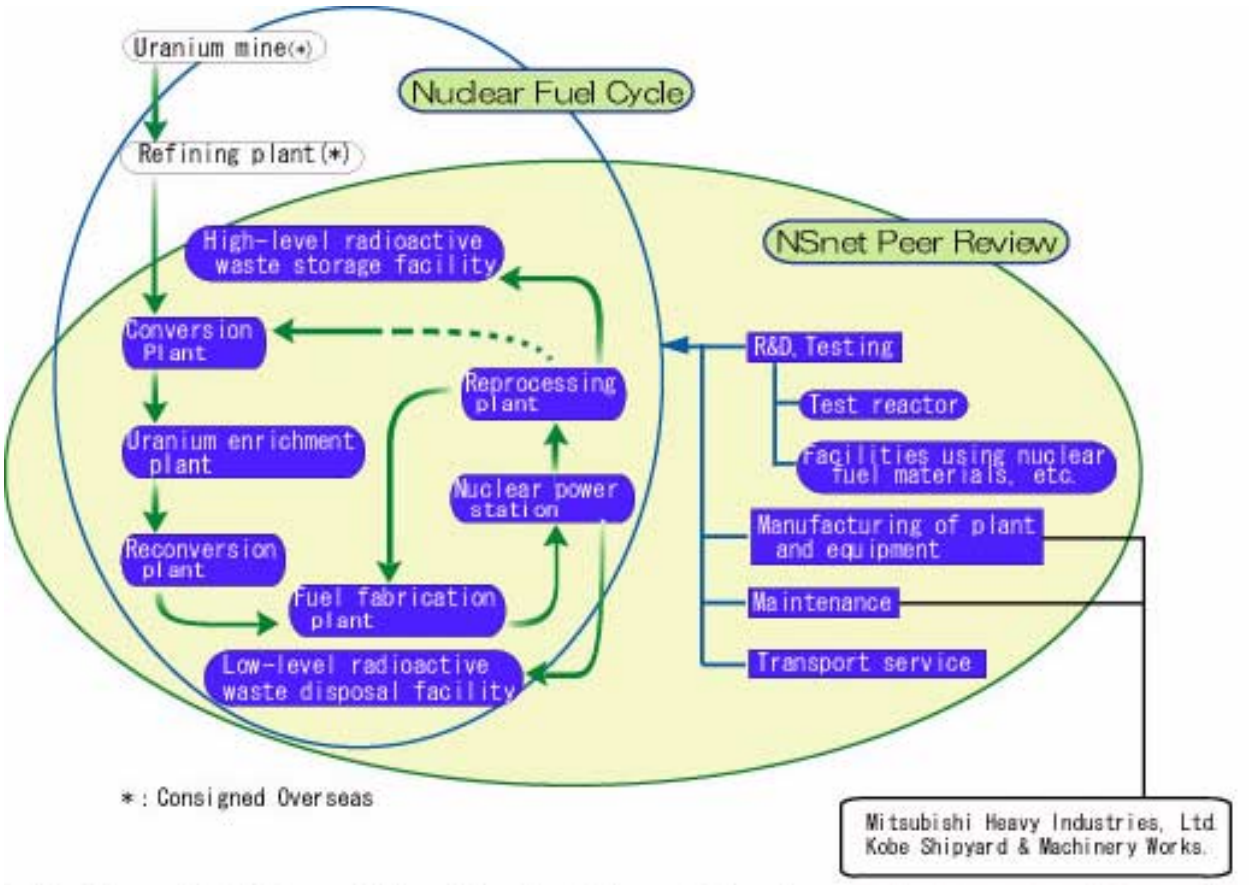
Contents

1. Objectives

The purpose of the NSnet peer review (hereafter referred to as “review”) is to achieve an improvement in the “safety culture” of the entire nuclear industry by sending review teams of member specialists to member facilities, where they conduct reciprocal evaluations on common nuclear safety subjects among members and share mutual knowledge about the horizontal progress of good practices as well as subjects to be improved would be achieved.

2. Summary of Facility Operations

At the nuclear business of Mitsubishi Heavy Industries, Ltd., since the start of development of its Pressurized Water Reactors (PWR) in 1957, the company has been involved in the development, design, manufacture, inspection and installation of various PWR power plants. In addition, it has conducted operational support and after sales service, as well as development, design and manufacture of new-types of reactors, and various systems in the area of the nuclear fuel cycle.



Kobe Shipyard & Machinery Works, Mitsubishi Heavy Industries, Ltd. in the nuclear fuel cycle

The Kobe Shipyard & Machinery Works of Mitsubishi Heavy Industries, Ltd. (hereinafter referred to as “the Shipyard”), the host of this review, started operations in 1905. It currently has three plants: the Main Plant, the Futami Plant and the Taibi Plant. The company produces a variety of products, such as ships, steel structures, environmental system, engines and turbines, and nuclear power equipment, among others. Related to nuclear power, the company conducts work such as design, manufacture, installation and after sales service, serving as the core of Mitsubishi Heavy Industries’ nuclear business.

3. Points of Review

Among the activities carried out at the Shipyard, the review concentrated on activities related to nuclear safety carried out at the stages of design and manufacture, with the aim of demonstrating functions required from the perspective of nuclear safety in the designed and manufactured machinery, equipment and systems.

The review was divided into four sections: (1) Organization/administration, (2) Education/training, (3) Design/manufacture, and (4) Handling of important issues. It was carried out with a focus on the entire nuclear industry best practice.

Of these, the reviews were carried out with a focus on, in (1) Organization/ administration, “composition of organization and system of responsibility” and “activities related to fostering a nuclear safety culture and improving morale”; in (2) Education/training, “education and training planning”; in (3) Design/manufacture, “manuals and observance of the manuals,” “design management,” and “manufacture planning and management”; and in (4), Handling of important issues, “cooperative activities related to safety with cooperating companies” and “incorporating examples of problems related to design and manufacture.”

4. Period and Outline of Review

(1) Date

Jun 19 (Wed.) to Jun 21 (Fri.), 2002

(2) Formation of Review Teams

A group: The Tokyo Electric Power Co., Inc.; Nuclear Fuel Transport Co., Ltd.

B group: Japan Atomic Energy Research Institute; NSnet Office

Coordinators: NSnet Office

(3) Fields of Responsibility

A group: Organization/administration, Education/training (excluding certification of qualifications), handling of important issues

B group: Education/training (related to certification of qualifications), design and manufacture

(4) Facilities to be reviewed

The Shipyard consists of the Main Plant in the city of Kobe, Hyogo Prefecture; the Futami Plant in the city of Akashi, Hyogo Prefecture; and the Taibi Plant in Aki-gun, Hiroshima Prefecture. The subject of this review was the Main Plant, which is the core of nuclear power related activity of the Shipyard.

5. Schedule of Review

The review was carried out over a 3-day period for each field according to the schedule shown below.

<table>
<tr><th colspan="2"></th><th colspan="2">A Group</th><th colspan="2">B Group</th></tr>
<tr><td rowspan="8">6/19
(Wed.)</td><td>A
M</td><td colspan="4">Opening (Greetings, Members Introduction, explanation of plant facilities, work summary, etc.)</td></tr>
<tr><td rowspan="2">1. Organization/
administration</td><td rowspan="2">- Effective organization and management
- Safety culture
- Activities to create unity with local communities, etc.
[Document Examination]</td><td>3. Design/
manufacture</td><td>- Effective design management
- Effective manufacturing management
[Document Examination]</td></tr>
<tr><td>2.Education/
training</td><td>- Qualification certification
[Document Examination]</td></tr>
<tr><td rowspan="6">P
M</td><td>2.Education/
training</td><td>- Education and training planning
[Document Examination]</td><td rowspan="5">3. Design/
manufacture</td><td rowspan="2">- Design review room
- Simulator Center
[Field Observation]</td></tr>
<tr><td>1. Organization/
administration</td><td>< Manager class >
[Interviews]</td></tr>
<tr><td>2.Education/
training</td><td rowspan="2">- Design review room
[Field Observation]</td></tr>
<tr><td>4. Handling of major issues</td><td rowspan="2">< Manager class >
< Responsible persons >
[Interviews]</td></tr>
<tr><td>1. Organization/
administration</td><td><General Manager>
[Interviews]</td></tr>
<tr><td rowspan="4">6/20
(Thu.)</td><td rowspan="3">A
M</td><td>4. Handling of major issues</td><td>- Nuclear safety
- Examples of problems Incorporation
[Document Examination]</td><td rowspan="3">3. Design/
manufacture</td><td>- Core Internal & Machinery Shop
- Nuclear Plant Manufacturing Shop
[Field Observation]</td></tr>
<tr><td>2.Education/
training</td><td>- Mitsubishi Nuclear Training Center
[Field Observation]</td><td>< Manager class >
< Workers >
[Interviews]</td></tr>
<tr><td>P
M</td><td colspan="2">Verification of Facts</td><td colspan="2">Verification of Facts</td></tr>
<tr><td rowspan="2">6/21
(Fri.)</td><td rowspan="2">A
M</td><td colspan="4">Verification of Facts</td></tr>
<tr><td colspan="4">Closing</td></tr>
</table>

6. Methods and Items of Review

6.1 Methods of Review

The review looked at activities related to nuclear safety at the Shipyard, and extracted good practices and suggestions for improvement through the following field observations, indicated document examinations, and discussions and interviews based on such.

In addition, in the review process, communication about nuclear safety culture took place, including exchanges of opinion based on the provision of information deemed valuable from the review teams.

6.1.1 Execution of Review

(1) Field observations

For the field observations, direct observations of how actual activities are implemented for the items confirmed in the interviews and documents, were conducted with investigations based on the experiences and knowledge of the reviewers.

(2) Document examinations

For the document examination, the review was conducted through requesting necessary relevant documents based on explanations regarding related documents for each review item. Following the plant and field observation, documents related to the observation were required, and more detailed investigations were done.

(3) Interviews

Interviews based on the following objectives were conducted with the General Manager, managers and responsible persons.

(a) Examining the level of the effort and awareness about the fostering of the safety culture including nuclear safety measures

(b) Gathering additional information not confirmed in the documentation

(c) Questions and answers including ones arising from document examination

(d) Evaluating the level of understanding about the determined items and the responsibility imposed on each member

(e) Evaluating whether the determined rules are being implemented or whether they are merely carried out in name only.

6.1.2 Standing point to select Good Practices and Suggestions for Improvement

(1) Good Practices

“Information on good practices incorporating appropriate, effective, and unique methods

into activities to ensure safety should be widely distributed to the members of the NSnet and the nuclear industry”

(2) Suggestions for Improvement

“After comparing the station’s practices with the best in the nuclear industry, suggestions to improve and enhance safety activities should be implemented so as to achieve the highest level of nuclear safety.”

Even if current activities are equal to or higher than general standards in the nuclear industry, there is still room for improvement.

6.2 Items of Review

The Field observations and confirmations, document examinations, and interviews were carried out based on the review items shown below. The results were evaluated and organized in the Itemized Results, and those were summarized as the Main Conclusions.

Section 1: Organization/Administration

Investigations were conducted from the perspective of whether organizational composition and accountability are clear, whether targets have been established related to guaranteeing nuclear safety, and whether activities are being conducted involving the fostering of safety culture and the improvement of morale.

Review items

(1) Effective organizational management
   a. Organizational composition and responsibility system
   b. Organizational policies and targets
   c. Leadership of managers
   d. Creation of a quality assurance system

(2) Activities involving the fostering of safety culture and improving morale
   a. Concrete activities related to fostering safety culture
   b. Concrete activities related to improving morale
   c. Activities for creating unity with local communities

Section 2: Education/Training

Investigations were conducted from the perspective of whether, for technicians and engineers involved in design and manufacture, a qualification certification system was established and operational, and whether skill improvement, nuclear-safety-related education and training, and technical and skill dissemination were being conducted appropriately.

Review items

(1) Qualification certification
    a. Qualification certification system and qualification standards
(2) Planning and carrying out of education and training
(3) Technical and skill dissemination

Section 3: Design/Manufacture

Investigations were conducted from the perspective of whether organization, period and work environments were guaranteed for nuclear power related design and manufacture, whether design and manufacturing manuals were being observed, and whether the various types of design and manufacturing management were being carried out properly.

(1) Effective design management
    a. Design organization
    b. Design manuals and observance of these manuals
    c. Design management
(2) Effective manufacturing management
    a. Manufacturing organization
    b. Manufacturing manuals and observance of these manuals
    c. Equipment maintenance
    d. Manufacturing planning and management

Section 4: Handling of important issues

Investigations were conducted on, as efforts related to major issues of nuclear safety, cooperative activities related to safety with cooperating companies, quality assurance, prevention of human error, and activities for the prevention of problem recurrence.

Review items

IV-1 Efforts toward nuclear safety

(1) Cooperative activities related to safety with cooperating companies
    a. Appropriate communication with cooperating companies, and fostering and improving safety culture
    b. Evaluation of cooperating companies
    c. Educating and training of cooperating companies
(2) Quality assurance
    a. Effective auditing system
    b. Handling of data falsification issue and JCO accident
(3) Efforts to improve reliability of nuclear facilities
(4) Contribution to safe operations of nuclear facilities
(5) Efforts related to product safety
(6) Labor safety (including radiation management)

IV-2 Incorporation of examples of problems related to design and manufacture

(1) Problem-prevention activities

a. Activities for the prevention of human error

b. Activities to prevent the recurrence of problems

7. Main Conclusions

In summing up this review of the Shipyard, we have not found any item that would lead to a serious accident unless immediate remedies were taken in the nuclear safety field.

With regard to nuclear safety, it is important to obtain a "sense of security." Toward that end, it was confirmed that at the Shipyard, the director, staff members and cooperating companies are making various efforts seriously and sincerely.

In other words, the Shipyard engages in careful work in the design, manufacture, maintenance and trial operations of nuclear power facilities and in precise after-service following the start of operations at such facilities, upon understanding the importance of and dangers involved in nuclear power. This is based on the recognition that the Shipyard is a core of the design and manufacturing operations for nuclear power facilities in Japan's nuclear power industry.

Moreover, the Shipyard's recognition of safety in the form of a policy of "compliance and actions from an ethical perspective are indispensable" based on "an unabashed technical conscience" can be given high marks.

In the future, it would be advisable for the Shipyard to continue its own independent activities aiming at the further improvement of safety culture.

In addition, it is hoped that the results obtained in this review be developed from the Shipyard to the entire nuclear power operations at Mitsubishi Heavy Industries, Ltd., and further to cooperating companies.

In this review, several good practices were uncovered that should be introduced to other NSnet members and widely to the nuclear industry as a whole. The major good practices are as follows:

<u>- Carrying out effective field patrols</u>

As part of "Meister Patrol," the company has field specialists conducting patrols. At these times, the specialists hold meetings with workers, thereby heightening the effectiveness of such field patrols. In addition, the General Manager and Deputy General Manager often carry out their own field patrols, confirming the contents of basic policies. Such field patrols strengthen communication and contribute to the fostering of a safety culture.

- Active efforts toward achieving corporate ethics

The Shipyard engages in active development of the following activities with the aim of improving staff morals.

- Distribution to all staff members of the "Mitsubishi Heavy Industries Compliance Guidelines" (carry-along type the size of a business card) to all staff members
- Establishment of a dedicated Compliance Committee Window (with a dedicated e-mail address and fax)
- Carrying out of education and training starting with study of "Simulation practice involving moral dilemmas," with the aim of increasing sensitivity, analysis and judgement regarding moral issues.

- Introduction and utilization of a qualification certification system for "Chief engineer" and "Master technician"

The company has introduced a qualification certification system for "Chief engineer" and "Master technician," which are the pinnacles of achievement at which young technicians and field engineers can aim. This system is utilized in creating "technical promotion groups" headed by executive advisory engineers, transcending department boundaries, creating horizontal mechanisms for the checking of work in each department, and passing on technology that supports the incorporation of work experience outside the departments and supports the core of product creation.

- Development of independent maintenance activities and separate improvement activities through systematic TPM[i i] activities

Small-group improvement activities conventionally carried out on the field in manufacturing departments have been developed further as improvement activities with systematic and long-term targets under the umbrella of TPM activities. By so doing, the activities have permeated the field areas more than ever before, becoming effective in fostering a feeling of unity, preventing latent problems and decreasing the incidence of breakdowns.

- Good communication with cooperating companies such as suppliers

The QA/QC[ii ii] Conference is held each year in November, during Quality Month, and throughout the conference in lectures, excellent maker awards and opinion exchanges in plenary sessions of the conference, safety-related cooperative activities are developed with suppliers. In addition, through the use of QA/QC Communication Sheets, a communication channel is established over which can be directly heard the opinions and demands of these people as supplier companies.

The following represent proposals toward the further improvement of the Shipyard safety activities.

- Further refinement for making company policy concrete

A company mission statement, management policy, CS[iii] policy and General Manager's policy have been made concrete in steady fashion in stages in the form of department work policies and section work policies. At the time they are made concrete, it would be effective to further enlarge their development in an action formula, by touching upon all policies so that they are evident in the creation and development of new projects and new products and by having each employee consider the policies.

- Heighten nuclear safety consciousness through the utilization of the Simulator Center

In the manufacturing departments, know-how education and training regarding the connection between manufacturing work and nuclear power safety and reliability are carried out consistently. To further heighten nuclear safety consciousness in the manufacturing departments, it is hoped that the Simulator Center for verifying designs is fully utilized, with the result being knowledge of the effects of such work on plant operations.

- Inviting opinions and demands from the individual staff members of the cooperating companies, including suppliers

Utilizing QA/QC Communication Sheets, a communication channel has been established to directly listen to opinions and demands from supplier companies, but it would also be effective to establish opportunities to ask for opinions and demands from the individual staff members of the cooperating companies, including suppliers.

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[i] TPM : Total Productive Management
[ii] QA/QC : Quality Assurance／Quality Control
[iii] CS : Customer Satisfaction