Nuclear Safety Network (NSnet)
Otemachi Building #437
1-6-1 Ote-machi, Chiyoda-ku, Tokyo 100-0004
Tel: +81-3-5220-2666 Fax: +81-3-5220-2665
URL: http://www.nsnet.gr.jp

NSnet document number：（NSP-RP-025）
Date of publication: November 20, 2002

Summary Report of Peer Review

(Provisional Translation)

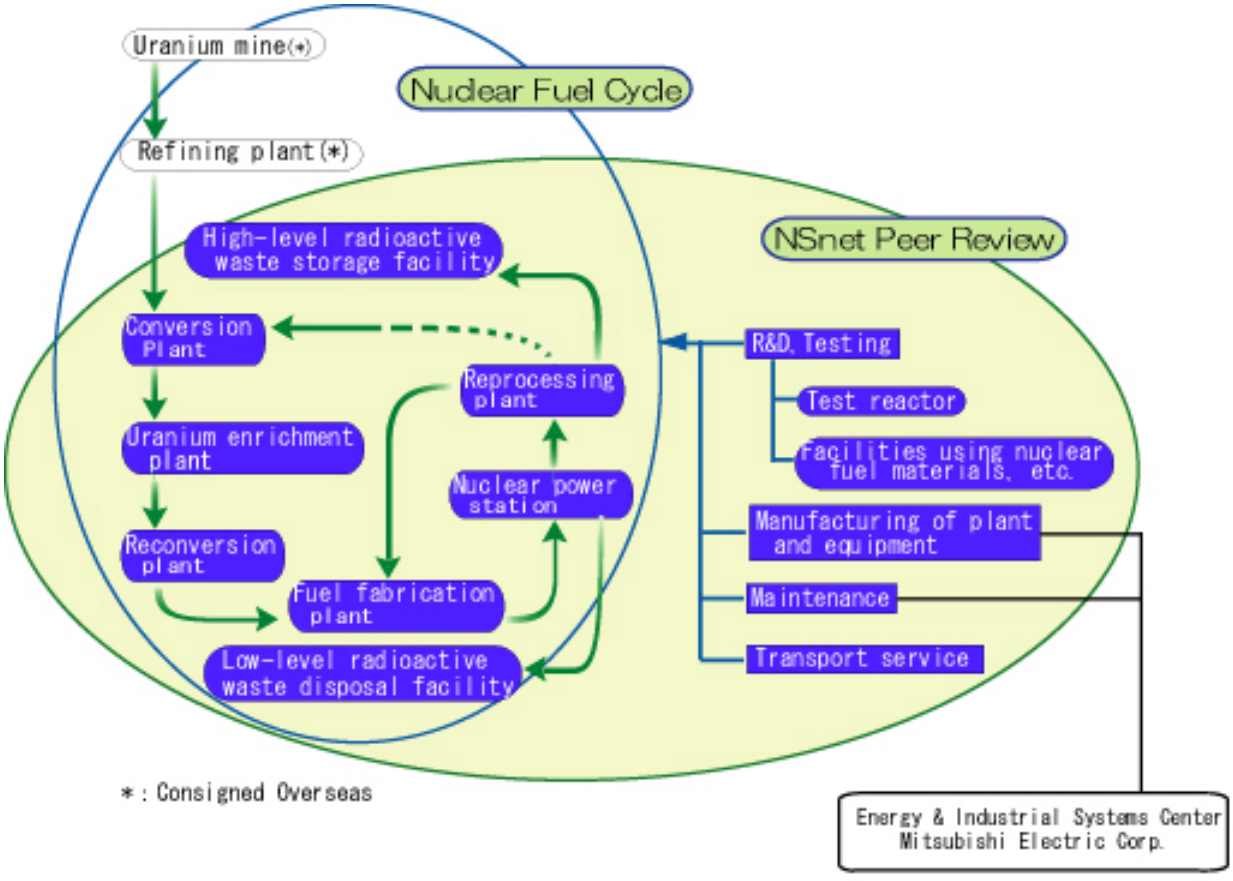
Place of Review:	Energy & Industrial Systems Center Mitsubishi Electric Corp. (Kobe-shi, Hyogo Prefecture)
Date of Review:	October 2 - 4, 2002
Publisher:	Nuclear Safety Network

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 power 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 that have been singled out.

2. Summary of Facility Operations



Energy & Industrial Systems Center, Mitsubishi Electric Corp. in the nuclear fuel cycle

Mitsubishi Electric Corp. has developed, designed, manufactured, inspected, installed along with conducting support and after service for numerous Pressurized Water Reactor (PWR) power plants, the fields of new types of reactors and nuclear fuel cycles since its first delivery of the control system for a PWR and turbine generator in 1968.

The Energy & Industrial Systems Center of Mitsubishi Electric Corp. (hereafter referred to as the “Center”), which was subjected to the review, was established as a result of reorganization in 1997. The Center has the Kobe Site (Kobe-shi, Hyogo Prefecture) and Nagasaki Site

(Nagasaki-shi, Nagasaki Prefecture) and manufactures various products: main control systems, instrumentation and control equipment, generators, uninterruptible power sources, electrical penetration (Kobe Site), and reactor coolant pump-motors (Nagasaki Site).

The Nuclear Power Department located at the Center's Kobe Site consists of nuclear operations of Mitsubishi Electric Corp. ranging from development through after-service. The Center is the core of the nuclear business.

The Center has approximately 3,100 employees, 1,300 of which are assigned to nuclear-related departments.

3. Points of Review

Among the activities carried out at the Center, 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 machinery, equipment and systems that are designed and manufactured.

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 nuclear industry's best practices.

Of these, the reviews were carried out with a focus on, (1) in Organization/Administration, "composition of organization and system of responsibility" and "activities related to fostering a nuclear safety culture and improving moral", (2) in Education/Training, "education and training planning" including technical and skill dissemination, (3) in Design/Manufacture, "manuals and observance of the manuals," "design management," and "manufacture planning and management", and (4) in Handling of important issues, "cooperative activities related to safety with cooperating companies" and "incorporating examples of problems related to design and manufacture."

In addition, following the voluntary inspection data manipulation problem occurred at nuclear power stations of Tokyo Electric Power Co., Ltd. (hereafter referred to as the "TEPCO Problem"), the review also focused on ethics, communications, and data handling.

4. Period and Outline of Review

(1) Date

October 2 (Wed.) to October 4 (Fri.), 2002

(2) Formation of Review Teams

A group: Electric Power Development Co., Ltd.; The Tokyo Electric Power Co., Inc.

B group: Mitsubishi Materials Co.; NSnet Office

Coordinators: NSnet Office

(3) Fields of Responsibility

A group: Organization/Administration, Education/Training, Handling of important issues (Cooperative relationships with cooperating companies and quality assurance)

B group: Design/Manufacture, Handling of important issues (Excluding cooperative relationships with cooperating companies and quality assurance)

(4) Facilities to be reviewed

Although the Center has the Kobe Site (Kobe-shi, Hyogo Prefecture) and Nagasaki Site (Nagasaki-shi, Nagasaki Prefecture) as sites relating to nuclear operations, the Kobe Site, which is the core of nuclear-related operations of Mitsubishi Electric Corp., was subjected to the review.

5. Schedule of Review

The review was carried out over a three-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="7">10/2
(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>- Effective organization and management
[Document Examination]</td><td rowspan="2">3. Design/
Manufacture</td><td>- Design management
[Document Examination]</td></tr>
<tr><td>- Fostering a nuclear safety culture and improving morale
[Document Examination]</td><td>- Manufacturing management
[Document Examination]</td></tr>
<tr><td>P
M</td><td rowspan="3">1. Organization/
Administration</td><td>- Fostering a nuclear safety culture and improving morale
[Document Examination]</td><td>4. Handling of important issues</td><td>- Improve reliability of nuclear facilities
- Contribution to safe operations of nuclear facilities
- Labor safety (including radiation management)
- Prevention of human error
- Problem prevention
[Document Examination]</td></tr>
<tr><td>< Vice-Director >
< Manager class >
< Responsible persons >
[Interviews]</td><td rowspan="2">3. Design/
Manufacture</td><td>< Manager class >
< Responsible persons >
[Interviews]</td></tr>
<tr><td>4. Handling of important issues</td><td>- Quality assurance
[Document Examination]</td></tr>
<tr><td rowspan="6">10/3
(Thu.)</td><td rowspan="5">A
M</td><td rowspan="2">4. Handling of important issues</td><td>- Quality assurance
- Product safety
[Document Examination]</td><td rowspan="2">3. Design/
Manufacture</td><td rowspan="4">- Power Generation Systems Factory
- New Radiation Workroom (radioscope calibration and test station)
- Turbine generator assembly and test factory
[Field Observation]</td></tr>
<tr><td>< Manager class >
[Interviews]</td></tr>
<tr><td>2.Education/
Training</td><td>- Qualification certification
- Planning and implementation
[Document Examination]</td><td rowspan="3">4. Handling of important issues</td></tr>
<tr><td>4. Handling of important issues</td><td>- Cooperative relationships with cooperating companies</td><td rowspan="2">< Manager class >
[Interviews]</td></tr>
<tr><td>2.Education/
Training</td><td>- Mock-up simulation facility (Power Generation Systems Factory)
[Field Observation]</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">10/4
(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 HAD, and extracted good practices and suggestions for improvement through the following field observations, indicated document examinations, and discussions and interviews based on the same.

In addition, communication about nuclear safety culture took place during the review process, including exchanges of opinions 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 experience 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 vice-director, 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 those arising from document examination

(d) Evaluating the level of understanding about the determined items and the responsibilities 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 Standpoint for selecting 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 Center'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 (for example, ethics-related programs, systems and culture in which internal opinions are heard and accepted with sincerity).

Review items

(1) Effective organizational and 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 harmony 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 education and training

a. Planning education and training

b. Carrying out education and training

(3) Technical and skill dissemination

Section 3: Design/Manufacture

Investigations were conducted from the perspective of whether personnel, 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, as efforts related to important issues of nuclear safety, were conducted on 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

b. Evaluation of cooperating companies

(2) Quality assurance

a. Effective auditing system

b. Handling of the 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 Center, we have not found any item in the nuclear safety field that would lead to a serious accident unless immediate remedies were taken.

Mitsubishi Electric Corp. gives the highest priority to providing better products. Its quality control is based on the "Memorandum on Quality" expressed by the then-president in 1958. Activities to encourage employees' consciousness toward safe products, represented by the new corporate statement "Changes for the Better[i]" started in July 2001, have been actively promoted at the Center. In addition, the Center recognizes the importance of ensuring nuclear safety for priority measures for nuclear quality assurance as part of the Mitsubishi Group and carries elaborate quality assurance activities, for example, setting a goal for each workplace.

The workplace environment of the Center is open as specified in the Superintendent's policy. Efforts are being made to establish a custom, in which disqualifying event information is smoothly communicated, and to promote corporate ethics. The intranet is also widely utilized and published and disseminated to cooperating companies, thereby contributing to information sharing.

In terms of education, it should be appreciated that practicable license acquisition is being systematically promoted and that personnel with excellent technical abilities are being utilized to disseminate technologies and skills.

As to labor safety, efforts are being made to strengthen safety measures to prevent the recurrence of similar accidents and disasters. For example, the labor safety management system has been introduced, which incorporates risk assessment.

It is expected that the Center will continue voluntary efforts aiming to further improve safety culture, rather than being satisfied with the current status quo.

It is also expected that the results obtained from the review will be disseminated by the Center to other operations and cooperating companies involved with the nuclear project system.

In this review, we have found some good practices that should be introduced not only to other NSnet members, but also widely to the nuclear industry. The good practices are described below.

- Disseminating goals and promoting consciousness by utilizing portable cards

"Corporate philosophy, ethics, and compliance declaration" as well as quality objectives of the Center/workplaces are organized into a card the size of a pocketbook. Employees are required to carry their cards and to be routinely aware of the contents. Moreover, efforts are being made to promote safety culture by having individuals enter their quality objectives into their cards, thereby recognizing higher goals, and write their personal goals regarding safety culture at the bottom of their name tags.

- Promoting open workplace environments

For the top management to exercise leadership, above all, open workplace environments are being promoted. The door to the Superintendent's room is left open all day, so that anyone, whether they are employees of Mitsubishi Electric Corp. or cooperating companies, can speak to Superintendent. Moreover, the Superintendent's essays are published monthly on the intranet to promote a sense of belonging. Routine instructions are also given to communicate bad information more quickly.

- Introduction of the "BEST 30" evaluation system for multilateral design review

Selecting 30 technical experts ("BEST 30") from a spectrum across various fields who have rich experience and knowledge within the Nuclear Department, certain appropriate personnel among them are appointed as members of the design review meeting to conduct multilateral verification in design review at each stage of design starting from basic design to production design. For new and important design, not only "BEST 30" but also other technical experts with rich experience and knowledge from other departments also participate in design review for further multilateral design verification.

- Activities to prevent human errors in onsite work using the "MAPLE Method"

As a new effort in preventing mistakes in onsite work, an advance human error analysis method has been introduced. Unlike conventional activities centering on educational measures involving ex post facto analysis of work mistakes, this is a preventive activity, in which workers themselves assess their performance prior to actual work and prevent human errors utilizing the results on the spot. It is also an active method, in which workers themselves assess their performance, realizing quantitative evaluation of human error possibilities and factors.

The following represent proposals toward the further improvement of the Center's safety activities.

- Better ideas in the answer section for corporate ethics comprehension quiz in the internal news

To promote corporate ethics, corporate ethics comprehension quizzes are carried in the internal news "Sanden NEWS Kawaraban," thereby raising consciousness. To further promote

the understanding of corporate ethics and utilize the contents of rich “Corporate Ethics Guidelines,” it might be effective to mention appropriate sections of the “Corporate Ethics Guidelines” in the answer sections of the comprehension quizzes.

- Lively onsite notices

Information concerning safety (emergency liaison channels), education, quality, and so forth for which it is desirable to thoroughly inform workers is posted onsite. However, since desktop materials are used as they are, the characters are small and have an insignificant impact. It is desirable to employ posting methods that focus on certain points, are livelier, easier to notice, and always present in workers’ memory.

- Further sharing the results from safety improvement activities with cooperating companies

Safety improvement activities to prevent human errors are carried out in communion with cooperating companies. These results are accumulated as a database together with the results gained in the factory. Although these results have been appropriately provided for cooperating companies, not all information including information useful for safety activities has been provided due to information security. To complement it and further promote safety activities as one, it is desirable to further promote the sharing of their mutual safety information at periodic information exchange forums.

Other details concerning this report may be found on the Japanese website.

[i] "Changes for the Better": A new corporate statement that each and every employee of Mitsubishi Electric Corp. promises customers involve himself/herself seeking for “the better,” strive to achieve the corporate philosophy, that is “improving technology, service, and creativity” in daily activities, and create “a more wonderful tomorrow.”