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NSnet document number : ( NSP-RP-036 )  
Date of publication: December 25, 2003

## **Summary Report of Peer Review**

(Provisional Translation)

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Place of Review: Komae Research Laboratory and  
Low Dose Radiation Research Center  
Central Research Institute of Electric Power Industry  
(Komae-shi, Tokyo)

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Date of Review: October 29 to 31, 2003

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Publisher: Nuclear Safety Network

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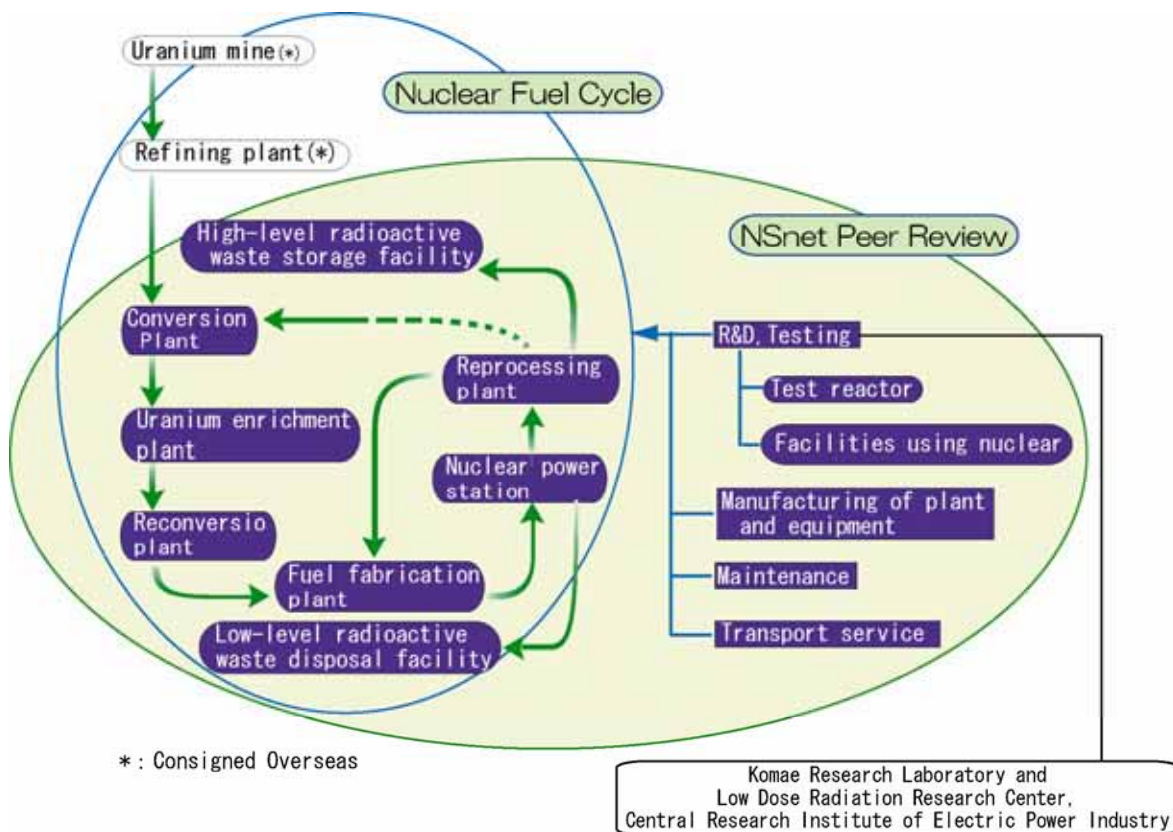
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## 1. Objectives

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



Komae Research Laboratory and Low Dose Radiation Research Center,  
Central Research Institute of Electric Power Industry in the nuclear fuel cycle

The Komae Research Laboratory is located where CRIEPI started her activities in 1951. As a major research base, the laboratory consists of a wide range of basic and practical research activities such as environment, energy services for consumers, electricity network, nuclear power and fossil fuel power generation, and natural and unutilized energy. Major activities on nuclear power research at the Komae Research Laboratory are to realize pyrometallurgical reprocessing technology, improve the economic efficiency of light water

reactors and establish nuclear fuel cycle backend technology. The Low Dose Radiation Research Center is conducting radiological research on the effects of the low dose radiation on animals.

The Central Research Institute of Electric Power Industry (CRIEPI) was established in Komae-shi, Tokyo in 1951. Since then, it has conducted public pioneering research from a neutral standpoint in the field of the electric power industry and brought extensive and fruitful results to society for more than 50 years. At present, there are the Komae Research Laboratory, Communication & Information Research Laboratory, Nuclear Information Center, Human Factors Research Center, Low Dose Radiation Research Center, and Administrative Operations Center, all located in the Komae District. This review was conducted with respect to the Komae Research Laboratory and the Low Dose Radiation Research Center (hereafter collectively referred to as the “Research Center”), both of which are engaged in nuclear-related business.

As a major research base of CRIEPI, the Komae Research Laboratory is carrying out extensive research activities ranging from basic to practical applications in such areas as environment, consumer energy service, power delivery, nuclear power generation, fossil fuel power generation, and natural and unutilized energy. It is also actively engaging in advanced basic research into computer science, materials science, high-temperature superconductivity, and so forth, which are the keys to technical innovation. With regard to nuclear power generation, it is promoting research into pyrochemical recycling technology, cost reduction of light water reactor power generation, back end measures, and so forth.

The Low Dose Radiation Research Center is conducting research with the purpose of deepening our accurate understanding of the effects of low radiation doses and low dose rates on organisms through the use of long-term low dose rate irradiation facilities.

At present, there are a total of approximately 200 employees working at the Komae Research Laboratory: about 80 are assigned to the nuclear power-related departments, while about 10 personnel are assigned to the Low Dose Radiation Research Center.

### **3. Points of Review**

#### **3.1 Review Subject**

This review was conducted with respect to safety promotion activities concerning nuclear power-related work (research and development) at the Research Center.

### **3.2 Points of Review**

The Research Center has been established as a place to conduct diverse research and development operations. The points of review were placed on how the concept of safety culture is utilized for any work that requires new processes and change of equipment according to nuclear-related research and development themes.

The review was divided into four sections: (1) Organization/Administration, (2) Education/Training, (3) Research and Development, 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 "specific activities related to fostering a nuclear safety culture and improving morale", (2) in Education/Training, "certification of qualification," and "planning and implementing education and training," (3) in Research and development, "securing personnel and work environments," "safety control manuals and the observation thereof" "ensuring safe work," and "research and development management," and (4) in the Handling of important issues, "cooperative activities related to safety with cooperating companies", "radiation management" and "emergency measures"

In addition, following the data falsification problem regarding neutron shielding materials (resins) for spent fuel transport containers in 1998 (hereafter referred to as the "Data Falsification Problem" and the "problem of voluntary inspection data falsification at a nuclear power station" and the "problem involving leakage test of reactor containment vessel" discovered in 2002 (hereafter referred to as the Voluntary Inspection Data Falsification Problem, etc.), the review also paid attention to ethics, communications, and data handling.

### **4. Period and Outline of Review**

#### (1) Date

October 29(Wed.) to 31(Fri.), 2003

#### (2) Formation of Review Teams

A group: Toshiba Corporation, Electric Power Development Co., Ltd.

B group: Mitsubishi Electric Corporation, JGC Corporation

Coordinators: NSnet Office

#### (3) Fields of Responsibility

A group: Fields of review: organization/operation, education/training and handling of major issues (emergency measures)

B group: Fields of review: Research and development and handling of major issues (activities to ensure safety, etc.)

## 5. Schedule of Review

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

		A Group	B Group		
10/29 (Wed.)	A M	Opening (Greetings, Members Introduction, explanation of plant facilities, work summary, etc.)			
		1. Organization/ Administration	<Director of Komae Research Laboratory > <b>[Interviews]</b>	3. Research and development	- Safety management in research and development <b>[Document Examination]</b>
			- Effective organizational and management <b>[Document Examination]</b>		- Environment management in research and development <b>[Document Examination]</b>
	P M	1. Organization/ Administration	- Safety culture <b>[Document Examination]</b>	4. Handling of important issues	- Activities to ensure safety <b>[Document Examination]</b>
		2. Education/ Training	- Qualification certification - Planning and implementation <b>[Document Examination]</b>	3. Research and development 4. Handling of important issues	< Manager class > < Responsible persons > <b>[Interviews]</b>
		4. Handling of important issues	Emergency measures <b>[Document Examination]</b>	4. Handling of important issues	Problem-prevention activities <b>[Document Examination]</b>
1. Organization/ Administration 2. Education/ Training 4. Handling of important issues	< Manager class > < Responsible persons > <b>[Interviews]</b>				
10/30 (Thu.)	A M	4. Handling of important issues	- Equipment in relation to emergency measures <b>[Field Observations]</b>	3. Research and development 4. Handling of important issues	- R&D and related equipment <b>[Field Observations]</b>
		Verification of Facts		Verification of Facts	
		Verification of Facts		Verification of Facts	
10/31 (Fri.)	A M	Verification of Facts		Closing	

## **6. Methods and Items of Review**

### **6.1 Methods of Review**

The review looked at activities related to nuclear safety at the Research Center, 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.

##### **(3) Interviews**

Interviews based on the following objectives were conducted with the director of komae Research Laboratory, 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 practices of the Research Center 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, suggestion is taken up in case there is still room for improvement.

## **6.2 Items of Review**

The 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. Securing of appropriate personnel
- c. Organizational policies and targets
- d. Leadership of managers

##### (2) Safety culture

- 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 engineers involved in Research and development, 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 of education and training (Technical and skill dissemination)
    - (a) Planning of education and training
    - (b) Technical and skill dissemination
  - b. Carrying out education and training

## Section 3: Research and development

Investigations were conducted from the perspective of whether personnel, time frames, and work environments were guaranteed for casks, whether design and manufacturing management regulations were being observed, and whether the various types of design and manufacturing management were being carried out properly.

The review was conducted to check whether personnel and work environments concerning research and development have been secured; whether safety management manuals have been observed; whether effective schedule management has been performed; and so forth.

### Review items

- (1) Safety management in research and development
  - a. Research and development organization
    - (a) Personnel and work environments
    - (b) Knowledge and experience
  - b. Safety management manuals in research and development (including documents and procedures required for carrying out work) and the observation thereof
    - (a) Development of manuals
    - (b) Information and observation of manuals
    - (c) Work management
- (2) Environment management in research and development
  - a. Research and development management (managing experiment plans)
  - b. Consistency with permission (contents)
  - c. Maintenance of equipment
    - (a) Facilities interlocks

(b) Facilities inspections

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 program, prevention of human error, and activities to prevent reoccurrences of nonconformities.

Review items

IV-1 Efforts toward nuclear safety

- (1) Cooperative activities related to safety with cooperating companies
  - a. Appropriate communication with cooperating companies (relating to the promotion and improvement of safety culture)
  - b. Evaluation of cooperating companies
- (2) Quality assurance
  - a. Establishing a quality assurance system
  - b. Effective inquiry system
  - c. Handling of the data falsification issue and so on
- (3) Activities to ensure safety in research and development
  - a. Actions to take in times of problems
- (4) Radiation management
  - a. Management of radioactive substances and waste
  - b. Confinement of radioactive substances and monitoring
    - (a) Appropriate control of negative pressure
    - (b) Radiation monitoring
  - c. Personal exposure dose monitoring
- (5) Labor safety
  - a. Labor safety
  - b. Management of chemical substances

IV-2 Emergency measures

- (1) Fire and explosion prevention
  - a. Equipment, and instruments that can cause fires/explosions
  - b. Administrative methods for the prevention of fires/explosions
  - c. Detection of fires/explosions at the time of an accident and methods of alleviating the problem
- (2) Emergency plans
  - a. Adoption of emergency plans
  - b. Dissemination of information to employees
  - c. Implementation of training

#### IV-3 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 Research Center, we have not found any item in the nuclear safety field that would lead to a serious accident unless immediate remedies were taken.

In the CRIEPI facilities in the Komae District, nuclear safety guidelines called “My Lab, My Town” were laid down in February 2003: ((1). Safety can be maintained by all personnel’s retaining the sprit of acting as safety managers. Safety management, without fail! (2). Safety can be maintained by retaining a mindset of coexisting with the local community. Thus, it must be realized that we are an urban operation, and (3) Safety can be maintained by improving and making public engineering abilities. Thus, wisdom and intelligence is gathered together to achieve the goal). As a common goal, they require each and every one of the staff members who are engaged in nuclear power research and development and employees of cooperating companies (hereafter collectively referred to as the “personnel”) to act with a high degree of safety consciousness.

In addition, a forum called “Taei Online” was established on the CRIEPI website in February 2002, so that the president can send messages directly to the personnel while the personnel can communicate their opinions and demands directly to the president. This has helped create a workplace that facilitates communication, for example, by sending messages in view of the issue of manipulating voluntary inspection data as well as information concerning the improvement of morals.

With regard to safety education, radiation safety education and safety education for personnel handling chemicals are conducted once a year. In addition, safety education including that of improving morals is conducted properly.

Moreover, activities concerning the improvement of morals have been carried out, such as organizing lectures concerning ethics education and distributing brochures concerning engineers and corporate ethics.

As to safety management activities, the “Safety and Sanitation Rules,” the “Regulations for Preventing Radiation Hazards,” the “Regulations for Preventing Hazards Arising from Poisonous and Powerful Agents,” and so forth have been laid down. The “Safety and Sanitation Committee” and the “Radiation Safety Committee” are actively conducting on-site patrols. For example, laboratories are subjected to monthly safety patrols by directors of departments and projects and semiannual safety patrols by the members of the Safety and Sanitation Committee, including directors of laboratories and centers.

Measures have been implemented successively to cope with problems pointed out during safety patrols.

As emergency response measures, the “Emergency Response Manual” and the like have been laid down based on the “Regulations for Preventing Radiation Hazards” because the Research Center possesses diverse radioactive isotopes (hereafter referred to as “RI”) and fire drills are conducted by the self-defense fire brigade every year, including joint fire drills with neighboring firefighting organizations.

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

In addition, it is expected that the fruitful results gained from the review will be disseminated to cooperating companies as well as within the Research Center.

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.

- Activities to listen to opinions from within the Research Center via “Taei Online,” etc.

The “Taei Online” system that allows the president to directly transmit his messages over the web once a month or so is useful in that first-hand messages from the top management can be communicated directly to the personnel. It was confirmed, in particular, that the know-how for creating a workplace that facilitates communication has been transmitted to all personnel as a message regarding risk management in view of the issue of manipulating voluntary inspection data that occurred in 2002. In addition, the menu of this system includes a function by which opinions of the personnel toward the top management can be directly communicated to the president by e-mail. In fact, numerous opinions have been given, indicating that active efforts have achieved results in creating an atmosphere of leveling off the hierarchical structure of the organization resulting in an overall climate in which opinions can be expressed freely.

Moreover, in a message from the director of Komae Research Laboratory, which is located in a residential area, the spirit of disclosing all information in pursuit of coexistence with the local community as the ultimate goal appeared to have been shared by the personnel. In particular, the director of Komae Research Laboratory has endeavored to create an atmosphere in which opinions can be exchanged without regard to the corporate ladder by leaving the door to his office open in early morning hours before regular business starts. It is said that this has achieved some results.

- Qualification certification system for personnel handling chemicals

Since the Research Center is located in a Type-1 residential area, it is operated with keen risk awareness at all times in view of the fact that the Research Center would not

survive if an accident occurred involving radiation or chemicals. As to the handling of chemicals among others, a unique qualification certification system has been established based on the “Work Compliance Standards.” Safety education for personnel handling chemicals is offered once a year by those who have public qualifications and personnel in charge of safety. Qualifications are renewed as a result of examinations conducted within the Research Center every three years. Personnel who have passed for the first time the examination conducted at irregular intervals by the Administrative Department are certified as qualified to handle chemicals.

- Quick actions facilitated by the use of “handling instruction stickers” during safety patrol

Laboratories inside the radiation control area are subjected to safety patrols at least once every six months by members of the “Radiation Control Group.” During this safety patrol, “handling instruction stickers” are attached on the spot, thereby clearly giving instructions for arrangement, storage, or disposal.

- Easy-to-understand signs at places in which inflammable gas is used

With regard to inflammable gas used in laboratories inside the controlled area of Experiment Building 5 where unsealed RIs are handled, colored signs showing the type and location of the gas are displayed in an easy-to-understand manner on the wall by the entrance to the building, in consideration of safety of work and emergency response.

- Checking fingerprints for entrance/exit control and using personal dosimeters with IC tags

A system has been employed in which personnel are not allowed to enter the radiation controlled area of Experiment Building 5 without having their fingerprints checked or carrying personal dosimeters (glass dose meters<sup>1</sup>) with IC tags. They are not allowed to leave the area without going through contamination inspection and registering exposure doses. The system prevents improper use and careless mistakes.

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

- Distributing “My Lab, My Town” cards to all personnel

Recognizing that radiation-related accidents would have the greatest impact among all accidents that could be assumed to occur in the Komae district, “My Lab, My Town” cards are currently being distributed to those who are engaged in radiation work. It is desirable to distribute the cards to all personnel working in the district as soon as possible.

- Conducting periodic inspection of fire detection and mitigation systems

Although inspections and operation tests are being carried out with respect to various sensors to prevent and detect fires as well as dampers to prevent fires from spreading, it

was not confirmed that they are carried out periodically. To ensure safe operation in emergencies, it is desirable to conduct periodic inspections and operation tests in the future.

- Measures to prevent the recurrence of multi-faceted problems and make sure that information is thoroughly conveyed

Measures to prevent the recurrence of problems are organized at study meetings held by the parties concerned including experts on various events. To work out more effective recurrence prevention measures, however, it is desirable to conduct multi-faceted examinations, including non-technical aspects, by inviting personnel from different departments within the Research Center (e.g. the Human Factors Research Center, other departments, the Administrative Department, etc.) to participate in the Problem Study Forum.

In addition, the personnel are notified of problems at the Directors Meetings through line and safety education. To prevent the recurrence of problems quickly and with more certainty, however, it is desirable to build a system in which the personnel are directly notified of problems in a quick and thorough manner.

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

## **Annotation**

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<sup>i</sup> **Glass dosimeter:** A dosimeter that uses special glass to measure dose levels, which shows a coloring response to gamma ray irradiation. Normally, phosphate glass or cobalt glass that is activated by adding silver is used (excerpted from the “Nuclear Power Dictionary,” The Nikkan Kogyo Shimbun).