6.2.6 Administration of Safety and Health

Administration of safety and health implies prevention of accidents by checking the safety of equipment and minimizing hazards and errors in work, as well as managing the health condition of personnel.

Especially in this chapter, the current status and improvement plan for administration of the safety and health in TES4 is proposed: (1) Improvement of the work place environment and its administration organization, (2) Accident occurrence and measures for reducing industrial accidents to zero, (3) Real state of occupational disease and a plan for its improvement. (4) Measures for workers' safety and health, and (5) Improvement in the CCR environment.

(1) Improvement of the work place environment and its administration organization.

The wrong work place environment affects not only repair work results but also safety.

Current Status of TES4	*Improvement Plan*
(Work place environmental administration organization.) • Based on 6th article of the occupational health and safety regulation, measurement of the illumination in the work place environment (twice a month), coarse particulate (once a week), and noise (once per two months) is carried out, and data is recorded and kept. • The work place environmental regulation specifies that coarse particulate should be 10mg/m3N or less, noise should be 85dB(A) or less, and illumination should be 30 luxes or more. • Measurement is done only in the powerhouse (around the boiler and turbine equipment), and is not carried out in the service building. • The chemical section carries out the coarse particulate measurement, and reports the results to the Inspection and Research Department. The Inspection and Research Department carries out illumination and noise measurement. • When the measured data exceeds the limitation value, the Inspection and Research Department warns the section responsible in written form to improve the work place environment.	• A Safety and Health Control Department should be established under direct control of the president and instruction for improvement in the work place environment to the department responsible. (Refer to 6.1 "reexamination of an organization") • Improvement instructions are put into practice through the strengthening of the above-mentioned authority. • Work environment in CCR, ECCR, and in the service building shall also be investigated periodically as well as the powerhouse.
(Illumination in the work place) • The measurement results for October 9, 2001 are shown in Table 6.2-11. • The illumination in many areas of the boiler and turbine equipment is less than the limited value, and we are striving for improvement of lighting equipment. (Although an illumination improvement is under enforcement in the No. 5 boiler circumference, the price of lighting is as high as 5,000-10,000 Tug per set, and the renewal of a package in plant is difficult.)	• The deficiency of illumination in the powerhouse, obstacles left in the work place such as damaged machines, materials for repair, etc, broken steps and catwalks cause industrial accidents. These improper conditions should be improved immediately.

Table 6.2-11 Illumination around the Boiler and Turbine Equipment

(Measured at: October 9, 2001)

Boiler equipment (Net figures are less than the limited value) Unit :Lux

Equipment name	*IDF*	*FDF*	*Screw*	*Mill*	*Water supply equipment*	*Bunker*		*Coal Feeder*	*31m Height*	*Average*
Limit	**30**	**20**	**20**	**35**	**30**	**30**		**30**	**30**	**28**
No.1 unit	21	22	22	45 105	9	k ц -204*	10-35	13 10	10	27
No.2 unit	12	32	20	90 57	19	2k-300*	17	6 2	10	26
No.3 unit	10	42	17	9 28	22	3k-302*	2	2 9	16	16
No.4 unit	12	25	15	25 110	26	4k-212*	10	8 14	10	25
No.5 unit	10	24	10	34 28	6	5k-212*	17	16 12	10	16
No.6 unit	20	30	12	20 23	19	6k ц -300*	10	10 10	0	14
No.7 unit	17	13	20	5 19	18	7k ц -200*	5	10 10	0	10
No.8 unit	9	15	20	15 12	40	8k ц -300*	5	19 18	0	14
Average	9	26	17	38	20		12	10	7	17

*Measurement position: Valve name.

Turbine equipment. (Net figures are less than the limited value) Unit :Lux

Equipment name	*Ceiling 12m*	*9m*	*6m*	*4m*	*0m*	*De-aerator*		*Average*	*Note*
Limit	**100**	**20**	**20**	**20**	**15**	**30**		**34.1**	
No.1 unit	87	10	0-20	0-22	5	k ц -204*	0-35	20	Under repair
No.2 unit	80	26	10	0-15	0-3	2k-300*	7	18	
No.3 unit	63	0-8	5	8	3	3k-300*	2	13	
No.4 unit	18	12	20	0-70	5	4k-302*	18	20	
No.5 unit	80	25	30	25	40	5k-300*	17	36	Under repair
No.6 unit	40	15	0	16	18	6k ц -212*	7	16	
Average	61	14	12	17	12		12	21	

*Measurement position: Valve name.

Current Status of TES4	*Improvement Plan*
(The situation of a coarse particulate) • The measurement results for August 23, 2001 are shown in Table 6.2-12. • The equipment that generates severe coal dust are the coal discharging conveyer, tippler, crusher, mill, etc. • As a measure against a coarse particulate of a coal-discharging conveyer, a wet type dust collector is installed in the crusher house, and there is a spray of water and steam to the throat of the changeover chute. (As a prevention for coal dust scattering, the coal surface was covered with bubble using Russian equipment, but the import of medicine became impossible in 1992 and it has not been used since.) • The situation of coal dust scattering around the circumference of the coal-discharging conveyer at the time of supplying coal is similar to that in the power plant in Japan. • Water spray on a coal pile as a measure against coal dust scattering is not carried out. In the view of plant, water spraying supposes that it will lead to spontaneous combustion. • Although there is no measured data, coal dust generated at the coal storage yard flies into the power plant by the north wind at the beginning of spring, and premises are polluted.	• Although it is difficult to completely suppress coal dust generation in areas where coal is handled, dust elimination measures, such as the introduction or improvement of a ventilator in the area where the concentration of coarse particulate exceeds the limited value, should be introduced. • Coal dust generating from the pulverized coal feeder and the mill of boilers No.1 to No.4 has decreased sharply after conversion work on the combustion system, and the concentration of coarse particulate mostly settles within the limit value. The same improvement for boilers No. 5 - No. 8 is expected. It is important for exchanging seal agents, such as packing etc., from now on to perform the maintenance of the above-mentioned equipment firmly. • Trees or a wind-stop fence will be prepared as a method of preventing coal dust scattering from the coal storage yard in Japan. Although there is no scattering to the plant exterior due to the direction of the wind, and although complaints about coal dust do not arise now, coal dust scattering prevention measures of some kind may become necessary in future. • The telescopic-chute on an acceptance conveyer where the mouth drops to the coal storage yard should be restored.

Table 6.2-12 Measurement Results on the Concentration of Coarse Particulate

Major generating equipment of the coarse particulate	*Measured values(mg/m^3N)*
・Coal discharging conveyer	・Max. 37.5　(Average 31.7)
・Pulverized coal feeder	・28.7
・Mill	・Max. 35　(Average 28.3)

Current Status of TES4	*Improvement Plan*
(The noise situation) • Measurement results (EIA investigation) from 18th, 19th October 2001 are shown in Table 6.2-13. • The work places where the noise exceeds the limit value of 85dB(A) are the circumference of the boiler, the mill, the turbine, some coal conveyers, and the mechanical workshop, etc. • In the boiler operator room, the turbine operator room, various analysis rooms, and the water treatment room, the noise level is less than the limit value.	• When doing repair work in work places where the noise level is higher than the limit value, workers shall wear protective implements, such as earplugs, to prevent themselves from developing hearing impairment.

Table 6.2-13 Measurement Results of Work Environment (noise)

Work place	*Noise level dB(A)*	*Work place*	*Noise level dB(A)*
Boiler	91~94	Fuel supply control room	78
Mill (No. 3)	93	Water treatment / filtration room	81~83
Turbine	94~120	Chemicals store house	71~79
Coal conveyer	62~104	Each analysis room	70~71
Boiler operator room	75	Mechanical workshop	104
Turbine operator room	72	Lathe machine	82~88
Boiler engineer room	71	Milling machine	100~104

(2) Accident occurrence and measures for reducing industrial accidents to zero

Accidents spoil stable operation of, and superannuate the equipment. Furthermore, in the case of fatal accidents, the life of not only the person concerned but also that of his family would be lost.

Current Status of TES4	*Improvement Plan*
(Accident occurrence) • The number and items of accidents in 1995 - 2000 are shown in Fig. 6.2-7 and Table 6.2-14. • 72 accidents have occurred in the power plant in the past six years (1995 - 2000). • The most common types of accidents are due to electric shock or are accidents during machine operation. Burn and fall accidents rank second. • In 1998 and afterwards, in the power plant, measures such as labor protection, safety, and the construction of a special health improvement plan have been implemented, and the number of accidents is decreasing. • However, serious accidents, such as fall accidents, have also occurred recently.	• The Safety and Health Control Department should be established under direct control of the president and shall carry out all measures and instruction for improvement in the work place environment to each section. (Refer to 6.1 "reexamination of an organization") • The measure aiming for zero industrial accidents is strengthened under the instruction of the above-mentioned organization. • Improvement in the work place environment and in educational instruction about worker safety should be put into practice; for concrete measures refer to Chapter 6.2.6 (4) Measures for Worker Safety and Health.

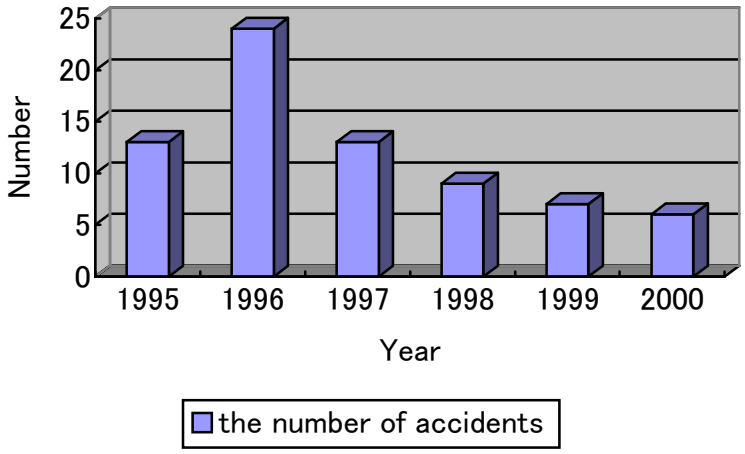


Fig. 6.2-7 Transition in the Number of Accidents in the Power Plant

Table 6.2-14 Accident Occurrence: 1995~2000

Accidents	*Number*
Electric shock	15
Burn	8
Burn with steam	1
Fall	7
Injury during machine operation	12
Others	29

(3) Real state of occupational disease and a plan for its improvement.

Current Status of TES4	*Improvement Plan*
(Situation of disease) • The number and items of occupational disease in 1995 - 2000 are shown in Fig. 6.2-8 and Table 6.2-15. • The numbers of occupational disease were decreasing at one stage but are recently increasing again. • The most common disease is pneumoconiosis. • Asbestos in various forms is used as heat insulation material. During handling of asbestos, the worker is obliged to wear a mask with a carbon filter attached. Asbestos waste is stuffed into a bag and kept in the warehouse. • Ranked second are back pain and lumbago; it is believed that these diseases are caused by having carried out work with bad posture, or by handling heavy weights. • Hearing disorder is caused by having carried out work for long periods of time in places where the noise level is high.	• In order to prevent pneumoconiosis, while putting the measure against a coarse particulate into practice and aiming at an improvement in work place environment, use of a protective dust mask is enforced. • In order to prevent back pains or lumbago, proper workshop tools, such as a forklift, should be introduced, and an improvement of work place environment would also be effective. • In order to prevent hearing disorder, workers should wear earplugs. Equipment that emits a high noise should be remodeled.

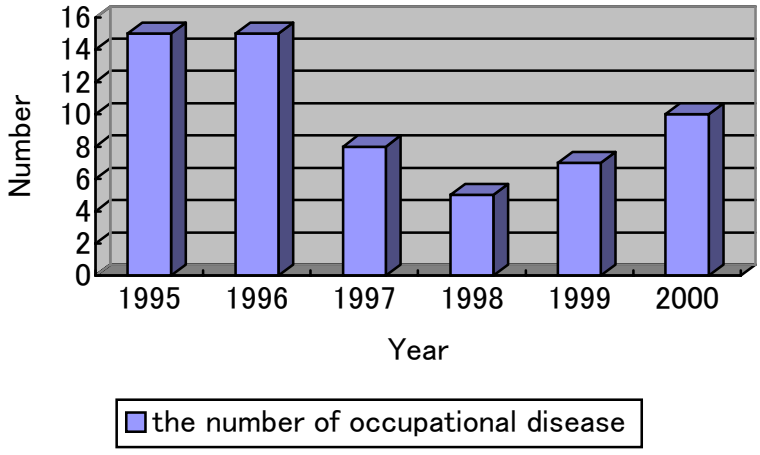


Fig. 6.2-8 Transition in Numbers of Occupational Disease

Table 6.2-15 Occupational Disease: 1995~2000

Name of disease	*Number*
Pneumoconiosis	47
Back pain and lumbago	20
Hearing disorder	8

(4) Measures for Workers' Safety and Health

Current Status of TES4	*Improvement Plan*
(Safety Patrol) • The safety patrol investigates inside the plant twice a day. (From October 1, 2001, one patrol is additionally nominated: one of them investigates inside the powerhouse and the other patrols other areas.) • Small issues regarding abnormalities acknowledged during the patrol are reported to the manager of the Inspection and Research Department and each section. In the case of a big issue, an improvement notice is sent to the section. In this case, if the abnormality is not yet resolved, work is not permitted to continue. • A solution for the abnormality indicated the previous day is checked at the 15:30-16:20 technical communication meeting, and also checked by patroller.	• Training of the safety patrol should be performed so the not even small abnormalities are overlooked. • The Safety and Health Control Department should be established under the direct control of the president. This will give authority to the patrol. (Hazardous work shall not be permitted under any circumstances.) • In addition to the issuance of the improvement notice, who shall resolve the issue and by when it should be resolved should be clarified immediately after the patrol. • When hazardous work is acknowledged, a direction of improvement should be made on the spot. • The patroller shall check whether the abnormality that he warned about the previous day has been resolved or not.
(Fire prevention patrol) • One engineer specializing in fire prevention and 17 firemen (3 groups, 4 shifts) are nominated. They patrol every two hours and report any abnormalities acknowledged in their patrol at the technical communication meeting.	• The fire-fighting team shall not only report patrol results, but shall carry out improvement instructions, including equipment reconstruction.
(Hazard display) • Although there are no displays in which power plant hazards are shown, as a result of a hearing the Inspection and Research Department is fully aware of present hazards(holes on stairs and floors, etc.), and is directing caution. • Although no hazard signs have been set up and separation is not being carried out on steam leak parts, it is our intention to strive for the required safety standards. • Even if hazards (destruction of handrails and catwalks, steam leak parts) are recognized, sufficient exchange and repair are impossible due to a financial deficit.	• All hazards in the plant should be recorded and measures to prevent the possibility of accidents should be put into practice.Even if immediate repair is difficult, it is necessary to take some measure, such as installing a hazard sign. • A concrete improvement plan for lighting should be planned and be put into practice immediately so that it exceeds limit values. • Although there is no evaluation criterion on safety for the catwalk, it is necessary to check hazards and to devise an improvement plan. (The photograph and measures for hazards are shown in Fig. 6.2-9) • Caution signs (caution items) should be provided where serious accidents have occurred to prevent similar accident.

Current Status of TES4	*Improvement Plan*
	• Many handrails are broken. All failed parts should be checked and repaired immediately. • When immediate repair is difficult, a hazard sign should be provided for fall prevention.
	• The handrail of the outdoor catwalk in a boiler house has broken and it is very hazardous. • It should be repaired immediately or a ban on entry should be considered.
	• Equipment such as that pictured left (probably the main part of a valve) was seen lying here and there around the power plant. • Scrap should be gathered in one place, or should be disposed of appropriately. • When equipment is temporarily laid on the field for repair work, a signboard (management / contents of work, storage / work period, and name of manager / worker in charge, etc.) should be provided, so that people unrelated to the project do not enter.

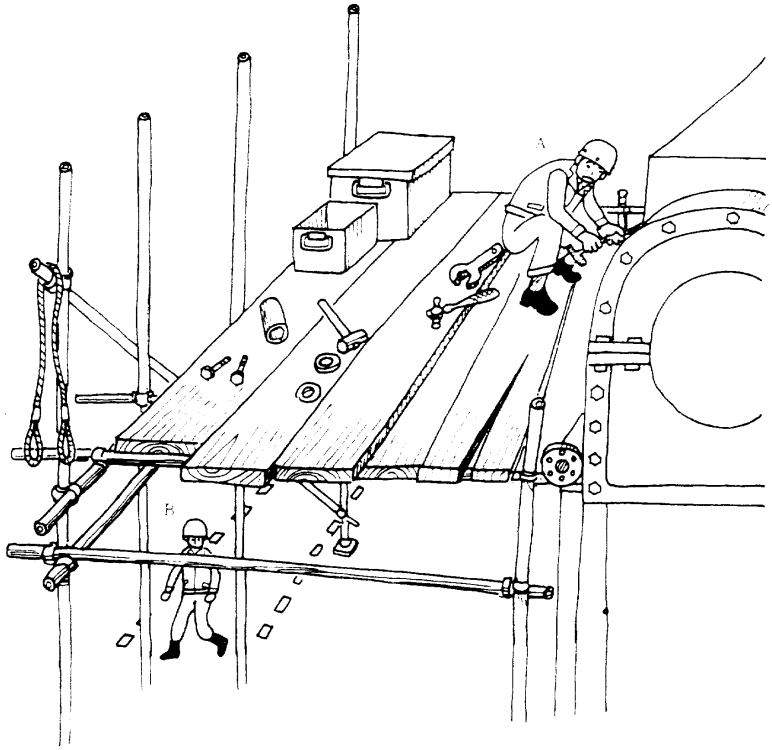
Fig. 6.2-9 Photographs of Hazardous Places and Measures

Current Status of TES4	*Improvement Plan*
(Safety instructions for repair work) • Before commencement of repair work, although a check of work tools and work procedures is carried out, a check of safety notes for the work is not performed.	• Before commencement of repair work, the repair engineer in charge shall draw up "safe work procedures" that indicate work procedures, safety measures, and names of workers responsible for each work segment, and it should be subject to the approval of a safety person in charge.

Current Status of TES4	*Improvement Plan*
(Display of work place, and proper arrangement and order of work place) • Repair works are performed here and there in the field. Tools and parts are left in disorder in these work places, and it has had a bad influence on repair results and on safety in the work.	• The work place should be separated and a display board (management / contents of work, storage / work period, and name of manager / worker in charge) should be provided, so that people unrelated to the project do not enter. • Tools and parts should be arranged neatly in the work place.
(Participation in an external seminar) • The research institute (JISHA: Japan Institution of Safety and Health Association) delegated a team (21 persons, from industries such as Toyota Motor, Shimadzu, etc.) to Mongolia, and a seminar on labor safety was held from July 11-21, 2001. About 40 people attended the seminar including two from TES4 and one from EA.	• The example of tackling labor safety that was introduced at the seminar (the Toyota example introduced at the seminar) should be examined as to how it can be implemented in TES4, and the seminar participants shall take the lead by devising and implementing a practice plan
(Practice of safety education in-house) • 4th - 6th class workers have taken examinations once a year under the supervision of the Inspection and Research Department. The chief engineer of each section, the chief of the Operation Department, and the chief of the Inspection and Research Department carry out the examination together. Technical questions and safety questions are included in the examination questions. The examination is carried out using the personal computer of the Inspection and Research Department. • Questions in the examination are set from the "Technical operation rules" and "Safety rules for equipment operation" that the Ministry of Infrastructure created. • The examination committee of each section carries out examinations for workers of classed lower than 4th. Technical questions and safety questions are included in the examination questions. • Workers can take the state examination (qualification), based on the order created in the plant, and will be given a diploma if they pass. (The examination is carried out by the National Research Department of MOI) • Work involving pressure vessels and piping, and the operation of a crane should be carried out by people who have passed the state examination and have a diploma.	• In order to eliminate industrial accidents, safety education of workers is important. Training which heightens the creative thought in regard to actual hazards should be carried out utilizing past examples of accidents in the power plant, and not simply by checking the degree of comprehension of safety rules on equipment operation by examination. The example of hazard identification training using the illustration is shown in Fig. 6.2-10. • Before commencement of repair work, a meeting should be held on the field. At the meeting, concerns of danger in the work should be discussed and all workers should be notified of these concerns. Accordingly, the occurrence of accidents can be prevented. (An example of a hazard identification activity board is shown in Table 6.2-16.) • There have been situations that have almost but not quite resulted in accident. Most workers have had this kind of experience. Discussion of this kind of experience between workers should help to prevent future accidents.
(Workers' health check) • The results of the in-plant clinic medical examination are indicated.	• Attention should be paid especially to the health of a shift worker. • A counselor for health should be employed in the power plant. • The causes of various diseases in employees should be investigated and preventive measures should be put into practice.

Investigate what hazards lurk in the following illustration!

Situation: Machine repair work is being done on the height scaffold.



Hazard identification training sheet (written example)

<table>
<tr><td colspan="4">The 1st round (what danger lurks?): Discover potential hazards and identify the hazard factor and the situation caused by the factor.
The 2nd round (this is most hazardous): ○ mark to be attached to severe hazards. ◎ mark to the severest hazard.</td></tr>
<tr><td></td><td>No.</td><td colspan="2">Hazardous factor and resulting situation (model of the accident)</td></tr>
<tr><td>◎</td><td>1.</td><td colspan="2">Since the worker is not wearing a safety belt, he may fall down if he loses balance.</td></tr>
<tr><td>○</td><td>2.</td><td colspan="2">Since neither a tool nor bolt nuts are arranged and tidied up, these may fall on passers-by.</td></tr>
<tr><td></td><td>3.</td><td colspan="2"></td></tr>
<tr><td colspan="4">The 3rd round (if it was you, how would you deal with it?): Consider measures which can be implemented for solving the situations in ◎ marked hazards.
The 4th round (our method): Attach a ※ mark to the most effective measure. Furthermore, the team action target for practice is set up.</td></tr>
<tr><td>No.</td><td colspan="2"></td><td>Concrete plan</td></tr>
<tr><td rowspan="2">1.</td><td>*</td><td colspan="2">During execution of height work, ensure that safety belt is fastened and is connected by a hook to a pillar, etc.</td></tr>
<tr><td></td><td colspan="2">Ensure that excessive power is not applied in an unnatural posture, and that suitable tools are used.</td></tr>
<tr><td colspan="2">Team action target (Object, preparation work, action).</td><td colspan="2">During execution of height work, start work after equipping the safety belt and attaching one of the two hooks to a safe place.</td></tr>
</table>

Fig. 6.2-10 Example of Hazard Identification Training Using the Illustration

Table 6.2-16 Example of a Hazard Identification Activity Board

June 12 / **Hazard identification activities**	
Contents of work	*Tidying up an external scaffold sheet, arranging and ordering, cleaning.*
Hazardous situation	*Fall during execution of height work*
	Stumble over materials etc. and a fall
	Object falls from height and strikes a passerby.
Our method	*Wear a safety belt*
	Secure a work place and a safe passage.
	Do not work above or below other workers

(5) Improvement in the CCR Environment

Operators reside in CCR permanently and improvement in the CCR environment is important from the viewpoint of dysfunction prevention. In addition, many electronic devices are installed in CCR, and protection of the proper circumference environment is important.

When the equipment cannot stand the environmental conditions, failure of equipment will result. Using a computer system as an example, it would result in (1) incorrect operation and decline in its accuracy, (2) failures, (3) shortening of life, and/or (4) damages, etc.

Two kinds of measure can be considered: One is an improvement in the environment-proof nature of the equipment, and the other is an improvement in the environmental conditions (or a change of the equipment location). It should be determined as the basis of the synthetic judgment including cost, reliability, maintainability, etc.

Furthermore, the reliability and the life of equipment depend greatly on the environment conditions. Even if it is within the limits of the environmental condition standards for the equipment, in terms of reliable operation and life maintenance it is important to use it in the best possible environment. For example, when the equipment of the operating temperature range of 5-40 degrees C was always used in a 35-degree C environment, compared with the case where it was used at 25 degrees C, failure reports doubled.

The classification of environmental conditions for the industrial computer control system is shown in Table 6.2-17, and then the current status of TES4 and improvement plans are described.

Classification of the environmental conditions can be independently performed for every environmental item. Therefore, regarding temperature, although it is Class A, there may also be cases where it is Class B in relation to coarse particulate.

Table 6.2-17 The Classification of Environmental Conditions for Industrial Computer Control System

		Unit	*Class A*	*Class B*	*Class S*
Temperature and humidity	Temperature	°C	15~35	5~40	0~50
	Humidity	%	40~70	20~80	10~90
	Temperature rate-of-change	°C /hour	±5	±10	±15
Noise	Electric field	V/m	≦1	≦3	≦10
	Magnetic field	A/m	≦1	≦3	≦10
	Static electricity	kV	2	4	6
Vibration	Continuation vibration	G	≦0.1	≦0.2	≦0.5
	Short-time vibration	G	≦0.2	≦0.5	≦1
Coarse particulate		mg/m^3	≦0.1	≦0.3	≦10

Class A: Environment where there is equipment for improving the installation environment of a computer control system, or a good environment which does not have a bad influence on computer control systems.

Class B: There is no equipment for improving the installation environment of a computer control system, and conditions are at a normal level.

Class S: There is no equipment for improving the installation environment of a computer control system, and the environment is especially severe for a computer control system.

Current Status of TES4	*Improvement Plan*
(Temperature, humidity) • Although an air-conditioner is installed in №1 CCR as a measure against a temperature rise in the single loop controllers, it is only temporarily operating in summer for energy saving. • No control equipment for temperature and humidity are installed other than the air-conditioner.	• The limits of environmental conditions regarding the temperature and humidity of CCR should be set up. • When introducing new equipment, equipment that covers the range of the current environmental conditions should be selected. • Environmental conditions of CCR should be measured periodically from the viewpoint of securing a suitable work environment and life maintenance for the equipment, and should be checked as to whether it is maintained within the limits of the environmental conditions.
(Illumination) • Although there is no measured data for illumination in CCR, there is a large window and there seems to be no shortage in illumination that may pose a problem to operation and observation during the daytime. • Nighttime conditions, however, are unknown.	• Illumination in CCR should be set up based on occupational health and safety regulations. • The illumination in CCR should be checked periodically. • When illumination is insufficient, it should be improved immediately so as not to disturb the observation work of the operator.
(Coarse particulate) • Although there is no measured data on coarse particulate in CCR, any damage due to coarse particulate is not acknowledged.	• The limits of concentration of coarse particulate should be set based on occupational health and safety regulations. • The limit value of concentration of coarse particulate in CCR should be set up at stricter value (for example, Class B: 0.3 mg/m3) than the limit value (10 mg/m3N) for the field in consideration of the environmental conditions for a computer control system.

Current Status of TES4	*Improvement Plan*
	• The coarse particulate in CCR should be measured and checked periodically. • The CCR should be cleaned periodically and be kept clean always. • Install a foot mat at the entrance of CCR.
(Electromagnetic wave : electric field) • Communication between CCR and the field is performed using a walkie-talkie machine (GP88: Motorola make) since there are no paging devices in the plant. • During a site survey, it was noted that walkie-talkie machines were used in the relay room while the doors and lids of equipment were open. • CCR may be in the middle level strength of electro-magnetic wave (Class B), due to use of a walkie-talkie machine**.**	• There may be a decline in performance of a computer control system, such as incorrect operation, decrease of accuracy etc., under the influence of a walkie-talkie machine. • Use of a walkie-talkie machine in the relay room of CCR should be prohibited. • Use of a walkie-talkie machine nearby the electronic devices in CCR shall also be prohibited. • Generally, since the door and lid of equipment provide a shield effect, these should be shut in the case of walkie-talkie machine use. • The changeover operation of transmission/ reception of a walkie-talkie machine affects electronic devices, therefore the frequent changeover operation should be avoided as much as possible.
(Electromagnetic wave : magnetic field) • According to the talk of a JICA specialist who performed technical instruction in TES4, in CCR, the shake had occurred on the screen of the camera of a television station before. • The result of the hearing to TES4, the shake, distortion and color gap on the screen of CRT in CCR, have not yet occurred by present.	• The magnetic field produced around a power line or by a transformer may affect on the electromagnetic equipment, such as CRT. • The influence of a magnetic field on CRT is the shake, distortion, and color gap on the screen. However, in the environment of Class A, such affection on CRT will not occur. • Although the mentioned phenomenon is not acknowledged yet, the cause and measure at the time of occurring are shown in Table 6.2-18.
(Inductive noise) • The control devices were affected by inductive noise during September to November 2001. • After investigation of the cause, it became clear that the inductive noise might have occurred in the external wiring between a single loop controller and a unit computer. • The route of the above-mentioned external wiring is in the cable processing room under the CCR. The situation of the cable processing room is shown in Fig. 6.2-11.	• Since it is difficult to evaluate and to regulate an inductive noise, there is no standard. • The surge voltage occurred by interception of the current to inductive loads, such as a relay and a motor, gives a noise in the form of a spike to a power supply line or a signal line. • When the noise source has been clarified, the first thing is to install sparks quenching equipment and to halt the occurrence. • When the noise source cannot be clarified, it is effective to install an external power source or a line filter. For the signal line, it is effective to install a bypass capacitor or a surge absorber. • On the occasion of the cable installation in the cable processing room, the signal cable should be of a shield type and it should be installed separately from the power cable.

Table 6.2-18 The Measures Against Magnetic Field

Magnetic field generating factor	*Measure*
Unbalance in each phase of a power line	The distance from each phase of a power line is equilibrated.
Fluctuation of magnetic flux around the power line	Use of stranded wire, electromagnetic shield
Stray capacitance between high-voltage power lines and communication wire	Electrostatic shield

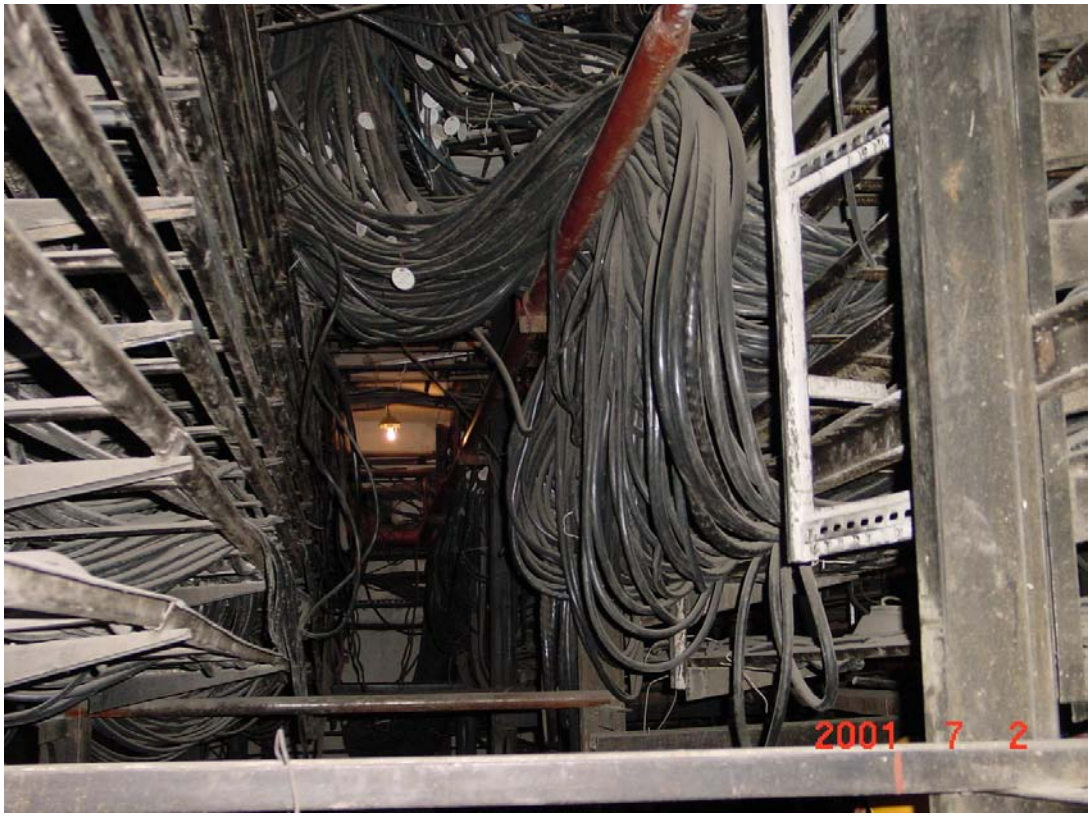


Fig. 6.2-11 Cable Processing Room Under CCR