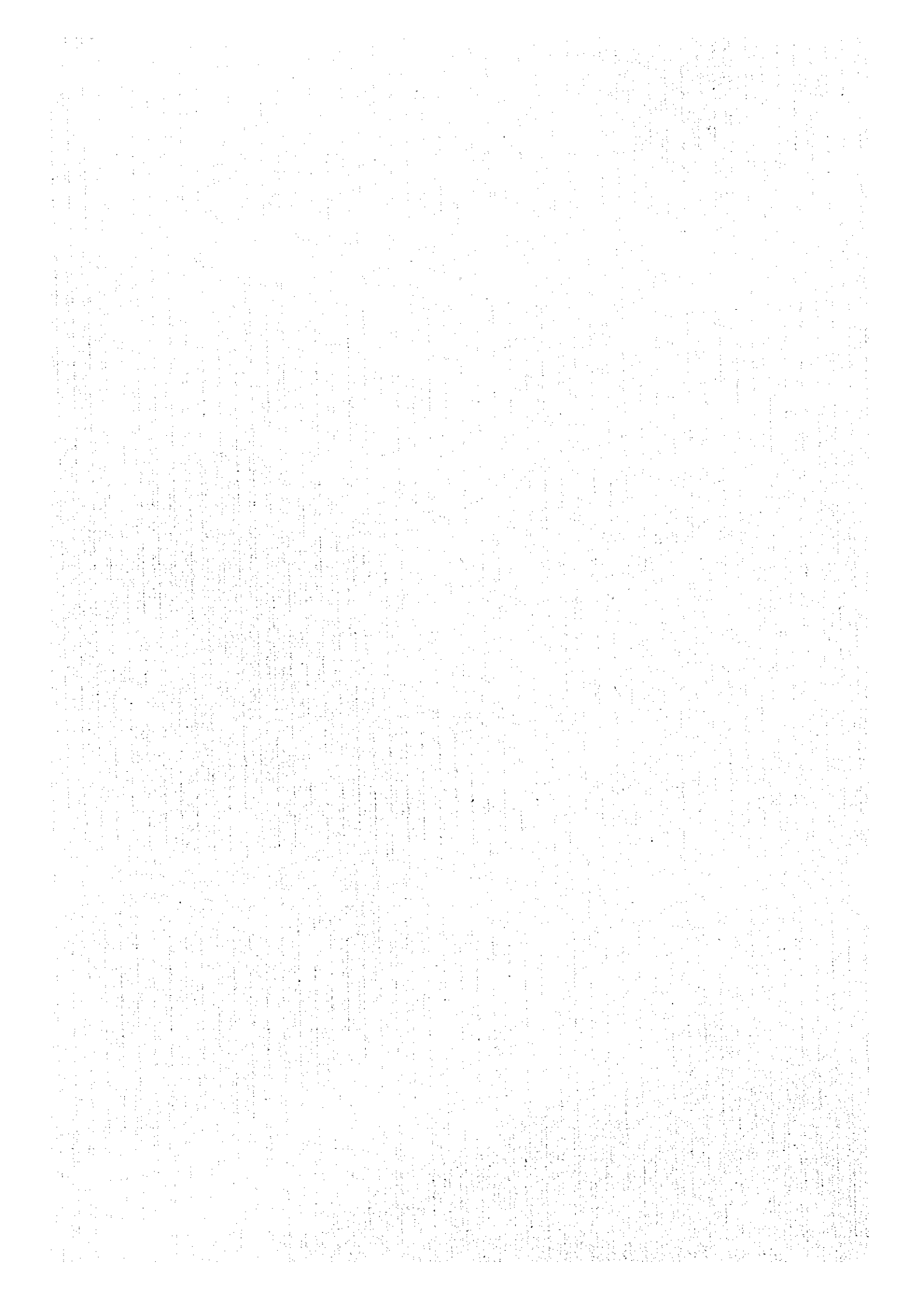


資 料 7



**QUESTIONNAIRE
ON
AN EVALUATION OF ENVIRONMENTAL EFFECTS OF
POWER PLANTS IN NORTH AND NORTHWEST AREA OF I.R. IRAN
(Project Formation Study)**

Please answer in written English together with supporting data/documents to the following questionnaire by the time of JICA Study Mission visiting. Please use updated data as much as possible.

1. Energy Sector Development Plan

- 1) What are Sectoral Targets for a. and b. shown below in the 2nd national five year plan of I.R. IRAN.:
 - a. Oil, Gas, Coal and
 - b. Electricity

2. Environmental Sector Development Plan

- 1) What is development policy of environmental sector in the 2nd national five year plan of I.R. IRAN.?
- 2) Role of the activities of Department of Environment (DE) in the Ministry of Energy (MOE) is understood as the goal of DE is to evaluate the environmental impacts of energy sector and prepare proper mitigation plans, what are the concrete targets/objects of DE's activities in the 2nd national five year plan of I.R. IRAN.?
- 3) Please describe a relationship between Environmental Protection Organization (EPO) and DE of MOE especially in environmental affairs?
- 4) Please attach administrative organization on environmental and proceeding flow chart.

3. On the Terms of Reference of the Proposed Study Made by I.R. IRAN Side

- 1) Is it existing power plants or newly established power plants to carry out the environmental impact assessment (EIA) in the project area?
- 2) Is(are) there any plan(s) for renovation or improvement on existing power plants in the project area? Therefore, is EIA required?
- 3) It is necessary for you to clear up the present situation of the power plants and plans for the future of power plants to carry out EIA in future. JICA Study Mission will request these data for the plants
- 4) Has it been shaped up for a scale, location and time of a coal firing thermal power plant to be seemed in the planning stage? If so, please describe an outline of the plan.
- 5) Do you have analytical data for coal to be used in the above coal firing thermal power plant? please provide data for the following parameters: coal heat value (MJ/kg), ash content (%), moisture content (%), volatile matter (%), carbon (%), sulfur (%), hydrogen (%), oxygen (%), nitrogen (%), and ash melting point, if any.
- 6) What is priority order for the power plants listed in the TOR for carrying out the EIA?

4. Environmental and Ecological Conservation Regulation

- 1) a. Do you have the law/regulations/guidelines on Environmental Impact Assessment(EIA)?
b. What ministry or agency is responsible for the assessment?
- 2) Do you have the law which regulates the environmental quality standard(s) and responsibility for the environmental monitoring? If so, please provide the summary.
- 3) Do you have the law which regulates the effluent/emission standards and responsibility for these monitoring? If so, please provide the summary.
- 4) Do you have the law which regulates the industrial waste disposals? Please provide the summary if any.
- 5) Do you have the law which regulates noise and vibration control? Please provide the summary if any.
- 6) Do you have the law which regulates the environmental conservation? Please provide the summary if any.

5. International Conventions on Environmental Conservation

- 1) Please give the name(s) of the convention(s) on natural conservation and environmental protection affiliated or ratified, and the date(s) of affiliation or ratification.
- 2) How is the situation on the program for the environmental conservation in the coastal countries of the Caspian Sea?

6. Environmental Pollution in the Project Area (approximate 30 km around a power plant)

What kind of exhaust substance is identified, such as sulfur oxides, nitrogen oxides and carbon dioxides gas, etc. including substance that future generation is to be prospected, for giving effects on ambient air quality and water quality in the project area?

7. Environmental Protection System in Power Plants

- 1) Are there emission and effluent standards stipulated by law for power plants? If so, please provide the emission and effluent standards.
- 2) On the thermal power plants in the project area, please describe the following items:
 - a. Name of the power plant, type by unit, capacity (MW) by unit, heat efficiency by unit, utility rate (%) by unit in a year, and location of power plant on a map:
 - b. Kind of fuel, consumption of fuel (t/h in solid and liquid or 1000m³/h in gas), heat value of fuel(MJ/kg in solid and liquid or MJ/m³ in gas), fuel composition including sulfur, nitrogen etc. ,
 - c. Height and inner diameter of top of stack(s) in meter. If a concentrated stack for flue gas ducts is used, number of units and its specific configuration should be shown.
 - d. Data for flue gas, such as amount (m³N/h), temperature (°C), and SO₂ , NO_x and Dust concentration of exhaust gas.
 - e. Analytical parameters for industrial waste water in the power plant
 - f. Conception drawing for a rain drain water check pit
 - g. Is there a public water sewage treatment facility in the vicinity of power plant?

- h. Water utility plan for:
 - electric generation (daily max. daily average, and main purpose) and other utilities, such as living (daily max. and daily average, main purpose)
 - i. On the steam type of power plant,
 - Type of boilers, steam generation per hour (t/h), type and output of steam turbines, type and capacity of generators
 - What are water resources (river water, sea water, groundwater or industrial water) for cooling water?
 - Type of a cooling method, amount (m^3/h) of intake water from water resources, temperature difference (Δt °C) between intake and outflow water
 - j. On the gas type of power plant;
 - Type and output of gas turbines, type and capacity of generators
 - k. On the industrial waste treatment;
 - What is the procedure to manage the industrial waste in the power plant.
- 3) How is the situation of pollution control facilities installed in power plants? If you have pollution control facilities at present, please describe 4) below.
- 4) What kind of pollution control facilities (including the capacities) for the environmental protection of power plant in the project are installed ?
- a. Name of the power plant:
 - b. Flue gas Desulfurization (De-SO_x) facilities;
 - Type:
 - De-SO_x efficiency (%):
 - Date of installation:
 - c. Flue gas Denitrification (De-NO_x) facilities;
 - Type:
 - De-NO_x efficiency (%):
 - Date of installation:

Do you have any other NO_x Emission Control Technology in the power plant?
 - d. Dust removal facilities;
 - Type:
 - Dust removal efficiency (%):
 - Date of installation:
 - e. Waste-water-treatment facilities;
 - Type:
 - Outline of the facilities:

Date of installation:

- 5) If you have no facility mentioned above a. ~ e. at present, do you have any plan to install pollution control facilities in future?
- 6) How many ambient air monitoring stations are there in around the power station?
 - a. Number of the monitoring stations:
 - b. Location of the monitoring stations on a map
 - c. Parameters for monitoring:
 - d. What agency is responsible for monitoring?
 - e. Starting year/month of monitoring:
- 7) What are measuring method and measured values of ambient air monitoring parameters? Please provide the summary for:
 - a. SO_x, NO_x, SPM and others
 - b. Wind speed and wind direction
 - c. Temperature, relative humidity, and others
- 8) Does water pollution occur around the ash-treatment facilities or pond?
If so, please provide the water pollution data.
- 9) Are there places where Water Quality is monitored?
If so, please describe next items;
 - a. Places where water quality is monitored:
 - i. Effluent, ii. River, iii. SeaMark down on maps
 - b. Number of the monitoring stations
 - c. Location of the monitoring stations on a map
 - d. Monitoring parameters:
 - e. Monitoring frequency:
 - f. Starting year/month of monitoring:
 - g. What agency is responsible for effluent/environment monitoring?
- 10) What are measuring method and measured values of ambient water and effluent water monitoring parameters? Please provide the summary for:
 - a. pH, SS, BOD, COD, DO, total nitrogen (TN), total phosphorus (TP), NH₄, etc. for ambient water.
 - b. pH, SS, BOD, COD, NH₄, Heavy Metals and Organic toxic, etc. for effluent water.
- 11) What are substances flowing into the Caspian Sea?, if the water pollution occurs in the Caspian Sea. Where are the emission sources?
- 12) What are the substances giving effects on water pollution caused by pollutant

discharged from power plants?

- 13) How many monitoring points are there in the project area? What are measuring method and measured values of quality of bottom deposit? Please provide the summary for :
- a. Location of the monitoring points on a map
 - b. COD, ignition loss, particle size , total sulfide, others
- 14) Is there any Environmental Protection System in the power plant?
If so, please describe outline of the system.

8. The Social Environment

- 1)
 - a. What is the number of people to be resettled, plan of resettlement and compensation?
 - b. Do you have any history or experience of resettlement? Please state the problems if any.
 - c. How is the land of the project area used? Who owns the land?
- 2)
 - a. Where and how many aborigines, minorities, former residents live within and near the project area?
- 3)
 - a. What kind and how many public facilities (hospitals, schools, etc.) exist within and near the project area?
 - b. How are the drinking water facilities and sewage systems provided in the area?
 - c. Does the project area have any history of epidemic diseases?
 - d. What is the restriction and standard for industrial waste disposal?
- 4)
 - a. Is there any law and restriction for land filling, reclamation? If so, please describe them.
 - b. What is the procedure of rights in case of land filling, reclamation ?
 - c. Is there any law for compensating the economic activities?
Please provide any case which has compensation record.
- 5)
 - a. What is the future development plan for the project area?
 - b. Do you have any statistical data of the economic activities of the project area?
- 6)
 - a. Is there any historic or cultural site within and near the project area?
If so, please describe them.
- 7) Is there any landscape that is important from the point of tourism and/or religion?
If so, please describe them.

9. The Natural Environment

- 1)
 - a. Is there any precious nature such as wetlands stipulated in the Ramsar Convention in the project area? If so, please describe them.
 - b. Is there any district where national parks and natural parks are located? If so, please describe them.
 - c. Is there any precious fauna and flora within and near the project area? If so, please describe them.
- 2)
 - a. Do you have the geographical and geological data within and near the project area?
 - b. Do you have any biological map and data?
- 3)
 - a. Do you have any water resources data?
 - b. How is the ground water used?
 - c. Do you have any restriction for using ground water?
- 4)
 - a. Do you have any data of the Caspian Sea condition including the sea current and sand flow?
- 5)
 - a. Is there any meteorological data in the project area?
 - b. Is there any air pollution in the project area?
- 6)
 - a. Is there any data of water quality and temperature of the rivers and the Caspian Sea around the project area?
 - b. Is there any water pollution in the project area?
- 7)
 - a. Is there any soil contamination in the project area?
 - b. Is there any standard for soil contamination?
- 8)
 - a. Is there any noise and/or vibration problem in the project area?
 - b. Is there any standard for noise and/or vibration control?
- 9)
 - a. Is there any offensive odor problem in the project area?
 - b. Is there any standard for offensive odor control?

10. Topographic Maps Covering Project Area Are Needed For The Study.

scale 1: 25000, 1: 50000, 1: 250000

11. Geographical Maps Covering Project Area Are Needed For The Study.

scale 1: 50000, 1: 100000, 1: 250000

12. Others

- 1) Are there environmental engineering consultants companies in I.R. IRAN?

RESPONSE TO:

**QUESTIONNAIRE
ON
AN EVALUATION OF ENVIRONMENTAL EFFECTS
OF POWER PLANTS IN NORTH AND NORTHWEST
AREA OF I. R. IRAN**

1. The 2nd National Five Year Plan

1-1. Please provide the 2nd national five year plan of I.R. Iran:-

The 2nd. National Five-year Plan of I.R.IRAN is written in Persian and it consists of many pages. If the study team clearly mention as what part is most useful to the project we can go ahead with specific translation of particular parts.

2. Environmental Sector Development Plan

2-1. What is development policy of environmental sector?

In the 2nd National Five-year Plan of I.R. IRAN more attention has been paid to environmental aspects. Protection of environment is among one of the Constitutional Laws (50th article).

2-2. It is understood that the goal of Department Of Environment (DOE) In the Ministry Of Energy (MOE) is to evaluate the environmental impacts of energy sector and prepare proper mitigation plans, what are the concrete targets and its position in the 2nd five year plan of I. R. Iran?

The authority of Ministry of Energy are well familiarized with the importance of environmental protection as well as concepts of sustainable development . Thus , Dept. of Env. in the MOE was established in 1994. The major goals of this Dept. is :

a) Analysing environmental pollution of power plants and recommending mitigation plans and,

b) *Editing guidelines for preparation of EIA of future power plants.*

2-3. Please describe a relationship between Environmental Protection Organization (EPO) and DOE of MOE especially in environmental affairs?

Institutionally Dept. of Env. of MOE is under direct supervision of Deputy Minister for Energy. However, DOE of MOE follows the guidelines/roles of Environmental Protection Organization (EPO). Construction and utilization of power plants are among MOE's responsibilities. Therefore, the responsibility of preparation of EIA for such projects is born by MOE. The EPO is responsible for general supervision and preparation of environmental policies.

2-4. Please attach administrative organization on environmental and proceeding flow chart.

It is presented as annex.

3. On The Terms Of Reference Of The Proposed Study Made By I. R. Iran Side

3-1. It is necessary for you to clear up the present situation of the power plants and plans for the future of power plants to carry out environmental impact assessment (EIA) in future. JICA Study Mission will request these data of the power plants.

All characteristics of power plants located all over Iran is presented as table in the annex.

3-2. Has it been shaped up for a scale, location and time of a coal firing thermal power plant to be seeded in the planning stage?

Yes. one foreseen in Minoo- Dasht of Province of Mazandaran and the other in Tabas (Province of Khorasan). Utilization of these power plants will likely start in the year 2006.

Tabas Power Plant and Minoo-Dasht Power Plant will Produce 1500 and, 700-900 MW/Yr. respectively.

3-3. Do you have analytical data for coal to be used in the above coal firing thermal power plant?

No. Official data has not been published but the coals of Tabas contains high sulphure.

3-4. What is priority order for the power plants listed in the TOR for carrying out the EIA?

The first priority is Tabriz and Neka Power Plants in the Tabriz and Mazandaran Provinces. But it is expected that Iranian team get familiarized with the methods of EIA preparation and extending it to the other power plants in Iran.

4. Environmental And Ecological Conservation Regulation

4-1-1. Do you have the law/regulations/guidelines on Environmental Impact Assessment (EIA)?

In 1995, EPO prepared a guideline for preparation of EIA. These guidelines are gathered and translated from foreign books. So far, its contents has not been used for preparation of EIA and its compatibility with the environment of Iran is not known yet.

4-1-2. What ministry or agency is responsible for the assessment?

EPO is responsible to provide the industries with guidelines of EIA preparation. Each industry must prepare his own EIA and submit it to EPO for the final approval.

4-2. Do you have the law which regulates the environmental quality standard(s) and who has a responsibility for the environmental monitoring?

EPO has prepared standards for effluents and emission. These standards are given to industries by EPO. Further, EPO is not involved in design of treatment plant and only looks into the quality of outlets (effluents/emmissions).

4-3. Do you have the law which regulates the effluent/emission standards and responsibility for monitoring effluent/emission?

EPO is responsible for monitoring. Standards for effluents and emission are available. We can provide these standards to the study team in the course of execution of project.

4-4. Do you have the law which regulates the industrial waste disposals?

Though I. R. Iran has ratified the BASEL Convention, it still does not possess law on industrial waste disposal. In many cases, industrial wastes are being disposed off along with municipal wastes in a common dumping site.

4-5. Do you have the law which regulates noise and vibration control?

There is not such a law. However, in the recent years more studies have been carried out on the noise pollution by some universities (e.g. Faculty of Environment, The University of Tehran).

4-6. Do you have the law which regulates the environmental conservation?

The 50th article of the constitution, law of reconstruction of environment, Law of hunting and fishing, Law of reception of some of governments income and its utilization for certain aspects, Announcement 13 of the first cultural-social-economical development law of I.R. IRAN, industries should pay 0.001% of their sales products for the protection of the environment. This amount would be spent under supervision of the EPO. Other laws could be summarized as follows.

4.6.1. Protection of sea and boundary rivers from oil pollution

4.6.2. Protection and utilization of forests

4.6.3. Illegal fishing in the Persian Gulf and Caspian Sea

4.6.4. Proper distribution of water

4.6.5. Extensive punishment of smugglers of weapons

4.6.6. Maritime locations of IR IRAN in the Persian Gulf and the Sea of Oman

4.6.7. Formation of a committee for the reduction of natural disasters damages

4.6.8. Formation of executive committee of oceanography

4.6.9. Formation of executive committee of environmental protection according to the second article of the protection and reconstruction of the environmental law.

- 4.6.10. *Executive regulation of hunting and fishing*
- 4.6.11. *Regulation for natural parks and exclusive places*
- 4.6.12. *Executive regulation of protection and reconstruction of environment*
- 4.6.13. *Regulation of the committee of environmental protection about national parks, natural features and wildlife habitats and also the protected areas*
- 4.6.14. *Regulations for the protection of the air pollution*
- 4.6.15. *Regulation for the protection of water pollution*
- 4.6.16. *Decree of council of ministers about the settlement of the industries
in the Province of Gullan and Mazandaran*
- 4.6.17. *Regulations for shifting the pollutant industries from Tehran*

5. International Convention On Environmental Conservation

5-1. Please give the name(s) of the convention(s) on natural conservation and environmental protection affiliated or ratified and the date(s) of affiliation or ratification.

- 5.1.1. *UNEP 1977*
- 5.1.2. *IUCN 1990*
- 5.1.3. *Convention for important wetlands (especially habitat wetlands for birds) 1972*
- 5.1.4. *Convention on international commerce of plant species as well as wild animals and plants that are subjected to the distinction 1973*
- 5.1.5. *Vien convention on protection of the ozone layer 1985*
- 5.1.6. *Convention on the transboundary of hazardous wastes 1989*
- 5.1.7. *Convention on the regional organization for the protection of marine environment 1978*
- 5.1.8. *South Asia Programme for environmental cooperation 1990*
- 5.1.9. *IWRB 1925*

5-2. How is the situation on the programme for the environmental conservation in the coastal countries of the Caspian Sea?

In the recent years, un-planned utilization from resources of the Caspian Sea has awoken the countries bordering the Caspian Sea. several

meeting were held among these countries for proper utilization and pollution prevention but so far, no positive action has been made to save the Caspian Sea. Lots of pollutants is being carried into the Caspian Sea via rivers, but the amounts of these pollutants has not been estimated. Thus, the share of each country in polluting the Caspian Sea can not be brought out. However, only some 10% of water balance of the Caspian Sea comes from Iranian rivers and besides ex-Russia is more industrialized than Iran. Therefore, more pollution must reach the Caspian Sea via northern coasts. It is said that due to sea level rise in the Caspian Sea, the landfill of atomic wastes of power plant of Kazakestan has been submerged.

6. Environmental Pollution in the Project Area (Guilan, Mazandara and Azerbaijan provinces)

6-1. What kind of exhaust substance is identified, such as sulfur oxides, nitrogen oxides and carbon gas, etc. including substance that future generation is to be prospected, for giving effects on ambient air quality and water quality in the project area?

So far, differentiation of NO_x, SO_x, and CO₂ has been only made for metropolitan cities. No comprehensive studies has been carried out on power plants. Dept. of Env. of MOE has determined the amount of air pollutants by converting factors (fuel into the pollutants) for power plants. Such determination can not be accurate as the efficiency of the power plants can greatly influence the amounts of pollutants. The theoretical amount of pollution is given in a table (Annex).

7. Environmental Protection System In Power Plants

7-1. Are there emission and effluent standards stipulated by law for power plants? If so, please provide the emission and effluent standards.

The standards that are provided by EPO encompassess all industries including power plants. Therefore, you are referred to paras 4-2, 4-3, 4-4 and 4-5.

7-2. On the thermal power plants in the project area, please describe the following items:-

7-2-1. Kind of fuel, consumption of fuel, heat value, fuel composition including sulfur, nitrogen, etc.

During the stay of study team these items were prepared for Neka, Tabriz and Combined cycle of Guilan (Rasht) power plants and were handed over to the Japanese research team. These are the three major power plants in the study area, thus similar information will be provided for other power plants during the execution of project.

7-2-2. Height and inner diameter of top of stack(s) in meter.

As 7-2-1.

7-2-3. Data for flue gas, such as amount, temperature, and SO₂, NO_x, etc..

As 7-2-1 and 7-2-2.

7-2-4. Analytical determination for industrial waste water in the power plant.

Normally the power plants in Iran are not equipped with flue gas determination facilities. Therefore, such information are not available.

7-2-5. Is there a public water sewage treatment facility in the vicinity of power plant?

No.

7-2-6. Water for use in plant for electric generation and others such as living

In coastal areas the main sources of water include ground and surface waters. In Tabriz, the cooling water comes from ground waters. In neka power plant, the cooling water comes from the Caspian Sea.

7-2-7. On the steam type-power plant, type of boilers, generation, cooling water, type of cooling water, amount, temperature difference between intake and outflow water.

In the questionnaire that was handed over to the study team of JICA, the temperature difference for inlet and outlet waters of Neka power plant is mentioned to be 2^oC. However, according to the latest information that DOE of MOE has obtained (through a research paper) the temperature

difference is found to be 6 to 11⁰⁰ in different seasons. The mortality of fish in the outlet channels is about 360 pieces of fish per hour.

7-2-8. On the gas type power plant, type and output of gas turbines, type and capacity of generations, etc...

Please refer to para 7-2-1.

7-2-9. On the industrial waste treatment, what is the procedure to manage the industrial waste in the power plants?

There is no comprehensive procedure to manage the waste in the power plants.

7-3. On the hydro power plant in the project area what are the most dominant problems of the existing power plants?

High sedimentation rate and also prevention from fish hatching are among the major problems associated with hydro power plants. With respect to Sefid Rud hydro power dam, occurrence of earthquake has created a crack in the dam which is renovated.

7-4. How is the situation of pollution control facilities installed in power plants? If you have any pollution control facilities at present, please describe name of facilities, efficiency, and date of installation of each power plant.

There is no facilities for pollution control in the power plants of study area.

7-5. If you have no pollution control facility at present, do you have any plan to install in future?

There is none. However, it is hoped that after execution of present study and clarification on the importance of pollution control facilities for the environmental protection and sustainable development, the authorities pay more attention to environmental concerns and subsequently do the needful.

7-6. How many ambient air monitoring stations are there in around the power stations?

None.

7-6-1. Number of the monitoring stations:

None.

7-6-2. Location of the monitoring stations on a map

Not relevant.

7-6-3. Parameters for monitoring:

None.

7-6-4. What agency is responsible for monitoring?

EPO.

7-6-5. Starting year/month of monitoring:

Not relevant.

7-7. What are measuring method and measured values of ambient air monitoring parameters?

Usually EPO follows standard methods of EPA of U.S.A. in metropolitan cities.

7-8. Does water pollution or ground water pollution occur around the ash and sludge treatment facilities or pond?

No information is available.

7-9. Are there places where water quality is monitored?

Seasonally monitoring is being carried out by EPO on some specific rivers.

7-9-1. Places where water quality is monitored:

No river has been monitored in the vicinity of power plants.

7-9-2. Number of the monitoring stations

It depends on river length. However, 3-5 points is practiced.

7-9-3. Location of the monitoring stations on a map

Please, refer to para 7-9-1.

7-9-4. Monitoring parameters

Usually BOD, Do, pH, Ec and anions and cations.

7-9-5. Monitoring frequency

Seasonally.

7-9-6. Starting year/month of monitoring

In some river more than a decade and in some other rivers in the recent years.

7-9-7. What agency is responsible for effluent/environment monitoring?

EPO.

7-10. What are measuring method and measured values of ambient water and effluent water monitoring parameters?

Since most of sewages and industrial effluents find their way into the Caspian Sea via rivers (sometimes with a limited treatment and sometimes without any treatment) it is expected that all sort of chemical and biological substances to be present in the Caspian Sea. However, the amount of these pollutants are not evaluated.

7-11. What are substances flowing into the Caspian Sea? If the water pollution occurs in the Caspian Sea, where are the emission sources?

Major pollutants that are released by power plants include those chemicals which are used for corrosion control or stopping growth of algae in the cooling systems.

7-12. What are the substance giving effects on water pollution caused by pollutants?

No.

7-13. Are there bottom deposit monitoring points in river or Caspian Sea near the project area?

No.

7-14. Is there any other Environmental Protection System in the power plant?

No.

8. The Social Environment

8-1-1. Do you have any history or experience of resettlement in the project area?

There was some resettlement after occurrence of Guilan's earth-quake in 1991. However, it was not followed with serious problems.

8-1-2. How is the land of the project area used? Who owns the land?

In connection with lands in the vicinity of Neka power plant it should be pointed out that most of the lands are being used for agricultural activities. Myan-Kaleh protected area is also located in the project area. The surrounding lands around other power plants consists of agricultural and residential lands. In Tabriz many industries are located around the power plant. Therefore, the lands are owned by farmers, industries and people.

8-2-1. Where and how many aborigines, minorities, former residents live within and near the project area?

It is possible to provide the study team with appropriate statistics but the area of power plants should be indicated by study team (i.e., we have to know as what diameter around power plant or how many square kilometer is to be considered).

8-3-1. What kind and how many public facilities (hospitals, schools, etc) exist within and near the project area?

Please, refer to para 8-2-1.

8-3-2. How are the drinking water facilities and sewage system provided in the area?

We need more time to collect necessary information.

8-3-3. Does the project area have any history of epidemic diseases?

No. However, in Ramsar (province of Mazandaran) some cases of cancer in this region is reported to be due to presence of natural radioactive minerals. In 1995, cholera was reported in a few places around Tabriz which was instantly controlled by the Government.

8-3-4. What is the restriction and standard for industrial waste disposal?

So far, no standards has been published/announced for industrial waste disposal. Therefore, it seems that there is not any serious restrictions.

8-4-1. Is there any law and restriction for landfilling, reclamation?

No.

8-4-2. What is the procedure of rights in case of landfilling, reclamation?

None.

8-4-3. Is there any law for compensating the economic activities?

There is. The amount of compensation will be evaluated in the court of law. We have not any access to case studies.

8-5-1. What is the future development plan for the project area?

The required information will be obtained from Organization For Budget And Planning and they will be handed over to the study team in the course of execution of project.

8-5-2. Do you have any statistical data of the economic activities of the project area?

Please, refer to para 8-5-1.

8-6. Is there any historic or cultural site within and near the project area?

There are a few old mosques in the vicinity of power plants of Mazandaran province. In Tabriz, there are many old mosque in and around the city. If we are provided with exact zone (based on the interest of the research team) we can furnish more accurate information.

8-7. Is there any landscape that is important from the point of tourism and or religion?

From point of view of tourism the two provinces of Guilan and Mazandaran are important. Usually, many people spend their vacations in the two mentioned provinces.

9. The Natural Environment

9-1-1. Is there any precious nature such as wetlands stipulated in the Ramsar Convention in the project area?

Protected area of Myan-Kaleh is close to Neka power plant. This is a wild life protected area.

9-1-2. Is there any district where national parks and natural parks are located?

There are many natural and national parks in the area of study, for instance the Gulestan Park in the province of Mazandaran.

9-2-1. Do you have the geographical and geological data within and near the project area?

Yea. Please, see enclosed maps.

9-2-2. Do you have any biological map and data?

No.

9-3-1. Do you have any water resources data?

Yes, we have the statistics of surface and ground waters. We can provide these data if needed.

9-3-2. How is the ground water used?

In the coastal zones where the ground water are either contaminated by salt water or seepage of sewage, the waters are used for agricultural activities. In other region of the study area, they are being used as a source of drinking water, agricultural and industrial activities.

9-3-3. Do you have any restriction for using ground water?

Considering the low potential of water in Iran and also inadequate use of ground waters in the past, the regional organization for water supply has placed some restriction in connection with ground water utilization. Even in some arid area water has been injected into the aquifer to reclaim the pathways of ground waters.

9-4. Do you have any data for the Caspian Sea condition including the sea current and sand flow?

We have collected over 300 abstract dealing with different aspects of the Caspian Sea. It is present in Annex. We have some restriction to obtain the papers, therefore, we suggest the study team to obtain the research papers through their on-line computer communications.

9-5-1. Is there any meteorological data in the project area?

Yes. These data can be translated and given to the study team at an appropriate time.

9-5-2. Is there any air pollution in the project area?

No air pollution has been reported by any organization and also there has not been any complain by people. However, air pollution is evident in Tabriz.

9-6-1. Is there any data of water quality and temperature of the rivers and the Caspian Sea around the project area?

So far, we have obtained a research paper reporting temperature difference for Neka power plant. It is reported that the temperature difference between intake water and outlet water to be 6 to 11^oc in different seasons. In this report, BOD, COD, DO and trace metals are also presented which are within normal range.

9-6-2. Is there any water pollution in the project area?

To answer this question we have to collect samples and analyse different chemical, physical and biological parameters.

9-7-1. Is there any soil contamination in the project area?

As 9-6-2.

9-7-2. Is there any standard for soil contamination?

No.

9-8-1. Is there any noise and/or vibration problem in the project area?

No.

9-8-2. Is there any standard for noise and/or vibration control?

No.

9-9-1. Is there any offensive odor problem in the project area?

No.

9-9-2. Is there any standard for offensive odor control?

No.

10. Topographic Maps Covering Project Area are needed for the study area (scale, 1:25000, 1:50000, 1:250000)

We have undergone the necessary formalities and in the near future this map will be obtained and dispatched to the study team.

11. Geographical Maps Covering Project Area are needed for the study area (scale, 1:50000, 1:100000, 1:250000)

We have undergone the necessary formalities and in the near future this map will be obtained and dispatched to the study team.

12. Others

12-1. Are there environmental engineering consultants companies in I. R. Iran?

Yes, in recent years the numbers of environmental engineering consultants has increased considerably. In the past, environmental engineering consultants had mainly focused on treatment plants of municipal sewage. However, in recent years such activities has been extended to industrial sectors too.

Annex. 1

Tables

Number	Name of Power Plant	Installation Site	Manufacturer	Establishment	Capacity	No. of	Gas-oil	Naphta	Gas x 1000	Heat value	Efficiency	Power generation
1	Shahid Firozji Besat	Tehran	General Eic.	1966	25	2	0	0	3684	4219	20.38	8
2	Montazar Oaem Combined cycle	Tehran	K. V. Union	1974	120	2	8874	0	188095	3536	24.32	532
3	Rey	Karaj	John Brown	1982	696	6	16065	0	660549	2903	29.63	2225
4	Tabriz	Rey	Ask, Hitachi, Fiat, Mitsubishi	1978	1243	40	50624	0	759367	3907	22.01	1977
5	Kermanshah	Tabriz	Fiat	1978	64	2	4758	0	23356	5982	14.38	45
6	Sulfan	Kermanshah	Ask	1977	64	2	24471	0	0	4538	18.95	50
7	Gulfan Combined cycle	Tabriz	A. E. G.	1985	16	4	50360	0	0	3070	22.22	120
8	Shahid beheshti	Rasht	Siemens	1992	862	6	14821	0	863424	2939	29.25	2853
9	Rasht	Lushan	K. V. Union	1977	120	2	0	0	79486	3366	25.4	224
10	Neka	Rasht	Hitachi	1977	24	1	4556	0	70501	4305	19.61	163
11	Bushehr	Neka	K. V. Union	1990	275	2	291	0	199780	2982	28.84	571
12	Islam Abbad	Bushehr	Alstom, Hitachi	1974-1976	166	7	108608	0	0	4537	18.95	221
13	Shahid Mad-Haj	Esfahan	Alstom, Hitachi	1973	41	2	86	0	6430	2197	39.13	28
14	Uromieh	Uromieh	Ask	1975	96	3	0	0	59789	3783	22.73	151
15	Shiraz	Uromieh	Brown Baveri	1981	60	2	34686	0	0	4968	19.69	73
16	Abadan	Shiraz	Fiat, Brown Baveri, K. V. U.	1967-1981	186	8	970	0	486389	4402	19.53	1079
17	Bandar Abbas	Abadeh	?	?	23	3	0	0	0	0	0	0
18	Oom Combined cycle	Bandar Abbas	Alstom	1973-1976	46	2	127	0	13103	4564	18.84	25
19	Shahid Zandbag	Oom	Mitsubishi	1993	512	4	28096	0	513011	2828	30.41	1875
20	Dorood	Yazd	Alstom	1979	95	4	13200	0	0	3981	21.6	31
21	Hesa	Dorood	Brown Baveri	1977	60	2	19617	0	0	4975	17.28	36
22	Kazeron Combined cycle	Shahin Shahr	United Technology	1989	98	3	15529	0	7683	4652	18.48	47
23	Shahid Rajaei Combined cycle	Kazeron	Mitsubishi	1994	256	2	20007	0	77082	2952	29.13	312
24	Lamard	Gazvin	John Brown	1994	640	5	2481	0	114077	2902	29.63	384
25	Ashkanan	Lamard	?	?	6	5	3744	0	0	9333	9.32	4
26	Juyam	Ashkanan	?	?	3	2	2865	0	0	9228	9.32	3
27	Bayram	Juyam	?	?	2	1	978	0	0	9232	9.32	1
28	Mash-had	Bayram	?	?	2	1	2394	0	0	9215	9.32	2
29	Shirvan	Mash-had	Alstom, Brown Baveri, AEG	1974-1983	219	5	2681	0	334333	3814	22.54	753
30	Shariat	Shirvan	AEG	1985	142	6	1263	0	141670	4026	21.36	302
31	Qaen	Mash-had	Hitachi	1985	142	6	810	0	129413	4013	21.43	276
32	Toos	Mash-had	John Brown	1994	256	2	254	0	32316	3197	29.9	97
33	Chahbahar	Qaen	Hitachi	1986	71	3	139434	0	0	3836	22.42	335
34	Zahedan	Mash-had	Subzer	1977	8	1	0	0	0	0	0	0
35	Kish	Chahbahar	Alstom	1978	142	6	120475	0	0	4604	18.68	242
36	Kish	Zahedan	Hitachi	1987	71	3	143683	0	0	3802	22.62	349
37	Total	Kish	Alstom	1991	75	2	30348	0	0	4869	17.56	58
	Total				7007	159	867113	0	4773518	mean=3481	mean=24.7	15402

Specifications of Steam Power Plants in Iran

Number	Name of power plant	Installation site	Manufacturer	Establishment year	Capacity MW	No. of Units	Gas-oil x 1000 L	Naphta x 1000 L	Gas x 1000 cubic meter	Heat value	Efficiency %	Power generation x1000 MWh
1	Shahid Firouzi	Tehran	Aistourm	1959	50	4	0	0	87316	3741	23	223
2	Besat	Tehran	General Elec.	1968	247	2	3409	146332	136208	2758	31	1010
3	Shahid Montazar Qaem	Karaj	General Elec.	1971	626	4	8775	979799	0	2601	33	3769
4	Eslam Abad	Esfahan	J. I. E.	1980	835	5	2242	824812	328436	2252	38	5038
5	Shahid M. Montazeri	Esfahan	Technoprom	1989	800	4	3054	1378131	0	2599	33	5272
6	Shahid Beheshti	Lushan	K. V. Union	1972	240	2	196	0	415595	2428	35	1636
7	Neka	Neka	Brown Baven	1981	1760	4	731	596287	1897535	2440	35	9047
8	Ramin	Ahwaz	Technoprom	1983	945	2	0	0	1180597	2187	39	5158
9	Shahid Madhaj	Ahwaz	J. I. C.	1975	290	2	0	0	345587	2382	36	1386
10	Bandar Abbass	Bandar Abbass	J. I. E.	1985	1280	4	927	241553	1440317	2217	39	6613
11	Zarand	Kerman	Spin Batin U.	1973	60	2	0	54298	0	3699	23	146
12	Tabriz	Tabriz	Aistourm	1989	736	2	974	891762	0	2563	33	3457
13	Shahid Rajaiei	Qazvin	Mitsobushi	1992	1000	4	105	483108	634678	2255	38	4814
14	Siston	Kermanshah	J. I. E.	1994	640	2	0	261705	0	2493	34	1042
15	Hamedan	Hamedan	Mitsobushi	1994	500	2	612	0	188333	2287	38	789
16	Mash-had	Mash-had	Elin Eshkoda	1974,1968	113	3	863	1163	219321	2867	30	658
17	Toos	Mash-had	Brown Baveri	1986	600	4	8611	28508	893443	2401	36	3318
	Total				10742	54	30499	5887458	7767356	mean=2490	mean=34	53376

The Theoretical Estimation of Azabaijan Province Power Plants Emission

Name of power plant	SO2 Ton/yr	SPM Ton/yr	NO2 Ton/yr	HC Ton/yr	HCHO Ton/yr	CO Ton/yr	SO3 Ton/yr	Other organics Ton/yr
Tabriz steam power plant	31.82	0.68	7.03	0.22	0.04	0.003	0.49	
	47856	1015	10567	325.3	61.18	4.08	731	
Tabriz gas power plant	505.6	1073	111.6	3.44	0.65	0.04	7.72	
	0.25	9.25	240.4		0.62			1.85
Sufian Gas power plant	2509	53.3	554.1	17.06	3.21	0.21	38.34	
Uromieh gas power plant	1583	33.6	349.6	10.76	2.02	0.14	24.18	
Total	52485.7	2184.83	11829.7	356.78	67.72	4.473	801.73	

The Theoretical Estimation of Guilan Power Plants

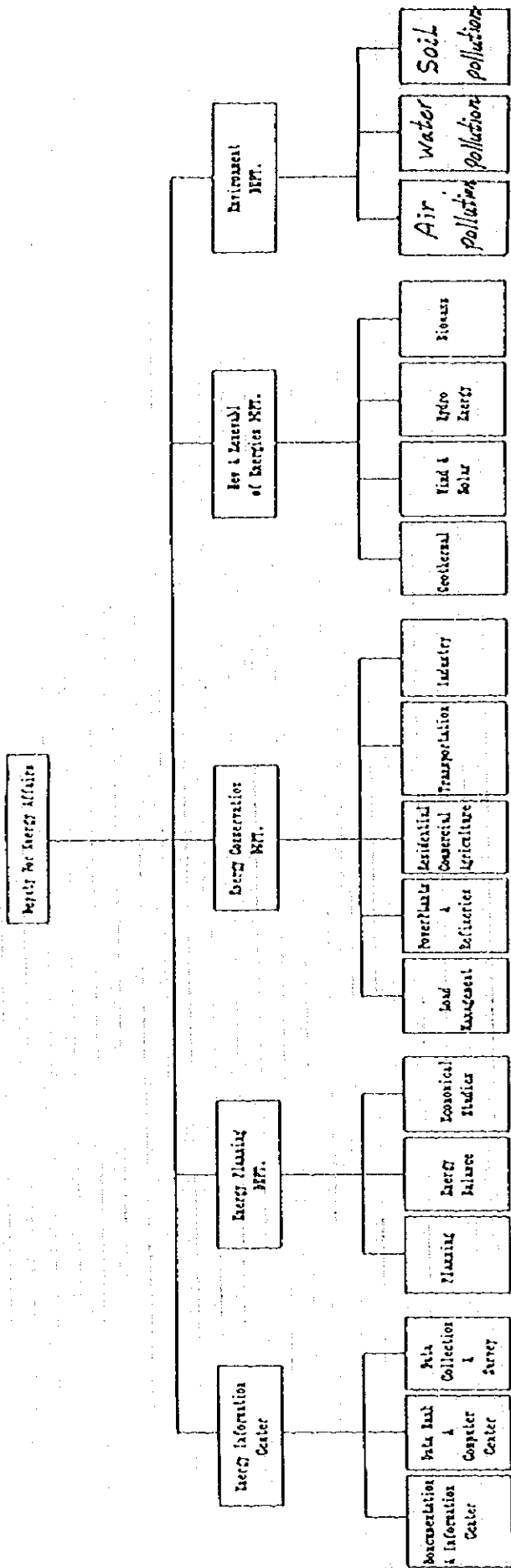
Name of power plant	SO2 Ton/yr	SPM Ton/yr	NO2 Ton/yr	HC Ton/yr	HCHO Ton/yr	CO Ton/yr	SO3 Ton/yr	Other organics Ton/yr
Beheshti steam power plant	12.58	0.27	2.78	0.09	0.017	0.001	0.19	
Guilan combined cycle power plant	2.76	103.35	2687.2		6.89			20.67
Beheshti gas power plant	5.15	193	5018		12.87		0.012	38.6
Rasht gas power plant	0.39	14.5	377.2		0.97			2.9
	8.87	0.19	1.96	0.06	0.01	0.001	0.14	
	0.32	11.85	308.2		0.79			2.37
Total	30.07	323.16	8395.34	0.15	21.547	0.002	0.342	64.54

The Theoretical Estimation of Neka Power Plant Emissions

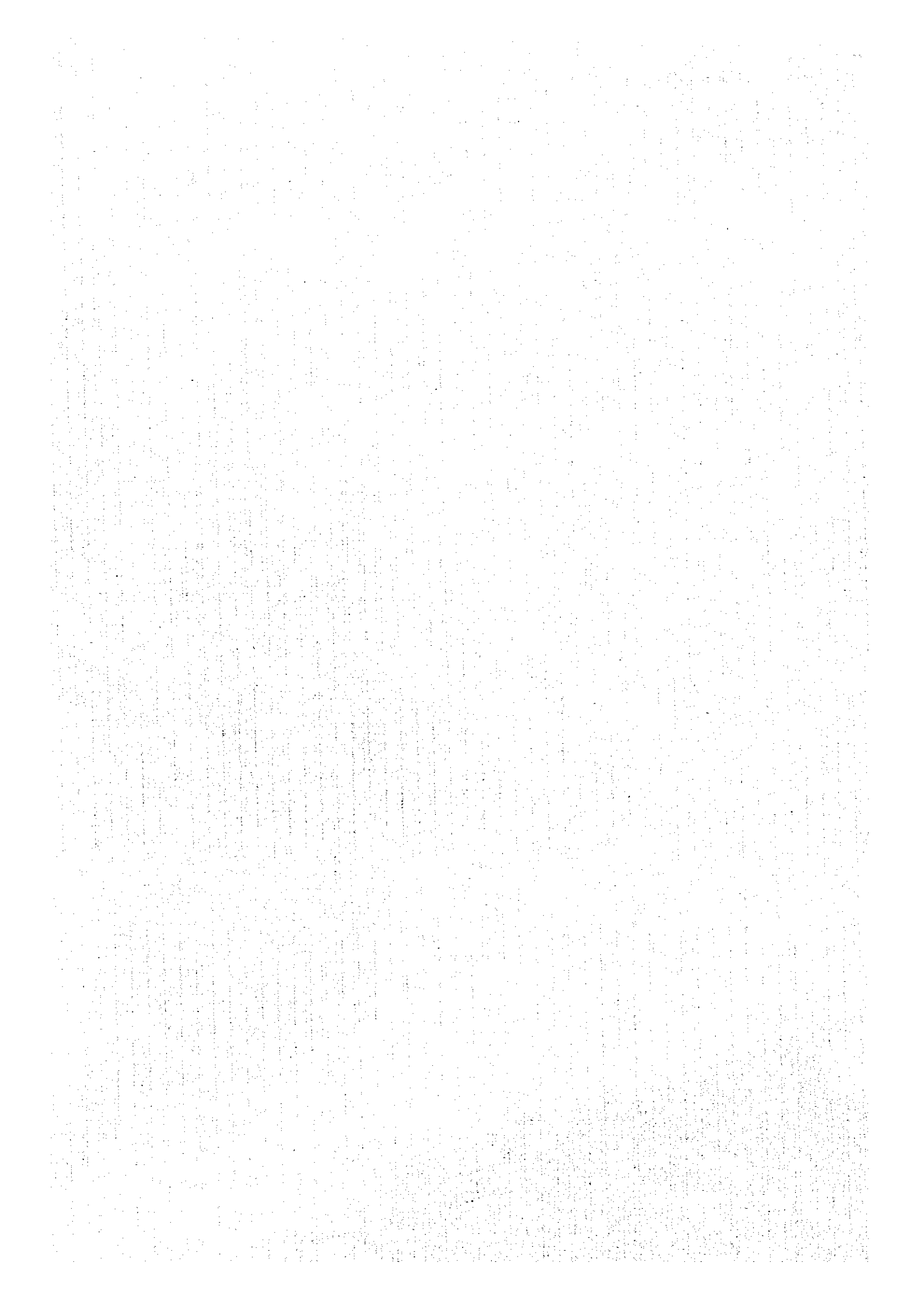
Name of power plant	SO ₂ Ton/yr	SPM Ton/yr	NO ₂ Ton/yr	HC Ton/yr	HCHO Ton/yr	CO Ton/yr	SO ₃ Ton/yr	Other organics Ton/yr
Neka steam power plant	82.84	1.76	18.3	0.56	0.11	0.007	1.265	
	48619	1031.7	10736	330.45	62.15	4.14	742.73	
	10	374.5	9737		24.97			74.9
Neka gas power plant	21.64	0.46	4.78	0.15	0.03	0.002	0.33	
	2.8	105.2	2736		7.02			21
Total	48736.3	1513.62	23232.1	331.16	94.28	4.149	744.325	

Development of Power Generation in The IInd five Year plan of Iran

Number	Province	Hydropower	Steam	Gas	Combined Cycle	Total Increment MW
1	Tehran	0	0	0	605	605
2	Markazi	0	650	0	0	650
3	Guilan	0	0	0	450	450
4	Mazandaran	0	0	0	140 Neka	140
5	E. Azarbaijan	0	650	0	0	650
6	W. Azarbaijan	0	0	0	299	299
7	Ardebil	0	0	0	0	0
8	Kermanshah	0	0	0	0	0
9	Khozestan	1633	945	0	0	2578
10	Fars	0	0	0	792	792
11	Kerman	0	0	0	590	590
12	Khorasan	0	0	0	792	792
13	Esfahan	0	800	0	0	800
14	Sistan & Baluchestan	0	256	0	0	256
15	Kordestan	0	0	0	0	0
16	Hamiedan	0	500	0	0	500
17	Charmahal & Bakhtiari	0	0	0	0	0
18	Lorestan	0	0	0	0	0
19	Ilam	0	0	0	0	0
20	Kohkiloyeh	0	0	0	0	0
21	Bushehr	0	0	0	0	0
22	Zanjan	0	0	0	0	0
23	Semnan	0	0	0	0	0
24	Yazd	0	0	0	0	0
25	Hormouzzgan	0	0	0	0	0
	Total	1683	3801	0	3668	9152



資料 8



資料 8. 要請書

**Application for the
Technical Cooperation (Development Study)
by the Government of Japan**

1. Project digest

(1) **Project Title:** -Evaluation of environmental effects of power plants in north and north-west area of I.R. IRAN

(2) **Location:** -Guilan, Mazandaran and Azerbaijan provinces

(3) **Implementing Agency:**

-Name of the Agency: -Ministry of Energy Deputy Minister for Energy Affairs

-Organization chart: -Attached (see appendix A)

(4) **Justification of the Project**

-Present condition of the sector: -In the past year, lots of changes was adopted in this sector for the attention that has been paid to energy sector at various levels of decision making (for instance, the government's parliament). In short, the present condition of the sector could be listed as the followings:

- a) Number of personnels is increased from 5 to 55 staff members within A year. this growth will likely continue.
- b) Recently, some solar energy activities have been formed and generally, this sector will serve as focal point of such activities.

More recently, for establishment of a solar energy power plant with 100 mega watts capacity, some meetings has been held with Germans.

- c) The geothermal Sub-Sector has started its activities. presently, this subsector is working on direct transmission of heat from geothermal point sources to some residential places at Azarbaijan state. It is planned to establish a geothermal power plant with global environment facilities (GEF) collaboration.
- d) More recently, department of environment has been established. The goal of above cited department is to evaluate the environment impacts of energy sector and prepare proper mitigation plans.
- e) Energy sector development study is being presently carried out with the help of World Bank.

-Sectoral development policy of the national/local government: -In the 2nd national five year plan of I.R. IRAN more attention has been paid to environmental aspects.

-Problems to be solved in the sector: -Energy and environmental issues

-Purpose (short-term objective) of the project: -Short-Term objectives include an investigation on the present situation of power plants in the three states of Guilan, Mazandran and Azerbaijan. Evaluation of environmental impact of power plants on the ecosystem of the states as well as southern coasts of Caspian Sea.

-Goal (long-term objective) of the project: -Long-Term objectives could be classified as the followings:-

- * Preparation of strategy plan for site selection of power plants
- * Preparation of mitigation plan for reduction of present adversed effects on environment

-Prospective beneficiaries

- * Sustainable development throught out the country
- * Preservation of environment at national and regional level.
- * Health development of the region
- * Green house gas reduction

(5) Desirable or scheduled time of the commencement of the Project: -DEC 1995

(6) Other relevant Project, if any: Tow projects concerning energy development and air quality control are in hand. The first one look at the environmental issues glancely. The other project objectives is limited and confined to Tehran city only.

2. Terms of Reference of the proposed Study

(1) Necessity/Justification of the Study:

- * So far, such study has not been carried out
- * It has regional importance

Characteristics of power plants in Guilan, Mazandran and Azarbaijan provinces

Power Plant	Type	Capacity (Mega watts)	Location
Shahid-Beheshti	Steam	240	Lushan/Guilan
Shahid-Salmi	Steam	1680	Neka/Mazandaran
Rasht	Gas	44.5	Rasht/Guilan
Guilan *	Gas	814.5	Rasht/Guilan
Sufian	Gas	79	Tabriz/Azarbaijan
Shahd-Beheshti	Gas	104.76	Lushan/Guilan
Shahid-Salimi	Gas	290	Neka/Mazandaran
Uromieh	Gas	49.50	Uromieh/Azarbaijan
Sefid-Rud	Hydro	87.50	Manjil/Guilan
Total		3389.76	

* Combined Cycle

(2) **Necessity/Justification of the Japanese Technical Cooperation:** Japanese have ample experiences in energy sector and environmental issues; therefore, the present proposal could well be benefited by their experts.

(3) **Objectives of the Study:** -It has been explained earlier

(4) **Area to be covered by the Study:** Guilan, Mazandaran and Azerbaijan provinces

(5) **Scope of the Study:** The necessity of any sustainable development (at local, national, regional and international level) list in the environmental protection. Such developments that could harm the human health as well as the ecology of the environment should not be included

in any short and long term objectives. Due to rapid industrialization in Guilan, Mazandaran and Azarbaidjan states, more electricity generations will be required. Considering the fragile ecology of the above cited provinces, such power generations must be environmental friendly.

(6) Study Schedule: It will be presented later

(7) Expected Major Outputs of the Study:

- * Effects of power plants on the environments of provinces of Guilan and Mazandran and Azerbaijan
- * Providing a clear picture for preparation of mitigation plan
- * Providing useful hints for the preparation of strategy plan
- * Providing decision makers with appropriate information for the preparation of environment friendly master plan for future developments.
- * Outlining the required equipment and methodology for pollution control

(8) Request of the Study to other donor agencies, if any: -None

(9) Other relevant information, if any: Such study has not been carried out so far.

3. Facilities and information for the Study Team, etc.

(1) Assignment of counterpart personnel of the implementing agency for the Study (number, academic background, etc.):

- Environmental specialist

a) Air pollution

b) Water pollution

c) Soil pollution

d) Hazardous waste

e) Aquatic

- Hydroelectric specialist
- Thermal specialist
- Energy conservation specialist

Apart from the above qualifications, it is necessary that the outcome and results of this study be comprehended by the related team of Japanese experts.

The estimated staff time is 12 MAN-MONTHS.

4. Global Issues (Environment, Women In Development, Poverty, etc): -Environment

(1) Environmental components (such as pollution control, water supply, sewage, environmental management, forestry, biodiversity) of the Project, if any:

- Pollution control (Air, Water, Soil, Hazardous Waste)
- Water supply
- Environmental Management
- Forestry
- Biodiversity

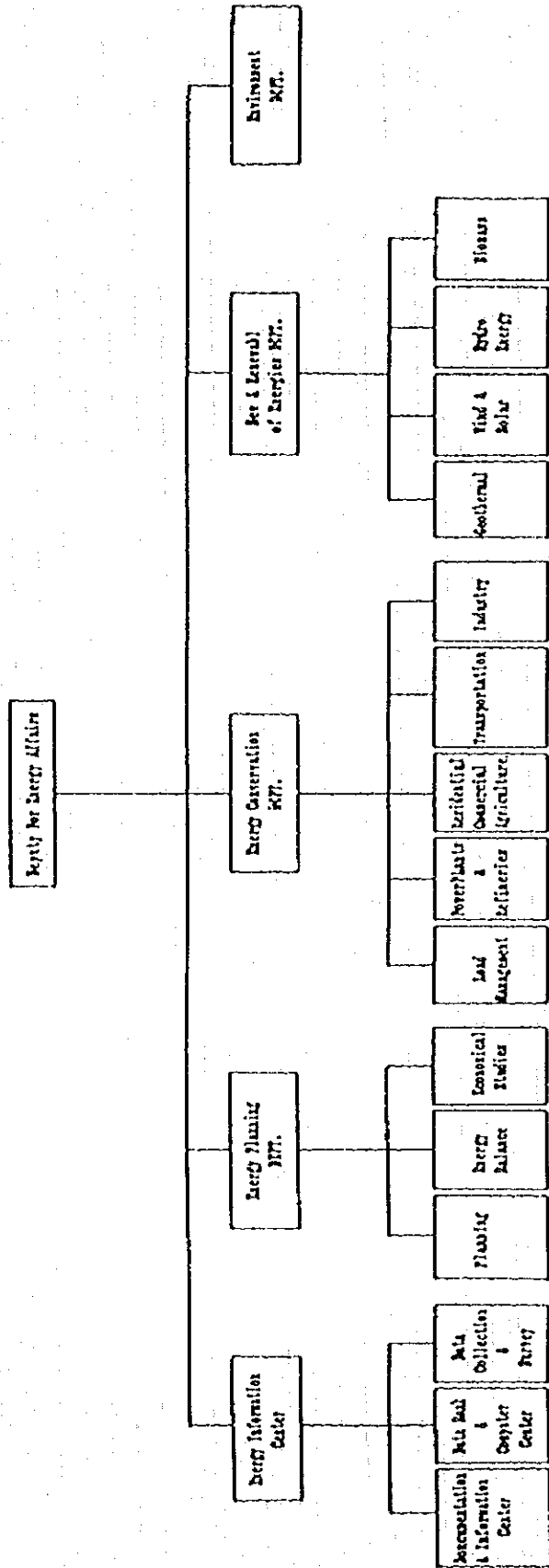
(2) Anticipated environmental impacts (both natural and social) by the Project, if any:

Not only the project does not have any adverse environmental effect, but

it solves many environmental problems.

(3) **Women as main beneficiaries or not:** -The whole society will be benefited from this project-including women.



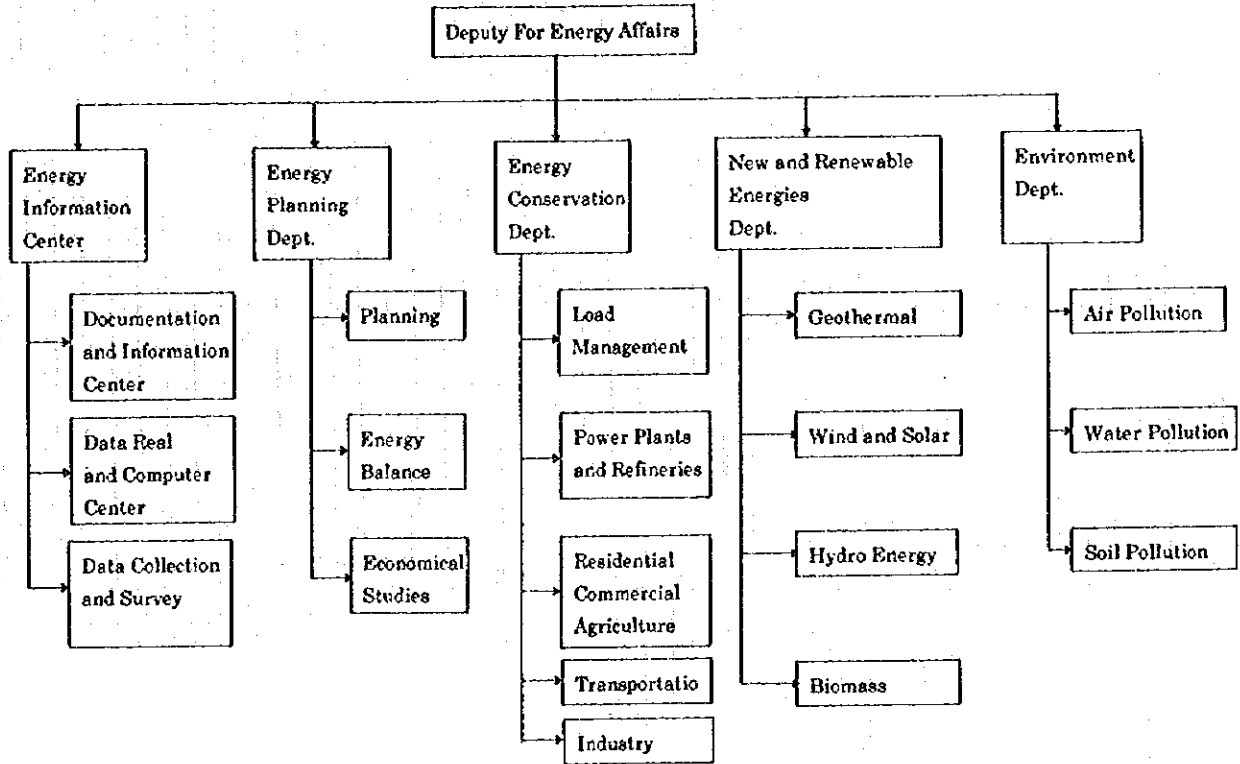


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資料 9

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資料 9. エネルギー省組織図



エネルギー省 (エネルギー担当次官) の組織図

資料 10. USEPA 大気質環境基準

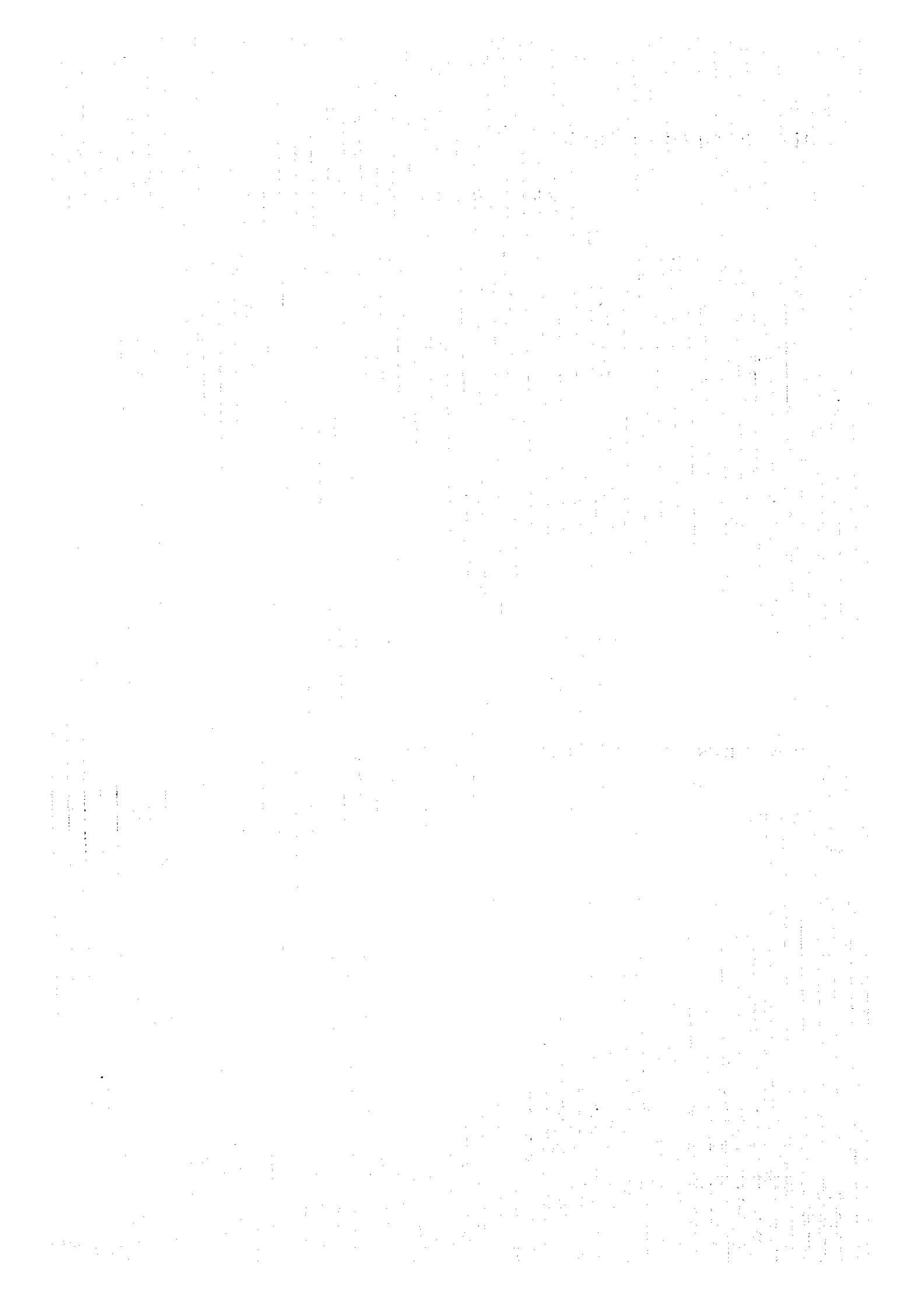
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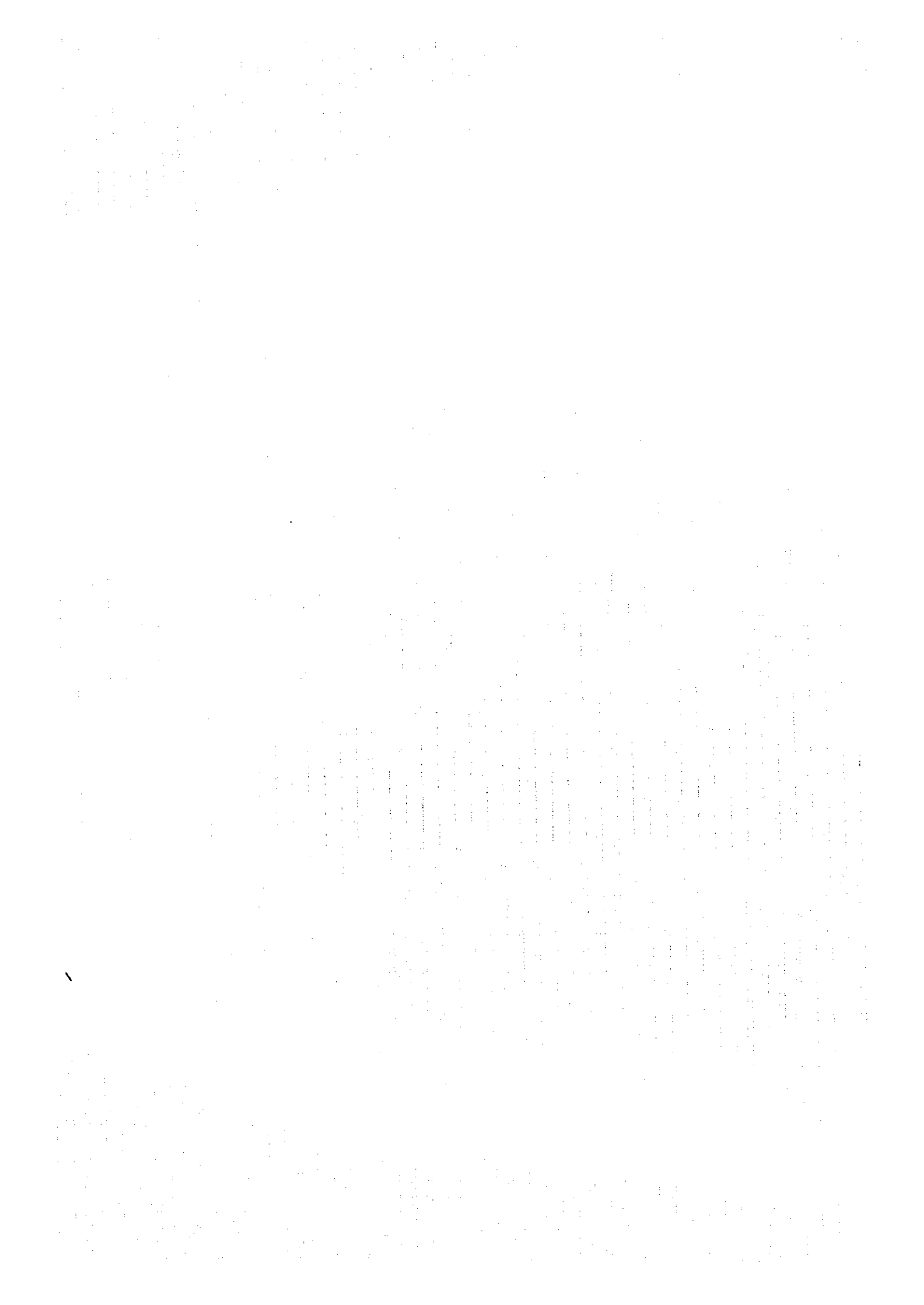
استانداردهای هوای پاک

U.S. FEDERAL GOVERNMENT AIR QUALITY STANDARDS

SUBSTANCE	PRIMARY	SECONDARY
Dioxide Sulfur.	0.14 p.p.m. (365 ug/m ³) /24hrs	0.5 p.p.m. (1,300 ug/m ³) 3hrs
	0.03 p.p.m. (80 ug/m ³), annual	0.1 p.p.m. (260 ug/m ³) /24hrs
Particulate	260 ug/m ³ /24hr	0.2 p.p.m. (60 ug/m ³), annual
	75 ug/m ³ , annual	150 ug/m ³ /24hrs
Carbon Monoxide	35 p.p.m. (40 mg/m ³) 1hr	60 ug/m ³ , annual
	9 p.p.m. (10 mg/m ³) 8hrs	same
Oxidants	0.08 p.p.m. (160 ug/m ³) 1hr	same
Nitrogen Dioxide	0.05 p.p.m. (100 ug/m ³), annual	same
Hydrocarbons (Less Methane)	0.24 p.p.m. (160 ug/m ³) /3hrs (6-9 a.m.)	same

* Not to be exceeded more than once a year.





JICA