5. Environmental Science Research Laboratory

◆Assessment of atmospheric environment

[Objectives]

To develop a pioneering and rational impact assessment method contributing to the conservation of the atmospheric environment with a view to dealing with diverse environmental issues and contributing to sustained development.

[Principal Results]

・A scenario was prepared for 23 wards in Tokyo for the diffusion of distributed power sources using fossil fuels by 2020. The prediction results for the atmospheric concentration of NOx emissions suggest that the relevant environmental standard could be exceeded depending on the level of diffusion.

・Using the urban air quality analysis system developed by the Laboratory, the scale of the contribution of artificial sources of air pollutants in the Metropolitan Area was shown to be low as halving of the air pollutant emissions in the Metropolitan Area would lower the secondary particle concentration in the air by only approximately 10%.

◆Assessment of aquatic environment

[Objectives]

To develop an assessment technique to solve various problems at reservoirs, rivers and sea areas for the purpose of achieving the efficient management and operation of power plants.

[Principal Results]

・The characteristics of sand transport due to outflow from the river mouth and the near-shore current were clarified by a model experiment using a water tank to develop a model capable of predicting the diffusion and deposition of sand discharged from the river mouth and assessing its impacts on marine algae.

・A highly accurate automatic flow velocity detection algorithm was developed for a high resolution maritime radar and a real-time monitoring system for wide area coastal flow was established to assist an efficient sea area survey at the time of environmental assessment and the regular monitoring of sea areas.

◆Biotechnology

[Objectives]

To develop unique as well as competitive environmental conservation and restoration technologies using advanced biotechnology.

[Principal Results]

・The nitrogen removal capacity of a nitrogen removal bioreactor was actually demonstrated at a thermal power plant and new useful microbes which can be used either to make the selenium contained in effluent insoluble or to remove it were successfully found.

・The internally accumulated water (85 specimens) in water heaters used in the home was investigated and no contamination by microbes, such as Legionella spp., was detected.

・The adsorption characteristics of microbes were established using nano-materials and their applicability to the development of new technologies in the biotechnology field was found.

◆Assessment of biological environment

[Objectives]

To develop a new ecosystem analysis method which is useful for the formulation of efficient environmental measures and a technology to control aquatic organisms at power facilities.

[Principal Results]

・The applicability of a research method for the distribution and ecology of wild animals in the area around a power plant subject to environmental assessment was successfully demonstrated. This method developed by the Laboratory uses a DNA marker for the individual identification of animals.

・A new technology was developed to quantitatively detect barnacle larva damaging power plants. A database of the toxicity of the trace substances on marine life was created.

◆Environmental risk assessment

[Objectives]

To develop a support tool which is required for the management of the environmental risk of mercury and other trace substances.

[Principal Results]

・Risk messages on volatile organic compounds (VOCs), sources of inhalation exposure, were prepared to clarify the important points when information on chemical substances is provided. The evaluation of the provision of such information by potential recipients through group interviews and other means helped to identify these important points.

・A multi-path model was developed to analyse the migration of chemical substances into the air, soil and water system and an environmental risk assessment database was developed.