



Feature Column

Current Status of Environmental Personnel Training

Since the establishment of the Environmental Professionals Training Institute thirteen years ago, already close to 100,000 licenses in various environmental fields have been issued. With limited manpower and budget, the institute has held training for all fields of environmental specialists, building up a complete database for professional licenses and gaining firm command over the issuance and management of licenses. The institute regularly cooperates with foreign organizations in holding specialized training programs to upgrade environmental specialists' proficiency in handling international issues and affairs.

Streamlined Staff Conducts Training for 10,000 Environmental Professionals Per Year

An important part of promoting environmental policies is to have outstanding environmental profes-

sionals with strong administrative skills and the means to improve the efficiency of environmental protection work. The EPA established the Environmental Professionals Training Institute (EPTI) in July 1991, serving as the principal location for training and certification of the nation's environmental professionals. EPTI is located in Chungli City, Taoyuan County, with a streamlined staff of 31 people. Their work is divided up among a research planning division, an education division, a counseling division, and a general affairs division, all of which work together to carry out the following tasks:

1. Enhance personnel training for various environmental protection agencies.
2. Complement the *Basic Environmental Act* (環境基本法) and various environmental protection ordinances by establishing an environmental professional training system, and handling certification training for 13 categories of environmental specialists and technicians.
3. Integrate private resources to extend the base of service operations: EPTI cooperates with over twenty academic institutes to conduct various training programs. EPTI held a

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Training in Singapore for on-site commanding officers and response personnel responsible for marine oil pollution prevention and treatment.

total of 152 courses (comprising 9,252 trainees) in the areas of environmental regulations, air quality monitoring management, soil and groundwater pollution remediation training, as well as plan report writing and inspection system procedures for industrial waste clearance. Up to the end of 2003, already upwards of 57,000 personnel had undergone training in these fields. This illustrates EPTI's remarkable achievements in enhancing the degree of professionalism among specialists in domestic environmental agencies.

As for license training for non-governmental environmental specialists and technicians, last year EPTI held training programs in 13 categories including air pollution control, wastewater management, toxic chemical substances management, waste clearance and disposal, vector control and automobile emissions inspections. In order to provide sufficient licensed manpower in these fields of pollution control, a total of 262 courses (comprising 10,500 trainees) were held in 2003 in the above disciplines. From July 1992 to the end of 2003, over 118,000 personnel had received training in these areas and nearly 100,000 licenses had been issued in the above environmental fields.

Integrated Environmental Specialist License Database

EPTI has been especially successful with regards to the issuance and management of environmental professional licenses, first in the area of establishing a placement and management system for holders of environmental specialist licenses. Starting in 1994, EPTI took the initiative to gather the loose ends of license placement information recorded by all

levels of environmental protection agencies. EPTI then compiled trainees' basic information, license information and any changes in licenses onto computer files. This allowed a full command over all different specialists and technicians' training levels and other information relevant to their licenses, as well as any changes in license placement.

In response to the *Basic Environmental Act* and various environmental regulations, a comprehensive licensed specialist system should be established.

EPTI utilizes this computer database to carry out careful audits of license placement violations, and proactively checks for illegal lending of identification or illegal placement of licenses. In addition to forestalling misplacement of licenses, these measures insure that all specialists conscientiously engage in environmental protection work. By the end of December 2003, already over 34,000 licenses from over 16,000 industrial facilities had been entered into this database, accounting for upwards of 31,000 personnel. An Internet version of the system has also been developed so that local environmental protection bureaus (EPBs) can access this database online.

EPTI is proactive in terms of inspecting for the unlawful use of licenses. The environmental specialist and technician personnel system is there to improve industry's anti-pollution systems and ensure that enterprises put environmental responsibility into practice. Therefore, details regarding license placement are thoroughly examined each time the EPTI reviews license applications, processes applications to reissue lost licenses, records local developments regarding placement of specialists,

and provides on-the-job training. If illegal lending of licenses or illegal placement of licenses is discovered, the license will be revoked as a security measure to maintain the integrity of the specialist management system. Last year (2003) a total of 49 environmental specialists and technicians' licenses were revoked. Overall, a total of 776 licenses have been revoked since the establish-

ment of EPTI.

Overseas training is essential in keeping Taiwan's environmental professional personnel in tune with the rest of the world in new environmental knowledge and skills, as well as upgrading professional know-how and capability, and cultivating environmental talents adept at working in the international realm. For areas in which other countries' experiences and technology is deemed essential, EPTI seeks cooperation with various nations' representative offices in Taiwan to design and hold special training programs abroad.

A total of 82 personnel received training abroad in 2003 through special programs in England (soil and groundwater pollution remediation training; and marine oil spill prevention, response management and decision making training), Holland (environmental pollution management training), and Singapore (training for on-site commanding officers and response personnel in marine oil pollution prevention and treatment). Local EPB personnel comprised 57% of trainees in these overseas programs; personnel from various EPA departments accounted for 18% of trainees and the remaining 25% were from other central agencies. The primary objective of such programs are to draw on the

knowledge, skills and experience of environmental counterparts in other advanced nations, as well as to upgrade the professional knowledge and technological proficiency of local environmental protection organization personnel.

As for cooperation and exchanges in international training, EPTI is currently actively engaged in expanding the four following work areas:

1) Cooperation with other nations' diplomatic and representative offices in Taiwan such as the trade and cultural offices of Britain, Holland and Canada; 2) Cooperation with foreign academic organizations such as Delaware University U.S.A; Cranfield University, Britain; and Holland's Institute for Water and Environmental Engineering; 3) Participation in international and regional training organizations, IFTDO and AFTDO, drawing on others' experience in training development; 4) Inviting developing countries to conduct study and research in Taiwan, providing them with our own experience and technology in environmental protection and playing a part in the development of the global community. Recent examples of international outreach include an environmental program in Southeast Asia in 1998 and a program for seven countries in Central and South America in 2000.

Toward a Comprehensive System for Licensed Environmental Specialists

EPTI Director Wang Long-chih (王龍池) recommends that a comprehensive licensed specialist system should be established in response to the *Basic Environmental Act* (環境基本法) and various environmental regulations. The existing 13 categories of environmental professional licenses already cover most fields of pollution control technology and man-

agement (air, water, waste, toxic substances, etc.). The only field the EPTI has yet to establish a professional license system for is environmental analysis and sampling. In the new criminal prosecution system, the success or failure of a lawsuit rests heavily on the public's confidence in pollution analysis and sampling. Therefore it is hoped that in the future, EPTI and related offices jointly draft regulations and establish a license system for specialists and technicians in environmental sampling and analysis. This addition would expedite the completion of a comprehensive system for licensed environmental specialists.

One long-standing problem for EPTI has been insufficient budget and manpower. Another problem is that each EPA department contracts training programs for their own respective department out to other agencies, thus rendering EPTI's services redundant and making it difficult for EPTI to bring its services into full play. In order to combine forces and avoid wasting administrative funds, as well as make the best use of the EPA's personnel training resources, Wang Long-chih proposed that each department's training programs be unified under EPTI. This scheme could allow EPTI to become the nation's foremost professional institution dedicated to training environmental specialists.

As to strengthening the promotion of international environmental training exchanges, Wang Long-chih indicated that in the future, EPTI will continue cooperation with foreign representative offices in Taiwan and professional environmental academic and research organizations abroad to plan more training and mutual learning programs. This opens up more opportunities to draw upon other progressive countries' environmental pollution control technology

and knowledge, and helps to promote international environmental diplomacy.

Meanwhile, EPTI will also augment the existing soil and groundwater pollution remediation online learning system and develop a comprehensive online training, teaching and search system for all categories of knowledge, technology and ordinances related to pollution control. The real-time speed of the Internet will allow for immediate access to environmental training programs. Plans are also being made to hold all categories of online on-the-job training courses for environmental specialists, which is expected to greatly improve training effectiveness.

Waste Management

GPS Up and Running in Waste Clearance Vehicles by February 27

Upon seeing good results with the first group of waste clearance vehicles fitted with GPS equipment, the EPA has announced the second group of clearance vehicles required to install GPS. Approximately 600 clearance vehicles that carry hazardous sludge, hazardous dust, infectious medical waste, incinerator fly ash, and incinerator bottom ash have been targeted in this group and will be ready to hit the roads by the end of February.

A rash of industrial development in recent years has led to the generation of large quantities of industrial waste. In order to prevent businesses from damaging the environment or jeopardizing public health through the illegal transport

or dumping of industrial waste, in 2002 the EPA began implementing a program to install instant tracking GPS equipment on waste clearance vehicles that transport hazardous waste liquid. The program integrates report data from waste production sources and specific fixed coordinates to create an integral network that can track the location of transported waste. Vehicles that have not followed regulations to install GPS or are suspected to have driven off the programmed route are inspected and penalized. The system has already proven effective in tracking the flow of industrial waste and ensuring that it is disposed of appropriately.

For this second group of waste clearance vehicles, the EPA has prioritized hazardous waste that is prone to being dumped illegally. The vehicles should already have installed GPS equipment and should comply with the new instant tracking system standards and be on the roads by February 27. This second group comprises vehicles responsible for transporting hazardous sludge, hazardous dust, incinerator fly ash, and incinerator bottom ash. In addition, due to the SARS epidemic in April and May 2003, vehicles carrying infectious medical wastes have also been included in this group. A total of approximately 600 vehicles have been fitted with GPS this time around.

The GPS equipment used in this second installation is unique in several aspects. For example, the transmission of positioning data adopts an updated version of the GSM system used in the first group of GPS vehicles; reporting quality is improved; and the system utilizes inexpensive GPRS wireless online reporting technology. Another advanced feature – instant online transmission of clearance vehicle trajectory data – when coupled with

24-hour monitoring capability, greatly increases the efficiency of controlling and tracking clearance vehicles. Data is transmitted to the EPA every 30 seconds, and the EPA can use computers to instantly pinpoint the location of vehicles and know where they are headed. If a vehicle enters a sensitive area or is suspected of engaging in illicit activities, the computer system will automatically issue a warning signal to inform personnel about details of its position and trajectory.

In order to assist clearance enterprises in installing GPS and help reduce their financial burden, the EPA has held numerous coordination meetings with GPS vehicle manufacturers and the telecommunications industry. GPS products were first tested out and test results were posted online for clearance organizations' reference

General Policy

EPA Adopts Strong Measures Against Bird Flu

Aiming to avert the threat of the avian influenza epidemic, the EPA has undertaken the vital task of clearing away dead chickens and incinerating their carcasses. In cooperation with agricultural authorities, the EPA has adopted high standard control measures for dealing with birds already infected or suspected of carrying the deadly virus. The EPA assures the public that there is no need to fear further spread of the epidemic.

Since the outbreak of the avian influenza in Taiwan at the end of 2003, the plight of this epidemic has so far been limited to bird populations. Even so, improper follow-up methods could stir up anxiety among the public. Faced with the responsibility of cleaning up animal carcasses, the EPA has drawn up comprehensive procedures, including personal safety measures and carcass sterilization, to control the spread of the avian influenza epidemic.

When the avian influenza epidemic was confirmed in Taiwan, the EPA immediately contacted the Council

when making their selection. The EPA also negotiated a preferential deal with GPS providers, requiring them to keep monthly telecommunication fee rates under NT\$600.

Taking steps to further promote this policy, the EPA has established a special webpage on the Industrial Waste Control Center Report System (<http://waste.epa.gov.tw/>), which provides relevant information for clearance organizations and vehicle manufacturers concerning GPS, such as regulations, announcements, and vehicle factory information. In the future, the EPA will also allow the clearance industry to use GPS monitoring systems so that they can keep track of their own vehicles. This combination of private and public efforts will reinforce supervision over sources of problems that could potentially result in illegal dumping of industrial waste. For more information, please call 0800-059-777.

of Agriculture (COA) to stay abreast of related animal epidemics. At that time, it was already understood that the current bird flu virus in Taiwan is only a weak strain. Animal quarantine organizations had already begun promptly carrying out control measures. The "Animal Infectious Disease Control Statute" (動物傳染病防治條例) requires the EPA and other related agencies to assist disease control and quarantine personnel in implementing control measures to prevent the virus from spreading any further. Accordingly, the EPA has already issued written requests to

local environmental protection agencies asking for their cooperation with agricultural authorities in handling the carcasses of dead animals. Animal carcasses deemed by agricultural agencies to be free of avian flu virus strains that would infect humans have been duly classified by the EPA as general industrial waste. Thus whenever local environmental protection agencies receive a call for assistance from agricultural authorities, they are required to immediately arrange for the transport of wastes to a nearby municipal incinerator for incineration. If the affected jurisdiction does not contain a municipal incinerator, the competent environmental protection agency should promptly coordinate disposal plans with a neighboring county/city environmental protection agency, which should cooperate in assisting the transport of carcasses to the nearest available municipal incineration plant.

Carcasses infected with strains of the avian flu virus that could potentially infect humans, however, should be treated as infectious industrial waste. Local environmental protection agencies should supervise agricultural authorities to transport these carcasses to a clearance and disposal organization that is approved by the EPA and has Grade A waste disposal facilities that are certified to handle the incineration of virus infected materials.

Addressing concerns for the safety of involved personnel, on January 30 the EPA drafted the *Work Procedures for Local Environmental Protection Agencies In Handling the Clearance and Disposal of Animal Carcasses During Avian Influenza Epidemics* (地方環保機關因應禽流感疫情清理棄置斃死動物作業程序), which was promptly issued to all local environmental protection agencies on February 2. The work procedures lay down

methods and critical points for six different levels of tasks – preparedness, reporting, on-site procedures, clearance, disposal and follow-up tasks – for local environmental protection agencies to follow when carrying out the clearance and disposal of animal carcasses.

The EPA has emphasized that private enterprises are not to arbitrarily engage in the disposal of carcasses and violators will receive penalties according to the *Waste Disposal Act* (廢棄物清理法). Fines between NT\$6,000 and NT\$30,000 will be issued if the violation involves carcasses that are classified as general industrial waste; fines between NT\$60,000 to NT\$300,000 will be issued for violations involving

Soil & Groundwater

Soil and Groundwater Remediation Takes Economic Status Into Account

Soil and groundwater pollution remediation projects have been underway for several years. Considering that the complex nature of remediation tasks and the selection of treatment technology must be based on both subjective and objective factors, the Soil and Groundwater Remediation Fund Management Board has indicated that when carrying out soil and groundwater pollution prevention measures in the future, the status of both social and economic development will first be taken into account to ensure the sustainable use of soil and groundwater resources.

In the three years since the promulgation of the *Soil and Groundwater Pollution Remediation Act* (土壤及地下水污染整治法) in February 2000, the EPA has already announced and promulgated eleven related bylaws and ten administrative regulations. Since the implementation of the remediation fee collection system in November 2001, already NT\$1,684 million has been collected.

As regards the investigation of sites suspected of having soil or groundwater contamination, the

carcasses classified as hazardous industrial waste. The EPA appeals to poultry farmers to heed statutes on animal infectious disease control in reporting and handling cases in which animals die from or are suspected of having an epidemic disease. Animal carcasses should not be arbitrarily discarded and the situation should be reported to the local environmental protection organization or to the EPA's report hotline at 0800-066666 so that assistance can be promptly arranged by the responsible agent. Also, the Department of Waste Disposal's website(<http://www.epa.gov.tw/h/>) provides information on the avian influenza and describes environmental protection agencies' response measures to control avian influenza.

EPA has already completed investigation of 319 hectares of farmland and has listed all detected sites with high concentrations of heavy metal as control sites. Nationwide investigation work has also been carried out on suspected pollution sites including 591 gas filling stations over ten years old, 193 large petrochemical storage tank facilities and 15 illegal dumping sites.

As for checking up on other cases of reported industrial pollution, the EPA indicated that land that has exceeded control standards for soil and groundwater pollution, has al-

ready been announced as pollution control sites according to regulations. These pollution control sites include 1,233 parcels of agricultural land (around 305 hectares), nine gas filling stations, five storage tank facilities and nine industrial pollution sites. In terms of efforts to assist pollution sites in handling emergency response work, pollution amelioration, and control and remediation work, the EPA has already completed pollution amelioration on two parcels of farmland (3.2 hectares) and amelioration on two pollution control sites, both of which have all been removed from the list of control sites. In the future, the EPA will continue to carry out nationwide inspections of suspected soil and groundwater pollution sites, in ad-

dition to handling emergency response, regulatory listing and remediation work.

Soil and groundwater pollution remediation work is already progressing from verification of site pollution to the stages of pollution impact assessments and pollution control remediation. Soil and groundwater pollution remediation is complex work, requiring scientific data to verify pollution boundaries as well as both objective and subjective factors before deciding on treatment technology. For these reasons, future advancements of soil and groundwater pollution prevention work will consider social as well as economic development factors so as to ensure the sustainable use of soil and groundwater resources.

species will shrink and become fragmented. 2) Distribution of Chinese cypress forest ecosystems could decline by 60% as the forests recede. 3) Forest ecosystems in the Jioujiou Peak Nature Reserve and Dawu Taiwan Amentotaxus Nature Reserve will rapidly deteriorate. 4) Habitat of the Formosan landlocked salmon will recede and fish populations will gradually decline. 5) Over one third of the Blackfaced Spoonbill's existing protected area will be submerged in the ocean, greatly reducing the function of this reserve. 6) The numbers of coral species in most of Taiwan's marine areas will noticeably diminish. Species sensitive to high temperatures such as the staghorn and Acropora corals will entirely disappear. Such events will greatly alter the makeup of coral reef communities.

Climate Change

Climate Change Takes Toll on Taiwan's Ecosystem

A continual increase in greenhouse gas emissions is delivering a blow to Taiwan's marine and land ecosystems. The results of one study predicts that Taiwan's national treasure Chinese cypress forest ecosystems are likely to diminish in size by sixty percent by the year 2100. Moreover, existing habitat for the endangered Blackfaced Spoonbill is expected to decrease by over one third due to coastal submergence.

The EPA entrusted National Taiwan University (NTU), National Taiwan Ocean University and National Central University to organize a research team to focus on the effects of greenhouse gas emissions based on data accumulated within the past 10 years, and sketch a picture of what potential damages the greenhouse effect may inflict on Taiwan's ecology. The study estimated that from now to 2100, we will see the following impacts:

1) Areas with the greatest diversity of Taiwan's breeding bird species will decrease by 17%; endemic bird distribution areas will shrink by 27%; the number

of amphibian species will see an overall decrease due to higher annual mean temperatures and areas with higher spatial distribution of

According to a simulated scenario of greenhouse gas emissions by the UN FCCC Intergovernmental Panel on Climate Change (IPCC), atmospheric CO₂ concentrations in 2100 will be at least twice that of average pre-industrial age concentrations (280 ppm). This will have a serious impact on Taiwan's ecosystem. The mean temperature rise between the years 1990 and 2100 could be as high as 1.4 to 5.8 °C. Higher temperatures will cause the volume of water in the world's oceans to expand, and will melt



The greenhouse effect has resulted in reduced numbers of Formosan landlocked salmon.

mountain glaciers and the Greenland ice sheet, resulting in a rise in global sea levels by 1.0~2.5 centimeters per year. It is estimated that the world's sea level will see an overall rise of 0.09~0.88 meters from 1990 to 2100.

As with all other subtropical island environments, Taiwan is quite fragile in terms of withstanding the impacts brought on by climate change. Taiwan is particularly susceptible to a rise in sea level and changes to water resource supplies, public sanitation, and ecology. A rise in sea level will directly lead to coastal submergence and erosion. Shoreline recession will force entire coastal villages to face relocation and consequent social adjustment problems.

As for the impacts on water resources, increased frequency and intensity of drought and water-logging combined with a lack of water resources will have an influence on people's livelihood and industrial development. Although increased concentrations of CO₂ and other greenhouse gases may increase photosynthesis levels and thus benefit the growth of forests and agricultural crops, the accompanying rise in temperature will also promote the spread of pests and disease vectors. The negative ecological impacts of climate change over the long-term are numerous, including the shrinking of habitats for most species, decreased populations, and the extinction of certain species.

Climate change will inevitably bring about droughts, floods, El Nino events and other extreme climatic episodes with immediate damage. Meanwhile, the impacts to ecosystems will be gradual and not as easily detectable; yet it will be impossible to ignore the accumulated effects over the long term as ecological change becomes increasingly obvious and widespread. The EPA has appealed to related gov-

ernmental agencies and academic institutions to take this issue seriously without further delay by beginning long-term collection of basic data and establishing an environmental database. Various tests, analyses and risk assessment should be undertaken to gain a comprehensive understanding of changing trends and the impacts they may bring so that appropriate response strategies can be worked out in the interest of alleviating the detrimental effects of climate change.

Soil & Groundwater

Progress Made in Cleaning Up Heavy Metal Contaminated Farmland

Remediation of heavy metal contaminated farmland throughout Taiwan is making headway. In 2003, the EPA issued a total of over NT\$200 million in remediation funds to subsidize counties and cities carrying out remediation work on polluted farmland. Already eight counties/cities have already finished calling for tenders and have commenced remediation work.

In 2002, the EPA carried out a nationwide in-depth investigation of 319 hectares of agricultural land with high concentrations of heavy metals. It was discovered that about 1,000 parcels of farmland, a total area of 282 hectares, had been subject to heavy metal pollution. The largest number of contaminated farmlands, with a combined total of 200 hectares, was found in Changhua County where electroplating and metal surfacing treatment factories are profuse. The next most polluted areas were

Hsinchu City with 33 hectares and Taoyuan County with 17 hectares. Heavy metal contaminated farmland was discovered in twelve counties and cities.

Remediation of the nation's heavy metal contaminated farmland is currently in progress. Last year alone the EPA issued NT\$240 million in remediation funds to subsidize the remediation of polluted farmland in various counties and cities. So far the following eight counties and cities have completed bidding procedures and have begun carrying out remediation work: Taipei County, Taipei City, Taoyuan County, Hsinchu City, Taichung County, Changhua County, Tainan County and Kaohsiung County.

The EPA indicated that by October 2003 Hsinchu City was the first on record to complete remediation work, where a total of ten farmland plots (combined total of 3.2 hectares) in Chinshui Community were treated and removed from the list of control sites. Another seven parcels of farmland (combined total of one hectare) with cadmium contaminated soil have recently completed acid washing procedures; the soil was restored by February 2004 and follow up remediation work will continue. Approximately 91 hectares of farmland in Changhua County have recently passed post-remediation tests and will soon be removed from the list of control sites after soil fertility enhancements are completed, upon which it will be returned to farmers for cultivation.

Although initial remediation procedures have been completed, these farmland plots have still not been released from the list of control sites and will not be ready in time for the spring planting season this year. Thus the EPA will continue agricultural subsidies to compensate farmers for the lost growing season. It is expected that most of

this farmland will be returned to agricultural production by this summer.

The EPA emphasized that the government stands to protect the livelihood of the nation's farmers, and therefore recovery work shall initially be funded by the remediation fund. In the future, however, compensation will be demanded of polluters. The most important tasks at hand are to eliminate all pollution sources and strengthen pollution inspections of related industries. It is hoped that this two-pronged approach will effectively bring all pollution sources under control and prevent future incidents of farmland contamination.

Water Quality

Engineering to Improve Wuluo River Water Quality by Yearend

The second stage of construction on the "Wuluo River Drainage (Kaoping River Basin) Advanced Artificial Wetland Natural Purification Project" will be completed by the end of 2004. The artificial wetlands are designed to treat 50,000 tons of river water per day and are capable of removing one ton of organic pollutants per day. This will effectively improve the status of water quality in the downstream areas of the Kaoping River.

The artificial wetland purification project with the largest treatment capacity in Taiwan to date – the "Wuluo River Drainage (Kaoping River Basin) Advanced Artificial Wetland / Natural Purification Project" (武洛溪排水(高屏河流域)人工溼地自然淨化

計畫) – is jointly executed by the EPA and the Water Resources Agency, Ministry of Economic Affairs. The Water Resources Agency (WRA) was in charge of obtaining funds to set aside twenty hectares of land for this engineering project, while the EPA contributed a total of NT\$67 million of its own funds for engineering costs. The 7th River Basin Management Bureau, under the WRA, was entrusted to call for tenders and see to actual construction. By the end of 2003, the first stage of construction was finished with the completion of the sedimentation basin, laying down an aggregate layer and constructing an oxidation pond. The second stage of construction will continue throughout the year 2004.

The EPA indicated that the Kaoping River's main pollution sources are currently from three of its mid- to downstream tributaries, namely, the Wuluo River (武洛溪), the Niuchou River (牛稠溪) and the Wandan Drainage (萬丹大排). Since the execution of the subsidy plan for pig farms to relocate out of the Kaoping River Basin in 2001, the upstream water quality of the Kaoping River now already meets Class II water body classification standards. However, in the mid- to downstream sections population density intensifies, industries are closely packed together, and the construction of sewerage systems cannot be completed all at once. In the meantime, while sewerage systems are still under construction, the EPA will continue to carry out the artificial wetland engineering project. This will help reduce the impact of pollution from household wastewater and help improve the current status of water quality in the region's waterways.

In the future the EPA will continue working with the WRA's

7th River Basin Management Bureau, and share the construction costs for improving the water quality of the Niuchou River on public land along the river. These efforts are expected to gradually improve the water quality of the Kaoping River.

Water Quality

6,000 Water Quality Monitoring Tests Underway This Year

The EPA is already embarking on the third year of a comprehensive water quality monitoring program. This year's implementation target is to carry out 6,000 rounds of water quality sampling and monitoring at testing stations island-wide, and gather 100,000 sets of substantial water quality monitoring data. The goals are to build up an environmental water body water quality monitoring database, update monitoring data on a regular basis, and make all of this information easily searchable and open to the public.

Since 2002, the EPA Department of Environmental Monitoring and Information Management has taken over the overall planning of environmental water quality monitoring for five classes of water bodies: rivers, reservoirs, groundwater, ocean waters, and ocean recreation waters. Each year requires around NT\$30 million in special program funds allocated by the Department of Water Quality Protection. The implementation schedule of this plan has been slated for 2002 to December 2004 and is designated as part of the Department of Water Quality Protection's "Taiwan Area

River Basin and Ocean Management Program, Part I" (台灣地區河川流域及海洋經營管理方案第一期計畫)。A second part of this plan will also be implemented in 2005.

Environmental water quality monitoring affairs primarily include planning water quality monitoring sites, drawing up monitoring plans, on-site sampling, laboratory test analysis, compilation of monitoring data, review, analysis and posting online. This work is divided up among the Department of Water Quality Protection, the Soil and Groundwater Remediation Fund Management Board, the Bureau of Environmental Inspection, the Environmental Analysis Laboratory and the Department of Environmental Monitoring and Information Management.

The 2004 Environmental Water Quality Monitoring Program principally handles monthly and seasonal routine sampling and monitoring of all environmental water bodies to establish the following environmental water quality monitoring information:

1. Monthly sampling and monitoring at 301 monitoring stations along 83 riverways
2. Seasonal sampling and monitoring at 111 monitoring points in 57 reservoirs
3. Seasonal sampling and monitoring at 431 regional groundwater wells
4. Seasonal sampling and monitoring at 97 monitoring points in 17 ocean waters
5. Sampling and monitoring at 10 recreational ocean waters from June to September

The 2004 water quality monitoring plan aims to carry out 6,000 sampling and monitoring tests throughout the year at stations in northern, central and southern

Taiwan. Test results will provide information on the status of pollution in various water bodies, which is necessary for making further assessments. Items tested include lengths of river pollution, the proportion of (each class of) water bodies that meet water quality standards, and reservoir eutrophication levels in order to establish trends of changes in water body water quality over a long term.

The expected outcome of this plan

is to complete 6,000 water quality monitoring tests, and use the estimated 100,000 sets of substantial data gathered during these tests to build a comprehensive environmental water body water quality monitoring database. Regular updates on the latest monitoring data will be added to this database, and all information will be made available and searchable to the public over the Internet.

For more information, please call 02-23117722 ext. 2313.

General Policy

Remote Control Helicopters Keep an Eye on the Environment

The EPA now has a new tool at its disposal to help in gathering evidence integral to environmental pollution control work. Low-altitude unmanned remote control helicopters, now with improved efficiency and image resolution, have been conscripted to the frontlines in monitoring, inspection and tracking duties. Already showing repeated outstanding performance in the inspection of several large public nuisance pollution incidents, these helicopters bear out infinite possibilities for the future of remote sensing technology in environmental protection work.

The EPA has successfully developed applications of low-altitude unmanned remote control helicopters to help carry out control work in gathering evidence on environmental pollution cases. This is the first domestic government department application of a precision unmanned remote control aircraft that uses aerospace remote control high

technology. In recent years this technology has already effectively assisted in several cases of pollution control and environmental related information gathering to prevent further damage to the environment. This remote sensing equipment carrier is easy to control and can be outfitted with various measuring instruments. It can



Remote control helicopters are light and agile, and are equipped with a full set of precision instruments to gather evidence.

fly as high as 3,000 meters to capture a video surveillance range of over two kilometers and is able to stay in the air for one hour. This new technology will provide instant and complete monitoring information and evidence on regional landforms and emergency pollution disasters, successfully leading environmental protection work into the realm of remote sensing applications.

The EPA has made use of its new low-altitude unmanned remote control helicopters to carry out monitoring and tracking of recent serious pollution incidents affecting the public, such as the oil tanker that recently flipped over in Miaoli County along the Fangli River, and large scale construction projects for environmental protection facilities such as landfills and incinerator projects throughout counties and cities in Taiwan. The remote control helicopters have already proven their effectiveness in terms of saving time and image resolution. These tangible results will prove beneficial in the future for dispute resolution, monitoring and assessment of environmental engineering quality as well as selection and planning of waste disposal sites.

The research and development of this new technology was jointly carried out by the EPA and the National Central University's Aerospace Remote Sensing Research Center. The aircraft combines the features of a low-altitude remote control helicopter with high maneuverability and no need for a runway, in addition to special GPS equipment and an integrated video camera / digital transmission control system developed by the R&D team. Low altitude unmanned remote control helicopters can be fitted with various different equipment, engines of varying horsepower and varying sensing instruments to suit the mission. The helicopters are easy to control and are especially suited to flying in

low-visibility weather conditions.

The EPA indicated that after several years of persistent planning, designing and modification as well as actual test flights in areas throughout Taiwan, the R&D team was able to develop a remote control system with high degrees of precision and stability. Such features make this unmanned aircraft highly suited not only to collecting evidence in public nuisance cases involving pollution, but also to carrying out investigation in the instance of

earthquakes, flooding and other natural disasters. The helicopters will offer extensive support of Taiwan's air and water quality pollution control, waste and toxic chemical substance disposal, environmental monitoring, assessments and tracking. Other environmental applications include handling public dispute cases and pollution appraisal, bearing out substantial benefits in all aspects of environmental protection in Taiwan.

For more information, please call 02-23117722 ext. 2930.

EIA

Fourth Expansion Phase of Sixth Naphtha Cracker Conditionally Passes EIA

The widely publicized "Fourth Expansion Phase of the Sixth Naphtha Cracking Plant" plan has passed its environmental impact assessment review pending certain conditions. Although the company will be able to begin construction as planned, the developer is requested to improve the plant's pollution emissions, water quality monitoring, air quality and toxic chemical substances emergency response.

The Formosa Plastic Group has invested NT\$120 billion toward the fourth expansion phase of its sixth naphtha cracking plant. Ever since the latter half of 2003, after numerous setbacks, the plan finally passed its EIA review, conditionally, on January 19. The company can begin its project as planned, however the developer has been requested to undertake the following measures:

The first measure regards pollution emissions. The Industrial Development Bureau, Ministry of Economic Affairs, approved first leasing part of the total quantity of resources and pollution emissions from the Yunlin Offshore Industrial Park for the sixth naphtha cracker's use. Currently the sixth naphtha cracker plans a total use of 423,982 tons of water per day, 245,888 tons of wastewater discharge per day, 5,310 tons of

VOCs per year and 23,820 tons of NOx per year. However, the developer must proactively carry out improvement measures and should make sure within three years of this EIA review conclusion, that the total quantities of the above four categories have been reduced to the amounts originally stipulated for the third phase sixth naphtha cracker which are: 257,000 tons of water per day, 187,638 tons of wastewater discharge per day, 4,302 tons of VOCs per year, and 19,622 tons of NOx per year.

Second, as regards water quality monitoring, the developer should make a comprehensive plan for the Mailiau area water system including reuse of treated water, rainwater harvesting, and separate systems for storm water and wastewater discharge. For storm water discharge points and all water dis-

charged from the plant, the number of chemicals that are monitored should be successively increased each season to include cadmium, lead, total chromium, total mercury, copper, zinc, nickel, arsenic, phenols and oils. Toluene and chlorinated hydrocarbons should be added to the list of items monitored in groundwater. Also, the plant should reach an overall water recycling rate of 75%.

In terms of air quality, three air quality monitoring stations and one air quality monitoring vehicle in the sixth naphtha cracker industrial park should handle quality assurance and quality control (QA/QC) according to EPA inspection methods and regulations. All instruments within the three air quality monitoring stations should have an annual effective data acquisition rate of over 85%. All instruments in air

quality monitoring vehicles should have an annual effective data acquisition rate of over 80%. The developer's air quality monitoring stations and vehicles should undergo QA/QC inspections by the Yunlin County Environmental Protection Bureau and emission control equipment in all facilities should comply with Best Available Control Technology (BACT).

Finally, developers should draw up emergency response plans and risk management plans for the transport of toxic chemical substances to and from all facilities and special attention should be given to the environmental fate of such substances. All plans should be comprehensively drawn up and executed according to "ecological industrial park" concepts. For more information, please call 02-23117722 ext. 2740.

2. Promote sustainable development and partnership in terms of global environmental protection.
3. Abide by international conventions and build up complementary regulatory systems.

A study was recently conducted under the "NCSD Action Plan on International Environmental Protection - From a Business Perspective," which put forward a number of suggestions for the IEPWG in their future work.

To encourage corporate participation in international environmental affairs, the above plan targeted the U.S.-Asia Environmental Partnership (US-AEP), The Global Compact, Global Reporting Initiative (GRI), World Business Council for Sustainable Development (WBCSD), and international business associations or concerned organizations, and reported on possibilities of participation or membership.

Among them, the US-AEP, established in 1990, successfully combined forces from the government and the private sectors, strengthening the US's power and further deepening Asia's dependence on US-based environmental policy and technology. According to the report, although Taiwan does not pursue the same goal as the US in terms of its role in the international environmental arena, the US-AEP is still a worthwhile model as it integrates environmental diplomacy and business opportunities, which may eventually help build up national credibility and foster international partnership.

To encourage corporate participation in international cooperation, the report suggests the following initiatives: 1) Host "Asia Sustainable Development Forum." Work with WBCSD and its Asian

General Policy

Taiwan Aspires to Join International Environmental Agreements

To increase Taiwan's visibility in the field of environmental protection by uniting the domestic environmental movement with the rest of the world, the National Council for Sustainable Development (NCSD), Executive Yuan has outlined the following objectives this year: establish a uniform portal website of international conventions, explore ways to increase international participation, and organize training courses on international agreements.

The National Council for Sustainable Development (NCSD) was set up by the Executive Yuan in August 1997 to enhance the protection of the environment and ecology, guarantee social fairness and justice, promote economic development, and establish Taiwan as a green silicon island. The NCSD was restructured in June 2002, at which time related experts were jointly called together by the EPA Administrator, Center for Marine Policy Studies Director Dr. Hu Nien-Tsu (胡念祖), National Sun Yat-sen University (CMPS, NSYSU), and Taiwan

Business Council for Sustainable Development (BCSD-Taiwan) Chairman Huang Mao-Hsiung (黃茂雄), to form the International Environmental Protection Working Group (IEPWG). The EPA Department of Air Quality Protection and Noise Control serves as the liaison window for this working group. The group has three primary missions:

1. Actively participate in the activities of international environmental conventions and sustainable development affairs, and bear responsibility as a member of the global village.

BCSDs to establish a regional forum. 2) Participate in greenhouse gas emission reduction and compliance strategies. The report suggests assessing the feasibility of participating in the international carbon fund to share experiences on international cooperation to reduce emissions. 3) Promote "Sustainable and Responsible Investment (SRI)." A national sustainable investment index (for instance, FTSE4 GOOD index) and fund is suggested as a strategy to mobilize the financial industry to take part in the sustainable development movement.

Responding to suggestions brought up in the research and by the business sector, the EPA Department of Air Quality Protection and Noise Control outlines the following plans to be carried out this year.

1. Establish a uniform portal website of international conventions. The Department commissioned BCSD-Taiwan to set up a website providing information on development trends of major international conventions and useful links. This will address businesses' growing demand to acquire information on key international environmental conventions.
2. Explore ways to increase international participation and

organize training courses on international conventions. Starting from this year, two

programs will be launched to train environmental personnel in international matters.

News Briefs

2004 International Conference on Eco-Technology

The 2004 International Conference on Eco-Technology was put on by the Public Construction Commission, Executive Yuan, from February 13 to 14, allowing participants a chance to visit ecological engineering sites and attend related forums. The conference encouraged domestic experts and scholars to engage in in-depth discussion with their international counterparts. Nine specialists from the U.S., Germany, Austria, Holland, and Japan were invited to attend the event, including Prof. William Mitsch from Ohio State University, who is also the president of the American Society of Ecological Engineering, and Prof. Volkhard Wetzel, head of Bundesanstalt fur Gewasserkunde, Germany. Prof. Edwin Herricks from University of Illinois Department of Civil and Environmental Engineering was also invited to attend. Deputy Director Yeh Jun-hong (葉俊宏) of the EPA Department of Water Quality Protection delivered a speech on "River Pollution Remediation through Ecological Engineering."

2003 National Cleanup Contest Outcome Posted

The EPA has announced the results

of the 2003 National Cleanup Contest. Seven cities/counties were selected for the top award including Taichung City, Taipei City, Taichung County, Kaohsiung County, Ilan County, Penghu County and Lienchiang County. Five townships were chosen for their outstanding cleanup efforts including Liedy Township (Kinmen County) and others. A total of 491 environmental cleanup and maintenance points were inspected and used to determine which counties, cities and townships showed the most outstanding performance.

Environmental Agent Active Ingredient Standards Revised

On January 27, the EPA announced the revised *Environmental Agent Active Ingredient Admissible Variation Standards* (環境用藥有效成分含量容許誤差標準), which will become effective six months after the announcement date. This revision mainly focuses on appropriately relaxing regulations on the admissible range of variation for active ingredients in insecticidal agents containing synthetic camphor, p-dichlorobenzene, or naphthalene so as to fit in with management requirements.

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