



Feature Column

River Pollution Remediation Yields Results

From prioritized rivers to entire watersheds, from river remediation to marine pollution control, and from centralized inspections to combined efforts with local volunteer patrols, the EPA has broadened the scope of its accomplishments in river pollution remediation over the past three years. It is now clear that ultimate goals of ecological remediation are more effectively actualized through unified mobilization that pulls together local manpower and resources.

The EPA has adopted a series of strategies to improve the water quality of Taiwan's rivers. The Danshuei River system (淡水河系) was prioritized for remediation at the outset, and has since been held as a model for other projects to learn from. With

the implementation of the Framework Plan for Protecting the Quality of Drinking Water Sources (飲用水水源水質保護綱要計畫) in 1998, already five river systems have been prioritized for remediation to address drinking water concerns, including the Danshuei River, the Toucian River (頭前溪), the Dajia River (大甲溪), the Cengwun River (曾文溪) and the Gaoping River (高屏溪).

The EPA has been actively initiating river pollution control measures since the Executive Yuan's 2000 ratification of the Taiwan River Basin and Marine Management Programme (台灣地區河川流域及海洋經營管理方

案), progressively carrying out remediation work within all of the island's watersheds. Revisions were made to this plan in 2001, which not only broadened actions toward marine pollution control, but also prioritized pollution remediation projects in 13 focal river basins.

Funneling Resources into Prioritized Rivers

The EPA Department of Water Quality Protection, responsible for river remediation works, indicated that the first stage of the Taiwan River Basin and Marine Management Programme, lasting from 2001 to the end of 2004, has a budget of over NT\$3.01 billion to be

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Stone-filled terraces are designed in riverbeds to increase dissolved oxygen (DO) content, filter the water and improve its quality by allowing biological contact oxidation (BCO) treat the water.

appropriated in a three to one ratio toward river remediation and marine pollution control, respectively. Particular remediation goals in this first stage entail selecting focal rivers, consolidating resources in specially designated regions to attain concrete results over the short term, and fully establishing a base from which to carry forward with further remediation. Thirteen rivers have been prioritized for remediation in the first stage of this plan.

each of the prioritized rivers and contain authorities in related county/city government agencies. Close work between the EPA and these working groups insures that all sides confirm priorities in remediation goals and implementation measures. Both central and local government counterparts work to advocate all measures and hold coordination review meetings so that implementation methods can be duly modified to facilitate the attainment of set goals.

been removed from this area, and pollution from this source has been sharply reduced by 98.5%. With a total area of 65.7 hectares, this river basin can provide 65 tap water purification plants with up to 476.8 million cubic meters of water. As for tangible results, the water quality of the Gaoping River has seen visible improvements from its former murky and malodorous state to its current state, which is clear enough to see fish swimming at the bottom. The EPA continues to inspect this region and so far has not discovered any reestablished pig raising operations. In the meantime, it has also taken 500 aerial photographs and established a geographical database that covers 360 thousand hectares of this water source zone.

Particular remediation goals in this first stage entail selecting focal rivers, consolidating resources in specially designated regions to attain concrete results over the short term, and fully establishing a base from which to carry forward with further remediation.

Coordination between government departments is an essential component of this plan. Within the implementation period, the EPA frequently consults with the Ministry of the Interior and the Construction and Planning Agency, requesting them to prioritize the coordination of construction on drainage systems downstream of the selected focal rivers so as to reduce the amount of pollution generated by domestic wastewater. The EPA also calls on related agencies such as irrigation associations, agricultural agencies and the Gaoping River Basin Management Committee, requesting their assistance in obtaining land for beautification and greening projects, implementing non-point source pollution control and clamping down on gravel extraction enterprises so that this plan can proceed more efficiently.

Apart from liaison and coordination with central government agencies, the EPA also supervises the establishment of county and city river remediation working groups, which are assigned to

Ecological Engineering to Restore River Ecology

As for achievements in river pollution remediation, since 2002 the EPA has completed a number of greening and beautification projects along the Gaoping River Basin, and all other sections of the river have either been planned, or already designed in detail. As for ecological parks and public access, already 43 hectares have been set aside as eco-parks for restoration work along the mouths of three river basins, and planning designs have been completed at 25 points along the river. As to non-point source pollution controls to protect drinking water source quality, an upstream flow interception demonstration site has already been completed in the Pozih River (朴子溪), and two other demonstration sites have been planned in the Gaoping River.

The EPA has provided subsidies for the removal of pig farms from water sources in five river basins including the Gaoping River. Approximately 650,000 pigs have

Ecological engineering carried out since 2002 is the most representative of implementation results in river remediation, and the methods used in these projects best fulfill environmental protection goals. Notable accomplishments include the first and second stages of projects in the Wuluo branch of the Gaoping River, where two hectares of stone-filled terraces facilitate biological contact oxidation and 16 hectares of constructed wetlands treat 50,000 CMD of water (cubic meters per day). The first stage of construction was completed in March this year (2004) and a trial run has commenced at the end of April. Detailed planning for stage two of the project is currently underway.

Among the successful examples of ecological engineering in river remediation include an overland flow project in the Yangzih Drainage (洋子大排) of the Pozih River basin (1.7 hectares, treating 2,000 CMD of water) and a soil filtration project in the Dajia Community (大甲社區) on the Erren River (0.18 hectares, treating 100 CMD of water). Another project was carried out in the

Wugu Marsh Eco-park on the Erchong Floodway (二重疏洪道) in the Danshuei River basin, with the creation of artificial islands on 93 hectares of land to treat 470 thousand CMD of source water (see photo).

Budget Allocated to Strengthen Inspections for Illegal Discharges

The EPA employs remote surveillance systems installed along riverbanks to strengthen inspection and management of business operations within river basins. Seven such pilot systems were installed in 2002, and already 47 units were in operation by the end of 2003. As for illegal smelting operations, in 2001, 57 factories were dismantled along the Erren River in Tainan County, and six illegal factories were dismantled in Kaohsiung County. Another 11 factories received assistance from the Industrial Development Bureau (MOEA) and either relocated to industrial parks or switched trades. Meanwhile, the EPA also installed automatic water quality monitoring facilities in industrial parks located near two river basins last year.

Recent years have seen frequent incidents of illegal discharge of factory wastewater into riverways. Seeking to overcome the problem of insufficient inspection man-

power in local environmental agencies, many counties and cities have already taken initiatives to organize volunteer river patrols. Relentless patrolling has led to a significant increase in the discovery of illegal "night pipes" ("暗管" concealed wastewater outlets). A total of 74 such pipes were uncovered in 2002; this figure rose greatly in just one year with a total of 153 pipes uncovered in 2003. The EPA has provided coordination assistance to establish 85 volunteer patrol units in rivers throughout the island and NT\$1.02 million has been awarded to these patrols for their meritorious services.

The most extensive network of volunteer river patrols exists on the Erren River in Tainan County, with Tainan City's Chang Jung Christian University playing a leading role in integrating efforts of seven other colleges near the river into one allied network. At the discovery of pollution or other abnormal incident in the river basin, just one telephone call to the nearest report station initiates a response consisting of water quality monitoring, assessment and technical support. Emergency response training is also provided to volunteers on a regular basis. The EPA works together with Chang Jung University to apply a budget of NT\$900,000 toward managing

the Erren River patrol network, which comparatively speaking is much more organized and has more operative manpower than patrols in other counties and cities.

As to future developments of river remediation, the problem of insufficient inspection manpower will be overcome by integrating private sector resources to handle inspection and management. Trial runs will first be held to entrust these tasks to the private sector. Examination of evidence, water body sampling, "night pipe" inspections, and related costs will be calculated into budgets to encourage assistance by the private sector in inspecting illegal effluent discharges. In addition to strengthening inspection, sampling, testing of effluent water quality, the EPA will also increase the frequency of disciplinary action in each river basin to prevent illegal discharges and raise the rate of compliance with wastewater effluent standards.

Reinforced inspections carried out during stage one of this plan will be continued in the future. Meanwhile stage two of the plan will commence next year and carry through over the next three years. This entails continued assessments to determine where to install remote surveillance equipment near rivers. The purpose of these remote surveillance systems is to provide evidence of illegal dumping and wastewater discharge incidents. Automatic water quality monitoring facilities will also be installed at designated areas and sites to gain better command over pollution coming from pollution sources at all times.

Other long-term measures included in the second stage of this plan: 1) natural purification engineering projects and aeration methods as primary measures to improve the water quality of water bodies; 2) non-point source pollution controls to protect drinking



After construction of the Wugu Marsh Eco-park in the Danshuei River Basin.

water sources; 3) education and policy advocacy; and 4) maintenance of ecological and natural areas along rivers. To inspire more action in cleaning up garbage along rivers, this year also marks

the commencement of national river cleanup contests. This provides a chance to judge the performance of local administrations and grant rewards of assistance to local plans for future years.

dies have already been given to local governments to establish 16 recycling and reuse plants. Large waste items are either repaired, sorted, dismantled and ground up and screened into materials for reuse. Construction of these facilities is nearing completion, and it is projected that all 16 plants will be ready to operate by the end of the year. It is estimated that by the end of this year, the recycling rate for large waste items will reach over 15 tons per day.

Waste Management

EPA Promotes Local Recycling and Reuse of Large Waste Items

The EPA has drafted a five-year (2003 to 2007) Large Waste Item Recycling and Reuse Plan to appropriately dispose of large waste items and encourage recycling and reuse of materials. Funding of NT\$1 billion will be used to assist counties and cities in carrying out recycling and reuse of large waste items.

A large proportion of oversized waste items thrown out by households, such as sofas, beds, chairs, cabinets, as well as general waste produced during building renovations can be recycled or reused. After collection, items worth repairing can be restored to usable condition. Items not worth repairing are sorted, ground up, and screened into plastic, metal and wood materials for reuse in other products.

Due to the difficulty in selecting times and locations for the collection of large volumes of oversized waste items as well as a general absence of appropriate local recycling and reuse systems, most

waste is disposed of by incineration or landfilling. The inability to effectively use these resources has resulted in the careless abandonment of many oversized items, which in turn has a detrimental impact on environmental sanitation.

Aiming to appropriately manage large waste items and encourage recycling and reuse of materials, the EPA has already drafted a five-year (2003 to 2007) Large Waste Item Recycling and Reuse Plan (巨大廢棄物回收再利用計畫). Funding of NT\$1 billion will be used to assist counties and cities in carrying out recycling and reuse of large waste items. Subsi-

The EPA has indicated that 25 recycling and reuse plants will be established by the year 2007, allowing for a combined recycling rate of 120 tons per day. Reduced incineration and landfill costs as well as the added value of secondhand furniture and reusable materials such as metal and plastic are estimated to bring in a net worth of around NT\$350 million annually.

Some counties and cities, including Taipei City, Taichung City, Tainan City and Chiayi County have already taken initiatives to post photos of renovated secondhand furniture on the Internet for regularly held auctions to sell these items. All items are reasonably priced and nice-looking, and the public has shown enthusiastic response. Taichung City's Baojihlin Park (寶之林園區) in particular has integrated a secondhand furniture market into an attractively landscaped setting with recreation facilities to become an out of the ordinary tourism spot that has so far received rave reviews. Tainan County's Rende Township (仁德鄉) has already established a shredding plant for large-sized waste items, while Kaohsiung County's Fengshan City (鳳山市) has also already set up a spring mattress dismantling plant. Such facilities allow for the reuse of screened components after dismantling or shredding of large-sized furniture.

The EPA reminds that achieve-

News Brief

Exhaust Testing Organizations Announced for Imported Used Vehicles

Based on the *Regulations for Issuing and Canceling Exhaust Inspection Certificates for Fuel and Alternative Clean Fuel Vehicles* (汽油及替代清潔燃料引擎汽車車型排氣審驗合格證明核發及廢止辦法), on April 26 the EPA announced the following designated testing organizations: 1. Organizations designated for in-motion testing of air pollution from imported foreign used vehicles: the Mechanical Industrial Research Laboratory (MIRL)

under the Industrial Technology Research Institute (ITRI), the Automotive Research and Testing Center, China Motor Corporation, Sanyang Industry Co. Ltd. (Hsinchu plant), Yulon Motor Co. Ltd., Formosa Automobile Corporation, Ford Lio Ho Motor Company, and Kuozui Motors Ltd. 2. Organizations designated for idle testing of air pollution from imported foreign used vehicles: MIRC (under ITRI) and the Automotive Research and Testing Center. The above organizations will perform inspections from May 1, 2004 to August 31, 2004.

ments in this area hold great implications for resource recycling and sustainable development. The EPA will strengthen efforts to advocate the recycling of large

waste items in anticipation that citizen cooperation with government initiatives will help create a sustainable society that recycles its resources.

land use status, sorting methods, as well as potential obstructions to implementation of deployment plans, treatment procedures, and pollution prevention.

Waste Management

Three Recycling and Sorting Plants Up Before 2008

On February 12, 2004, the Executive Yuan agreed in principle to the "Challenge 2008: National Development Plan—Green Industry Recycling and Reuse Plan (Draft)." Highlighting the "Trash Resource Recycling and Sorting Plant Construction Plan" as one of the subplans and in keeping with the "Reduce, Recycle And Reuse" policy which calls for sorting and collecting "resource garbage" and "general garbage," the EPA has scheduled the construction of three garbage resource recycling and sorting plants to be completed before the end of 2007. The three plants will be able to process a combined volume of up to 1,500 tons of garbage per day.

In the interest of promoting this construction plan and ensuring its successful implementation, the EPA Department of Engineering has commissioned consultancies to carry out feasibility assessment, investigation and planning, as well as technical and financial analysis. Other related departments were also invited to participate in numerous discussions during February, resulting in the formulation of a set of working guidelines. The guidelines stipulate methods for auditing local governments that apply for permission to build garbage recycling and sorting plants.

The draft working guidelines also stipulate that the EPA should bear responsibility for the construction of garbage resource recycling and sorting plants originally initiated by the EPA itself. After local government applications to build plants have been approved, the EPA will either provide subsidies or handle construction of plants. The location of proposed garbage resource recycling and sorting plants must either be within or proximate to an existing incinerator (or landfill), or within regions containing garbage

transport facilities so that after sorting, waste can be easily transported to an incinerator or landfill.

When a local government wishes to apply for construction of a garbage resource recycling and sorting plant, it should submit a "Garbage Resource Recycling and Sorting Plant Application" (垃圾資源回收分選廠申請計畫書) to the EPA for review. The EPA will then invite the local government to give a briefing, after which the EPA will make an on-site survey. After review results are submitted to the EPA budget committee and approved, the EPA will notify the local government to initiate the plan.

Plans are reviewed based on the following principles:

1. Necessity and urgency: based on garbage transport volume and status of incinerators and landfills, topography, transportation system and transport distances involved.
2. Appropriateness and feasibility: based on reuse channels, geographical location, range of service, clearance route plans,

3. Economic benefits: maintenance of sorting equipment (maintenance costs, administration management costs, profit from recycling, savings on cost of incineration and landfill disposal) and financial plans.

Notices concerning the working guidelines have already been issued to local governments on April 29 to solicit their cooperation with this policy.

Waste Management

Taichung County Sets Up Per Bag Fee Collection System

Taichung County will be the second area after Taipei City to implement a per-garbage-bag fee collection system. Days ago, EPA Administrator Chang Juu-en went on an inspection tour of Taichung County and showed strong support of the plans. In light of each township's eagerness to cooperate, the new system could be implemented by as soon as July this year (2004).

Taiwan has a new regional advocate of the per bag fee collection system. On April 28, EPA Administrator Chang Juu-en (張祖恩) accompanied members of the Legislative Yuan's Sanitation, Environment and Social Welfare Committee (衛生環境及社會福利委員會) to Taichung County to make a survey of their per bag fee collection system and food waste recycling operations. Chang showed strong support of Taichung County's plans to adopt

this pay-per-bag policy.

Taichung County will be the first county/city to take the lead in implementing the per bag system starting in July this year. Administrator Chang made an investigation of several townships and on April 28 the Taichung County government gave a briefing of their pay-per-bag implementation plan to the administrator and legislators. Currently only Taipei City has adopted such a fee collection system. Administrator Chang was therefore highly supportive of Taichung County's plans to adopt a similar system this July.

The Taichung County Environmental Protection Bureau (EPB) has indicated that Taichung County requires a large budget to actively carry out preparatory

work. Burdened by such financial constraints, the county is counting on help from legislators and the EPA. During the briefing, the EPB reported on the current progress on the per bag trash collection fee system and assertively sought financial assistance from the EPA. The estimated cost of implementing this plan is close to NT\$94.53 million.

The Taichung County EPB has sent personnel to Taipei City to learn from their experience in implementing the per bag trash collection fee system. It has already discussed the new policy with 21 township chiefs and city mayors as well as the county's local sanitation crews. All townships and cities have shown willingness to cooperate in promoting the plan.

for including medical and industrial waste under one integrated management system. It also strengthened source management and flow tracking, strengthened inspection to prevent environmental crime or illegal dumping of waste, provided guidance on establishing hazardous waste management and disposal facilities, and eliminated investment barriers to encourage private participation in the establishment of waste management facilities.

There are currently 19 operative organizations that manage infectious medical waste, including five Grade A disposal (clearance) organizations, four collective disposal organizations, one integrated waste management center directed by the Ministry of Economic Affairs, and nine hospitals that have installed their own disposal facilities. These 19 facilities have a combined total capacity of over 140 tons of waste per day, sufficient to handle the nation's current daily generation of 50 tons of infectious medical waste. Even with the additional volume of waste generated by hospitals and quarantined residences during last year's SARS epidemic, daily waste volumes never exceeded 75 tons.

The EPA indicates that in order to prevent illegal dumping activities, all infectious and industrial waste clearance vehicles should install GPS equipment to help environ-

Waste Management

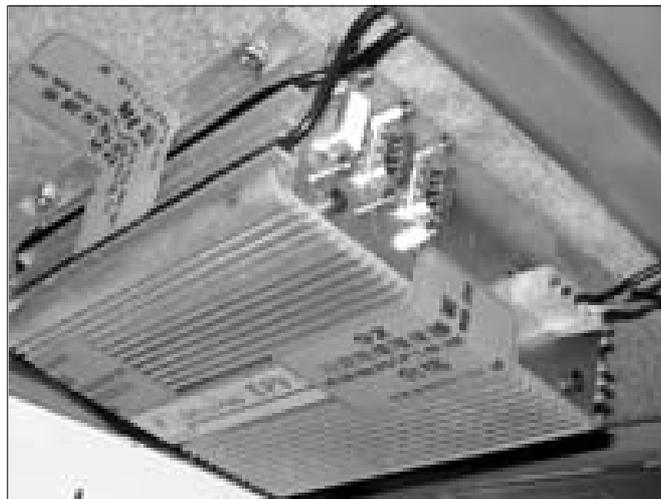
All Medical Waste Clearance Vehicles to Install GPS

Working to strengthen control over the flow of medical wastes, the EPA has stipulated that all clearance vehicles responsible for the collection of infectious medical wastes must install GPS equipment. It is hoped that continued investigation, guidance and discussion will lead to strengthened controls over the flow of medical wastes to ensure a safe environment for all.

The EPA expressed that during the course of medical waste management initiatives from 1987 to 1994, initial efforts focused on establishing management standards and preparing to build medical waste clearance and disposal facilities of adequate capacity. From 1994 to 2001, guidance was provided to medical institutions to ensure that regulations were put into practice, and incremental improvements were made to raise the quality of medical waste clearance and disposal.

Seeking to reinforce domestic industrial waste management controls, the Executive Yuan ratified the National Industrial Waste

Management Plan (全國事業廢棄物管制清理方案) in January 2001. This plan called



GPS tracking devices will be installed on all medical waste clearance vehicles.

mental protection authorities instantly track and monitor their whereabouts. According to the EPA's Industrial Waste Control Center, already 800 waste clearance vehicles have been fitted with GPS equipment, and 164 of these are designated as medical waste clearance vehicles. The EPA uses the information transmitted by these GPS devices to ascertain the route and position of medical waste clearance vehicles. As

for further steps to strengthen control over the flow of medical waste, the EPA has commissioned academic consultancies to investigate and provide guidance to 150 medical institutions and hold three medical waste management symposiums in southern, eastern and northern Taiwan. These measures have strengthened medical waste clearance, disposal and control systems, and ensure a safe environment.

average dioxin concentrations in environmental media near the nation's 19 incinerators are relatively low. The EPA hopes that this fact will reduce nearby citizens' fears of the effects of incinerator dioxin emissions on environmental quality and public health.

The EPA reminds that it has already drawn up strict dioxin controls and emission standards for all waste incinerators (including medium- and small-scale waste incinerators). Revisions have also been made to increase frequency of regular testing of large-scale (municipal) waste incinerators. All testing data is made available to the public so that all citizens are able to monitor incinerators. The future agenda calls for sustained investigation and strengthened pollution controls to keep tabs on environmental quality and public health.

Waste Management

Safe Dioxin Levels Recorded Near Three Incinerators

The EPA has released test results from an inspection carried out in 2003 on dioxin concentrations in the air, soil and vegetation near three incinerators in Hsinchu City, Houli Township in Taichung County and Renwu Township in Kaohsiung County. The results show dioxin levels to be lower than most other nations.

The nation has already completed the construction of 19 municipal waste incinerators, all of which are currently in operation. To forestall public misgivings about dioxin released from incineration plants, the EPA initiated an investigation of dioxin concentrations in environmental media proximate to municipal waste incinerators. Air, soil and vegetation were the targeted environmental media in this inspection. Recently, all inspection related work has concluded for all 19 operative municipal waste incinerators.

The EPA's investigation results show that average dioxin concentrations in air samples taken near three incineration plants during annual investigations ranged from 0.0148 to 0.175 pg (10-12g) WHO-TEQ/m³. Other countries show an average of 0.193 pg WHO-TEQ/m³ for corresponding data. Average concentration of dioxin in vegetation ranged from 0.804 to 12.8 pg WHO-TEQ/g, compared to a corresponding average dioxin value in other countries of 7.2 pg WHO-

TEQ/g. Average concentrations of dioxin in soil ranged from 0.169 to 9.21 pg WHO-TEQ/g, compared to a corresponding average dioxin value in other countries of 19.866 pg WHO-TEQ/g.

The three incinerators targeted in this inspection were relatively new, having been in operation for two years and eight months, two years and ten months, and three years, respectively, at the time of inspection. These newer plants are subject to stricter dioxin controls and emission standards, and accordingly have installed better control facilities that generate less dioxin.

During the investigation, the EPA took emission samples from flues for analysis and compared these with samples taken from the outside air near the incinerators. Dioxin concentrations of these two samplings were dissimilar, showing that the dioxin from incinerator emissions does not have a marked effect on the air of the surrounding environment.

Investigation results show that

Air Quality

Air Pollution Fees for Construction Projects to Adopt Three-tiered System

To address the construction industry's current situation and implement the polluters pay principle, the Construction Air Pollution Control Fee is to be charged by a newly rectified three-tiered system, which redefines types of chargeable pollutants and specifies application of the three-tiered system.

In order to improve air pollution caused by construction projects, on February 27, 1997, the EPA announced the "Construction Air Pollution Control Fee Rate" (營建



The Construction Air Pollution Control Fee is to be charged by a newly rectified three-tiered system.

工程空氣污染防制費收費率) and started to levy construction air pollution control fees from property owners. This measure applies economic incentives in an attempt to reduce particulate pollutant emission and is also consistent with the polluters pay principle.

The current rate is determined by the original amount of particulate pollutant emissions produced by the construction work. As soon as the *Regulations Governing Air Pollution Control Facilities at Construction Sites* (營建工程空氣污染防制設施管理辦法) takes effect from July 1 this year, all construction work will have to take necessary air pollution control measures to reduce particulate pollutant emissions. The former fee rates have been adjusted to reflect the extent of pollution reduction in actual fees.

The current system levies fees on particles of less than $10 \mu\text{m}$ in diameter, but this does not reflect the nature of the pollution or public perception of its effect on the environment and health; therefore, further modifications are required. Secondly, most pipeline construction projects are relatively short-term, thus liable for relatively lower air pollution control fees. As such projects account for a large portion of all cases, a joint filing method has been adopted to prevent great numbers of individual projects from disturbing society and increasing the administrative workload for authorities. Lastly,

under the current system, air pollution control fees for projects in the category of "other construction projects" are calculated by taking 0.3 percent of the contract value. Due to difficulties in defining contract value, this part has also been reviewed and modified.

The modified system includes three rectifications, four additions, and three deletions, highlighted as follows:

1. Leivable Pollutants:

According to the present construction air pollution control system, PM10 pollutants are chargeable, but the total suspended particulates (TSP) produced at construction sites can easily affect sensorial perceptions and may pose a health risk. Therefore TSP should be used to rate pollutants so as to reflect the health and social costs incurred. This new method not only responds to genuine needs but is also consistent with the polluters pay principle.

2. Tiered Rating System:

To cooperate with the management regulations, construction projects of various scales must employ pollution control equipment at corresponding levels. Since this equipment has definite control efficiency, construction projects that install such equipment should be charged accordingly to reflect respective performance. The renewed rating system is three-tiered. Those operations that are not regulated but still install facilities stipulated in the regulations are eligible to pay the appropriate level of construction air pollution control fees as approved by the competent authority.

3. Cross County (City) Construction

Construction sites that cover cross-county (city) areas shall be assigned an appropriate fee rate

according to the scale of work. Air pollution control fees shall be paid proportionally and respectively to county (city) governments.

4. Joint Filing for Pipeline Construction Work

This new addition stipulates that when an industry owner who undertakes several pipeline projects in the same county (city) in a certain period, and the fee for each individual project is below NT\$2,000, the owner shall follow all manners instructed by municipal or county (city) governments to jointly file all of the work at once and shall be exempt from levies once the submission is completed.

The revised fee rates will apply to construction projects that have already started and are projected to last beyond July 1, 2004. However, applicants are free to apply for either the original fee rate or the newer rate depending on which is lower. The revised fee rate will take effect as of July 1, 2004.

Waste Management

Waste Disposal Accounts for Bulk of Local Environmental Expenditures

Data from a survey carried out by the EPA shows that in 2002, over 80 percent of national environmental expenditures in the government sector went to local organizations for solid waste management. Waste clearance, recycling and disposal expenditures accounted for the greater part of these expenses. As for the industry sector, most environmental expenditures were in the area of wastewater and emissions management.

The EPA has been carrying out a statistical survey of environmental expenditures over the last few years to provide figures for policy analysis and Green GDP compilation, and to stay abreast of the level of involvement of each sector in environmental protection and the status of government budgets toward environmental protection. The definition of "environmental expenditure" in this survey adopts the framework of the OECD's Pollution Abatement and Control Expenditures. Except for worker safety, general daily environmental sanitation, ecological conservation, use and management of natural resources, all other expenditures are calculated according to the principles laid down by the OECD. The range of the survey covers government and industry sectors, including private and public manufacture industry and publicly-operated utility companies.

Results of the EPA's Environmental Expenditures Survey show that the nation spent NT\$115.7 billion on the environmental in 2002, split evenly between government and industry sectors. Approximately 83% of government environmental expenditures went to local organizations as 94% of all waste recycling, clearance and disposal operations are handled by local governments. In the industry sector, wastewater management comprised the bulk of expenditures at NT\$21.2 billion and management of emissions was next on the list at NT\$19.2 billion. Overall, results clearly indicate that local administration of waste recycling, clearance and disposal operations comprised the greatest proportion of government sector environmental expenditures, while emissions and wastewater management comprised the greatest proportion of industry sector environmental expenditures.

Government sector environmental

expenditures in 2002 amounted to NT\$52.1 billion, NT\$34 billion (65%) of which was allocated toward waste recycling, clearance and disposal. Funding in this area went into salaries of county, city and township sanitation crews and the construction of waste incinerators and landfills, as well as operation maintenance fees. Giving a breakdown of expenditures in terms of government levels, local government organizations and related administrative expenses comprised the highest proportion at NT\$43.5 billion (83%). A greater part of this went to Taipei County, Taipei City and Kaohsiung City with a total of NT\$21.3 billion, which equals about half of local organization administrative expenditures and nearly 41% of all government sector environmental expenditures. As for central government organizations, the EPA and the Ministry of Economic Affairs spent the most on environmental protection at NT\$3.8 billion and NT\$2.2 billion, respectively. The sum of these two figures – NT\$6 billion – accounts for 67% of the NT\$9 billion in total spent by the central government on environmental expenditures.

Compared to the previous year (2001), the government budget decreased by NT\$9.5 billion in

Noise Control

EPA Develops Taiwan Noise Indicator

In the interest of establishing a simple and concise noise pollution indicator that uses an integrated standard, the EPA has developed the Taiwan Noise Indicator (NI_{tw}). The EPA referred to calculation methods used in the EU's environmental noise indicator (L_{den}) and also considered factors such as noise time frames and classified control zones as well as the degree to which certain noises affect people. The new indicator facilitates noise assessment and management and has already brought about concrete results.

Statistical data compiled by the EPA shows that the number of cases concerning noise pollution

2002. The bulk of this decrease was in the area of water quality control, which saw a 46% decrease of NT\$5.6 billion. Higher costs in this area in 2001 are attributed to the construction costs of Taipei City's sewer systems. Waste recycling, clearance and disposal costs decreased by NT\$4.3 billion in 2002, largely due to the completion of an incineration plant in Changhua County in 2001.

Observations of 16 various environmental quality indicators show improvements in terms of air pollution, water quality, waste problems, and noise pollution in 2002. In terms of environmental factors that more directly affect the public, the 2002 public opinion poll on environmental policies shows that 78% of citizens noticed improvements in terms of household waste management compared to 2001. However, over half of citizens perceived no improvements in the areas of air pollution (59%) and noise pollution (54%). Although environmental quality has indeed improved, citizens have also raised their expectations of environmental quality and therefore may not perceive the results of improved environmental pollution controls. This could explain the low degrees of satisfaction on the polls, and indicate that the government should continue to strengthen efforts in the area of policy advocacy.

increased hand-in-hand with economic development, soaring from 7,779 cases in 1988 to 28,507 cases

in 2002. In just one year, this figure rose to 31,659 last year (2003), becoming the main topic of environmental complaint cases. Despite the vast amount of human and material resources invested by all levels of environmental organizations in handling these cases, results are not readily apparent due to the diverse nature of complaints concerning noise pollution.

The EPA indicated that Taiwan's current policy on assessing noise pollution and the effectiveness of measures taken is based on the same model used by Japan. The method is based on the percentage of days in which environmental noise exceeds a certain standard. It then considers both the number and content of public complaint cases and refers to this information when planning related control policies and plans. However, these two assessment indicators have their limiting factors.

Complaint cases involve other factors such as the relative impacts to citizens and the quality of noise. Moreover, Taiwan's noise standards are categorized into four control areas and four time periods according to the control zone and the work and rest patterns of local inhabitants. This system presents 16 different control standard values for inspectors to measure against and is quite complicated to use.

The EPA explains that the new in-

dicator adopts a weighted adjustment based on the assumption that citizens have different perceptions of noise in different places and at different times of the day. This adjustment is applied to compensate for these differing perceptions, depending on time and place. For example, in an extremely quiet Class I noise control zone (such as a national park) during the evening, people are quite sensitive to noise. In contrast, in a Class IV noise control zone (such as an industrial zone) during the daytime, the degree to which people are disturbed by noises is relatively lower. The EPA regards people's normal living activities in Class II noise control zones during the daytime as the standard noise level. Applying a weighted adjustment to these time periods and control zones brings a greater level of consistency to the relative perception of noise for each time and place.

Noise monitoring stations collected 4,331 sets of effective data from 1999 to the end of the third quarter of 2003. The weighted values added for each time period were: five decibels for early morning (05-06 hrs), none for daytime (07-18 hrs), five decibels for the evening (19-22 hrs), and ten decibels for the late night period (23-04 hrs).

Weighted values added for each

noise control zone were based on normal years when no special disruptive activity is taking place and were calculated as such: four decibels were added to Class I zones, none were added to Class II zones, one decibel was subtracted from Class III zones, and three decibels were subtracted from Class IV zones. The formula used in calculating the EU's noise pollution indicator, L_{den} , was referred to by taking the national noise monitoring station station/day 24-hour $L_{Aeq,1hr}$ values and applying the weighted adjustments for time periods and zone type. The resulting value is now what is termed as the Taiwan Noise Indicator (NI_{tw}).

The EPA refers also to OECD research, which indicates that sounds in excess of 60 decibels are known to affect human health. The EPA has used the new Taiwan Noise Indicator (NI_{tw}) to reanalyze environmental noise monitoring data recorded in each of Taiwan's counties and cities from 1999 to 2003.

Analysis results show that the percentage of days in which noise levels averaged more than 60 decibels dropped from 59% in 1999 to 31% in 2003. The number of counties and cities that experienced over 50% of days with noise levels over 60 decibels decreased from 14 counties/cities in 1999 to five in 2003. Conversely, four counties and cities experienced under 20% of days with noise levels over 60 decibels in 1999, compared to nine counties/cities in 2003.

The EPA emphasizes that the Taiwan Noise Indicator is currently still in the developmental stage. Most developed countries have done very little research on environmental noise and it is difficult to obtain information in this area. Nonetheless, this indicator can be used by government agencies as a reference for planning and implementing noise control policies and measures. The indicator will prove

Environmental sound volume criteria from general areas

Time Frame / Control Zone	Early morning 5:00-6:59 2hrs	Daytime 7:00-19:59 13 hrs	Evening 20:00-21:59 2hrs	Late night 22:00-4:59 7hrs
I	45	50	45	40
II	55	60	55	50
III	60	65	60	55
IV	70	75	70	65

Units: $L_{Aeq,1hr}$ dB(A)

Note: Duration and criteria are identical for early morning and evening periods

useful in comparing environmental sound volumes between different counties and cities to gain command over the effectiveness of noise quality improvement measures. The EPA is open to sug-

gestions from all fields of study regarding this topic in hopes that research and development in this area can be more helpful to environmental protection.

The EPA has requested Hualien County to announce the area as a pollution control site according to Article 11 of the *Soil and Groundwater Pollution Remediation Act* (土壤及地下水污染防治法). Taiwan Cement is requested to abide by the procedures in the Act and immediately proceed with follow-up removal of pollutants, determining pollution boundaries and carrying out soil remediation. Apart from jointly supervising follow-up remediation work, the EPA will also assist the Hualien County EPB in bringing in scholars and experts to help audit remediation plans proposed by Taiwan Cement Corp.

In response to concerns whether on-site pollution will continue to spread to the surrounding environment, the EPA has indicated that the pollutant was discharged over two years ago, and consists of heavy oil with a high boiling point, which spreads very slowly through soil. The underground brick structure has prevented the oil from dispersing, and has allayed any suspicions that the oil may have rapidly spread to adjacent soil.

Soil & Ground Water

EPA to Strictly Oversee Remediation of Taiwan Cement Waste Oil Pollution Site

In early April, legislators and environmental groups voiced outrage over Taiwan Cement Corp's illegal dumping of waste oil into old bomb shelters in Hualien County. The EPA has requested the Hualien County Government to announce the area as a control site and to proceed with necessary cleanup and land restoration work. The EPA will assist with inspections and will jointly supervise remediation work.

An alarming pollution incident was discovered in Hualien County this February, in which Taiwan Cement Corp(台灣水泥) arbitrarily dumped waste oil into old underground bomb shelters. Several environmental groups, including the Taiwan Environmental Protection Union jointly pressed charges on April 8 against Taiwan Cement for illegally discharging industrial waste. The environmental groups requested the EPA to strictly oversee Taiwan Cement's Hualien branch during clean up of the waste oil.

Taiwan Cement's Hualien factory does not generate hazardous industrial waste under normal circumstances. The pollution in this instance was heavy oil generated by the heavy oil centrifuge of the factory's power generator at a rate of three to five tons per month. Acting in response to citizen reports, a Hualien local prosecutor led police and the Hualien County Environmental Protection Bureau (EPB) personnel to the Taiwan Cement factory grounds on February 19 to investigate the pollution incident. Preliminary excavation work revealed a 1.5 meter by 0.7 meter brick tunnel filled with oily

sludge and earth.

Based on examination results of soil and groundwater samples taken by Hualien EPB, the heavy metal and total petroleum hydrocarbons (TPH) contained in samples exceeded soil and groundwater pollution control standards. For example, arsenic levels were 284 mg/Kg (60 mg/Kg is the standard), nickel levels reached 910 mg/Kg (200 mg/Kg standard), and TPH-D (diesel) levels were found to be 9910 mg/Kg (1000 mg/Kg standard). Groundwater tests in five monitoring wells near the site all complied with control standards.

The EPA indicated that the factory's inappropriate disposal of waste oil is in clear violation of the *Waste Disposal Act* (廢棄物清理法) and the Hualien County EPB has punished the company accordingly. Hualien's local prosecutor is currently investigating whether the polluting behaviour is subject to disciplinary action as per Article 46 of the Act.

As for remediation work, the EPA has verified that Taiwan Cement Corp has undoubtedly contaminated the soil and groundwater.

Activity

Earth Day: President Chen Calls for Conference on Energy Policy

On Earth Day, April 22, President Chen Shui-bian made an appearance at the 2004 NGO Environmental Forum held by citizen groups and expressed his wish for Taiwan to not only transform into a "No Nuke Homeland" in the near future, but also to regain the qualities implied in its former name "Formosa". Chen promised to hold a national conference in the near future on energy and sustainable development, as well as expedite environmental protection initiatives in Taiwan.

News Briefs

Cross-Regional Waste Management Cooperation to Be Rewarded

The EPA announced the *Guidelines for Awarding Subsidies to Municipal and County (City) Governments for Mutual Cooperation in Disposal of General Waste* (直轄市及縣(市)政府互助合作處理一般廢棄物獎勵補助要點) on April 26, 2004 to encourage cooperation between municipal and county (city) governments in waste management, as well as conserve administrative resources and raise the efficiency of general waste management. In the future, awards will be issued for cooperative management of general waste between municipal, county and city governments, in which 1) both parties provide incinerators, or 2) both parties provide landfills, or 3) one party provides incineration services and the other party provides landfilling services. In addition to issuing awards, the EPA will provide monetary assistance of up to NT\$30 million based on the form of cooperative management. Each local government is eligible for this assistance for a maximum of three years.

Tax Credit Benefits Extended for Recycling and Disposal Enterprises

December 31, 2003 marked the deadline for waste recycling, clearance and disposal organizations to make use of tax credit toward pur-

chases of equipment or technology. In order to continue assistance to waste clearance and disposal organizations and recycling enterprises, as well as to reduce operating costs, spur investment, raise the quality of industry, upgrade waste recycling, clearance and disposal industries, and expedite changes to industrial structure, the EPA has revised the purchase deadline in regulations concerning promotion of industrial upgrades. The main revisions are as follows:

1. The period for purchasing equipment or technology using tax credit is from January 1, 2004 to December 31, 2005. For parties that purchase equipment or technology through financial lease agreements, the purchase date and delivery date is established in the regulations.
2. Those companies that purchase equipment or technology after January 1, 2004 but before this new revision has become effective will still be covered under the new revision.

New EIA Requirements for Stone Extraction Sites

Based on Article 5~2 of the *Environmental Impact Assessment Act* (環境影響評估法), on April 23 the EPA announced a draft stipulation that requires an EIA to be performed when any organization extracts stones on non-sloped terrain within a tap wa-

ter source quality protected area where there is reason to suspect detrimental impact to the environment. According to the revised draft, an EIA must be carried out when any organization extracts stones on non-sloped terrain within a tap water source quality protected area and matches any one of the following three criteria: 1) excavation area is located on the same land number; 2) excavation area contains consecutive land numbers; 3) excavation areas in the same drainage area and within 500 meters horizontal distance (in this case, EIAs shall be carried out on all excavation areas).

Seven Counties/Cities Excel in 2003 Local Environmental Performance Evaluation

The EPA has announced the results of the local environmental protection organization performance evaluation for the year 2003. Seven counties and cities showed first-rate performance, including Taipei City, Kaohsiung City, Taipei County, Kaohsiung County, Taichung City, Ilan County and Chiayi County. The other counties and cities were also noted for their good overall performance. Taipei City was praised for its exceptionally outstanding performance last year due to its proactive handling of garbage landfill operations and its cooperation in handling infectious medical wastes during the SARS epidemic.

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