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In this issue . . .

lawsuit will be brought against them unless relevant regulations are promptly enforcement.

Feature Article

Taiwan's Recycling System Moves Forward

In the past ten years, Taiwan's average annual growth rate of municipal waste has reached nearly 6%. In 1998, waste treatment capacity had already exceeded 9,030,000 tons, more than 40% of which could have been recycled and re-used. Consequently, the implementation of recycling efforts has become an urgent priority.

To effectively remedy Taiwan's recycling system, and to strengthen the island's recycling enterprises, the EPA recalled previous provisions that had entrusted all of Taiwan's recycling efforts to eight private recycling foundations and, in July of 1998, set up a "Resources Recycling Fund Management Committee" (hereinafter referred to as the "Fund Management Committee") to comprehensively manage recycling affairs. Over the past year, recycling regulations have gradually been established, the amount of recycling has steadily grown, and auditing of regulatory violations has become more effective.

The growth of recycling enterprises:

(1) Recycling of scrap containers and dry-cell batteries:

From July of 1997 to June of 1998, the certified monthly average of scrap containers recycled was 6,672 tons; and from July of 1998 to the present, this amount jumped to 12,229 tons. Since December of 1998, the total certified amount of dry-cell batteries recycled was 13.5 tons. From November 1 of this year, comprehensive recycling of all types of dry-cell batteries will commence.

(2) Recycling of scrap vehicles and tires, lead storage batteries and used lubricant oil:

From July of 1997 to June of 1998, the certified monthly average of scrap vehicles recycled was 19,519 tons, and from July of last year to the present, 24,562 tons have been recycled.

From December 1997 to June 1998, the certified amount of lead storage batteries recycled totaled 1,780 tons, and between July 1998 and March of this year, the recycled amount increased to 2,461 tons. Recycling amounts of waste tires and lubricants, which became certified starting January 1998, increased from 4,122 tons and 597,240 liters, respectively, between January and June 1998 to 5,448 tons and 811,326 liters, respectively, between July 1998 and March of this year.

(3) Recycling of scrap home appliances and computer related articles:

The certified amount of scrap home appliances recycled was 2,000 items, from March to June of 1998, and from July of 1998 to the present, this number significantly increased to 91,273 items.

The certified amount of computer related articles recycled has increased from 5,060 items before July of 1998, to the present amount of 21,013 items since July of last year.

(4) Recycling of Cars and Motorcycles:

From December 1, 1998, a policy has been implemented to provide incentives to citizens to replace older vehicles with newer (less polluting) ones. Up to the present, 29,238 submitted applications for subsidies have been reviewed, of which 1,425 cases were returned for not meeting the criteria. 29,131 cases were reviewed and approved, and among these, 27,350 cases have already received financial payment. Moreover, those who have decided not to purchase another automobile have dialed the special incentive program application telephone number (0800085717), and up to May the 25th of this year, 18,852 applicants have submitted their applications for incentive payments in this program.

In addition to promoting the stable growth of recycling efforts, the fund management committee will continue promoting establishment of the recycling system. Recycling points with waste recycling containers have already been set up. Of these, 17,868 recycling points provide compensation for goods to be recycled and 5,353 of the recycling points do not. Since July of 1998, many public areas have been selected for the placement of recycling containers, including five airports, four highway rest-stops, five train stations, Yang-ming Mountain National Park, and so on.

Concurrently, the EPA has also aggressively promoted the establishment of a community and school recycling system which now includes 242 community and school organizations and groups which have applied for subsidies. To date, there are now 2,802 recycling points located at schools and 1,188 points set up in communities around Taiwan. Remote mountain regions around the island now have 768 of these recycling points, and bids have already been issued for recycling enterprises in seven districts to collect, for a guaranteed price, recyclable articles in mountain areas once every two months.

As the EPA aggressively promotes a recycling system with zone-based responsibility, related questionnaires have already been sent out to communities and schools. The EPA has also been in active discussions with Taipei City's Environmental Protection Bureau, the Ilan county government, and the Green Consumer Foundation regarding the *Plan for Demonstrating Zone-based Recycling*, and by July 1, 1999, public bidding for the comprehensive implementation of zone-based responsibility recycling plans will be announced.

To insure a smooth implementation of the recycling plan, the EPA will actively push for the development of the technical skills required for the task of collection, recycling and reuse of these resources. In recent years, the results of the EPA's efforts have included successfully assisting firms to perform the research and development on

combining recycled rubber powder (obtained from scrap vehicle tires) and non-foamed PS (Styrofoam) in order to make a secondary material that can be used to make shoe soles. The EPA has also developed plans for using scrap tires as a fuel source in cement kilns and as a construction material. These developments have thereby resolved the scrap tire problem that has plagued Taiwan's environment for years. By November 1998, a total of nine treatment organizations were able to treat 6,620 tons of recyclable waste per month, and with the addition of four treatment plants, this figure can be increased to a total of 19,000 tons per month.

In terms of management, the EPA has already established 44 storage firms (in 67 sites) for scrap home electrical appliances. These sites have increased storage capacity and are now instrumental in resolving the many years of environmental problems resulting from discarded home appliances. Concerning waste household appliances, the EPA is developing operating permit criteria for electrical appliance collection and processing facilities as a means to resolve the problems associated with the final treatment and reprocessing (reuse) of discarded household appliances. These criteria, which were developed during a February 11, 1999 public hearing attended by academics and experts, have been incorporated into the recycling and treatment organization contracts. Additionally, 90 organizations have registered with the EPA to handle the collection and clearance of waste lubricants, and five organizations have registered to treat waste lubricants, thereby raising capabilities to recycle and re-use Taiwan's waste lubricants.

A Look Inside the EPA

Resource Recycling Fund Management Committee

To reduce municipal waste and promote resource recycling, the EPA has especially established the Resource Recycling Management Fund. To safeguard, supervise and plan the fund's operations and to discuss and promote each item of recycling, clearing and treatment, the fund is managed by the "Recycling Fund Management Committee (hereinafter referred to as the "Committee"). The position of Committee chairman is held by the EPA administrator, and the position of Committee vice-chairman is held by one of the EPA's deputy administrators as appointed by the EPA administrator. The Committee is composed of 15 to 21 members, who are appointed by the EPA administrator and drawn from government agencies and industrial and commercial groups. Academics, experts and impartial members of society are also appointed as members. The term of office for each member is two years and is renewable. Membership positions are non-paid positions.

The director general of the EPA's Bureau of Solid Waste Management serves as

executive secretary of the Committee and is responsible for carrying out the orders of the Committee chairman, as well as for general management affairs. The position of Committee deputy executive secretary is held by deputy director general of the Bureau of Solid Waste Management. All group leaders and general staff members will be selected according to relevant regulations on an as needed basis, and if necessary these staff may be drawn from the ranks of EPA staff.

The Committee is divided along functional lines, and internal units are organized according to recycling resource categories, as follows:

The Comprehensive Planning Group handles general planning and general affairs management; research and development; public recycling awareness and public relations; the contracting and auditing of financial organizations; public surveys and questionnaires; a public consultation service line; registration of recycling related bodies; and other related matters.

Group One is responsible for establishing a recycling system for general waste products and containers; manages subsidies and business operation and recycling capacity; audits processing capacity and performs other related tasks. Currently, waste items that have been included in mandatory recycling controls include iron cans, aluminum cans, PET bottles, glass bottles, foamed and non-foamed PS containers, PVC containers, and PP/PE containers, paper containers (such as take-out boxes and disposable utensils), aseptic packaging containers, dry-cell batteries, and scrap pesticide containers.

Group Two handles the setting up of a system for recycling scrap vehicles, as well as overseeing related subsidy disbursements and the auditing of production/handling quantities, business operation volumes, and recycling and treatment quantities. At present, the publicly announced vehicles that can be recycled include automobiles and motorcycles.

Group Three takes care of establishing a management system for the recycling of discarded tires, lubricants and lead batteries; and managing related subsidies and auditing of operation volume and recycling capacity, and auditing of treatment capacity and other related tasks.

Group Four is in charge of establishing a comprehensive electrical appliance recycling and treatment system and handling the auditing of related subsidies, as well as the auditing of operating volumes, recycling and treatment quantities. Items that have been designated as recyclable in this category include waste electrical appliances such as televisions, refrigerators, washing machines, air conditioners, and heaters.

Group Five is responsible for establishing a recycling system for PC-related items, and manages subsidy disbursements and the auditing of operating volume, and recycling and treatment quantities and other related affairs. Current publicly announced

recyclable PC-related items include mother-boards, hard disks, monitors, power supplies, and notebook computers.

As needed, the Committee can separately set up technical advisory committees. Members of these committees are appointed by the Committee chairman and include industry representatives, academics, and experts. Each committee will have one convener, appointed by the Committee chairman, and all positions will be non-paid service position.

Dry-cell Batteries to be Comprehensively Recycled

The plan to comprehensively recycle dry-cell batteries was recently completed and announced on May 4, and will formally come into force in November. Once the plan goes into effect, a differential fee rate will be adopted. For batteries whose mercury, cadmium, and lead content exceeds an EPA-designated standard, fee rates will be doubled. After the comprehensive recycling policy is implemented, it is expected that the number of batteries to be controlled under the new plan will dramatically increase from the present annual amount of 20 tons to several thousand tons. The annual amount of recycling fees paid out will total at least 77,000,000 NT dollars.

Suggestions for a comprehensive recycling plan (as opposed to a policy of sorting based on battery type) for dry-cell batteries have been coming from diverse sources for quite some time. In public hearings held in November of last year and January of this year, environmental groups and recycling enterprises, as well as representatives from other industries, have openly supported the idea of a comprehensive recycling plan for dry-cell batteries. After extensive research into the matter, the EPA publicly announced requirements for comprehensive collection and recycling of dry-cell batteries. A transitional period of six months has been given to related firms and industries until the law comes into force on November 1of this year.

In order to encourage the reduction of amounts of mercury, cadmium, and lead in batteries, if the amount of these metals exceeds the standards, the fee will be doubled. This policy was approved during the third provisional meeting of the Fee Rate Committee. (See the accompanying table)

Just recently, the EPA entrusted Yuan-Chr University to carry out a plan to initiate standard tests for metal content of dry cell batteries, and to research standard testing methods to establish a future basic standard for the lead, mercury, and cadmium content of all batteries.

Estimates indicate that Taiwan’s yearly use of batteries is at least 3,500 tons, but the present quantity of batteries listed for recycling is less than 1%. After implementation of the comprehensive recycling system, the annual amount of batteries to be brought under control will increase dramatically from the present amount of 20

tons to several thousand tons. The estimated recycling fee rate per kilogram will be approximately 22 NT dollars to reach an annual total that will exceed 77,000,000 NT dollars.

Once the scale of recycling expands, costs associated with enterprise registration, reporting and fee collection will increase accordingly. On the other hand, not only is it easier to promote public awareness, the per unit cost of collection and separation will effectively decrease. It is hoped that the scale of recycling and processing will increase to an annual amount of fifty million tons, and the nation can take advantage of a thorough and effective recycling system.

Additionally, the EPA will promote a systematic plan to include assistance in setting up waste battery recycling points and processing capabilities for the related industries. According to the policy plan, by the end of 2000, recycling points will total 6,000 in number which will achieve a projected monthly recycling rate of 25%, and the overall goal of constructing island-wide collection and processing centers will be one step closer to accomplishment.

Proposed Fee Rates for Comprehensive Battery Recycling

Category	*Proposed fee rate (NT$/kg)*	*Current fee rate*	*Percentage change*
Non-rechargeable batteries			
Manganese zinc	22 (44)	--	--
Cylindrical alkali	22 (44)	89.45	-75%
Cylindrical lithium	35 (70)	--	--
Button-style manganese zinc	200	279.51	-28%
Button-style lithium	200	279.51	-28%
Silver Oxide	200	279.51	-28%
Mercury Oxide	200	279.51	-28%
Zinc-air	200	--	--
Rechargeable batteries			
Nickel cadmium	28	50.52	-45%
Nickel hydrogen	2 (4)	--	--
Lithium	11 (22)	--	--

Notes: figures in parentheses represent the doubled fee rate for batteries whose heavy metal content exceeds a basic standard.

Control of Waste Electroplating Solutions to Proceed in Two Stages

The illegal disposal of waste electroplating solutions and sludge is a serious problem in Taiwan. The only existing domestic receiving and treatment center for this waste is currently achieving a processing rate of only 2% of its design capacity. In light of this situation, the EPA has resolved to enforce control of this waste in a two-stage plan. In the

first stage, the EPA will require that a certain number of electroplating firms hand over an adequate supply of waste to the processing center to demonstrate its operation capacity. In the second stage, a policy will be implemented to provide for the expansion of processing capacity to resolve the current deficiencies.

Taiwan's electroplating industry has prospered to the extent that the current total value of electroplating-related products is more than one hundred ninety billion NT dollars. However, the amount of hazardous waste in the form of solutions and sludge resulting from the production of these products has consistently eluded effective control for quite some time. In response to the serious problems caused by the illegal dumping of this waste, the EPA is determined to create a two-stage plan to strengthen enforcement of regulatory controls over solutions and sludge

According to statistics, there are more than 3,000 electroplating companies in Taiwan at present, located primarily in Taipei and Taoyuan counties, in both Taichung city and county, and in Changhwa and Tainan counties. Among these, the 1,000 or so legal operations produce approximately 80% of Taiwan's electroplated products, and the 2,000 or more illegal operations are responsible for around 20% of production.

The toxic substances most frequently found in electroplating solutions and sludge are cyanide and chromium. According to data from the first three quarters of 1998, domestic enterprises had used a total of 3,800 tons of cyanide and 59,000 tons of chromium. Comprehensive inspection of the waste solutions and sludge generated during the use of these toxic substances has still not been implemented.

Not only is control as of yet insufficient, it has also been found that a large amount of legal treatment equipment is currently unused. Presently in Taiwan, potential treatment centers for handling waste electroplating solutions and sludge do exist, namely the IDB's waste electroplating processing demonstration center, and metal surface treatment zones in the Chiang Bing and Ta-Yuan industrial parks. To add to the problem, due to the high cost of land in the Chiang Bing area and because United Water Treatment Co. in the Ta-Yuan Industrial Park has consistently been unable to acquire the appropriate registration, only the demonstration center is currently able to treat waste electroplating solutions.

Moreover a contradiction exists, namely, the center is the only legal facility which can handle such waste but only 2% of its treatment capacity is used because electroplaters do not hand over waste solvents for treatment.

Concerning hazardous electroplating sludge, handling and treatment capabilities are still inadequate. Based on an initial EPA investigation, the majority of the contaminated sludge remains inside electroplating facilities. Presently, 120 tons of sludge remains in the Ta-Yuan industrial park, 20 tons is held in the demonstration center, and 118 electroplating firms are storing a total 200 tons.

In order to prevent potential contamination from the sludge, the EPA is determined to strengthen regulatory enforcement in two stages. In the first stage, a certain number of electroplaters will be required to hand over an adequate amount of the sludge to the demonstration processing center, with the aim being to promote the eventual treatment of the entire amount of waste. In the second stage, the emphasis will be placed on resolving the deficiency of treatment capacity, with the overall goal of expanding domestic treatment capabilities.

Recently, the EPA has once again sent out related questionnaires, has investigated the actual conditions regarding solution and sludge treatment, and has requested that electroplaters clearly report methods and processing time frames for the treatment of the waste solutions. As part of the first stage, on-site inspection will also commence immediately, focusing on 200 electroplating facilities.

Regulations for Industrial Waste Clearance and Treatment to be Streamlined

Regulations concerning waste clearance and treatment organizations will be streamlined in many areas, and restrictions on geographic operating areas will be relaxed. Those enterprises that have been required to report on-line, will no longer have to complete the 6-copy manifests previously required for the clearance, transport and treatment of waste. Furthermore, a legal basis for first receiving, then treating industrial waste will be established. The draft of the management regulations stipulates that treatment organizations may appoint a trustee, such as a financial organization, to temporarily hold the treatment fee. Once treatment of the waste at issue has been completed, the waste treatment organization can receive the treatment from the appointed trustee.

In order to simplify management procedures and enhance market mechanisms, the EPA recently completed significant amendments to the *Regulations Governing Management Assistance to Public and Private Waste Clearance and Treatment Organizations*.

In drafting the amendments, the EPA studied the lifting of restrictions regarding industrial waste clearance and treatment regions. In the future, clearance and treatment of industrial waste operations will no longer be restricted to certain geographical areas. Additionally, for hazardous industrial waste clearance and treatment firms required to report on-line through the Internet will no longer be required to complete 6 copy manifests.

The EPA is also looking into measures to liberalize restrictions on temporary storage sites so that firms that intend to construct treatment facilities can initially receive and store industrial waste before actual operations of the sites begin. Treatment facilities can also begin collecting treatment fees from entrusted parties so that the

period for receiving investment will be shortened and the goals for encouraging investment in hazardous waste treatment facilities will be met. To this end, the EPA has included in the aforementioned amendments a legal basis for receiving and storing waste, and collecting necessary fees, prior to actual treatment.

The draft amendments also stipulate that, in the future, Class One organizations may first store hazardous waste that has already been approved for treatment, provided such organizations have applied for permission to treat hazardous industrial waste, have received an installation permit and installed storage facilities, and having had this function reviewed and approved. Moreover, everyday operations of temporary storage sites must be recorded item by item and reported on-line to the EPA. Reported records must be retained for a period of more than ten years for auditing purposes.

In addition, the draft allows the storage and treatment fee rates to be set by firms themselves. Fee rates, however, must also be approved by the EPA. Treatment fees should be stipulated in the management contract drawn up by the entrusted parties and the treatment organizations. After the batch of waste sent to the entrusted parties has been treated and has been completely inspected and verified by the verification unit, the entrusted parties may receive the treatment fee upon producing a serial number and documentation that provides proof of treatment

Because local environmental agencies have taken a very cautious attitude toward measures to liberalize temporary storage facilities, and have expressed concerns about the system's overall layout, the EPA will in the very near future initiate new rounds of discussions with local authorities concerning the content of the draft amendments.

Island-wide Inspections for Soil and Groundwater Contamination in Industrial Parks to Proceed

The EPA intends to engage in island-wide groundwater and soil sampling and testing in areas where organic chemical compounds are used, produced and stored, such as in key industrial parks where petroleum refineries, pesticide factories and other sites with potential subsurface pollution are located. Thirty areas island-wide have been targeted for 203 groundwater and 657 soil samples. Initial testing and inspection will be completed in the aforementioned areas by the end of June of this year. The EPA will also suggest to the Industrial Development Bureau (IDB) to develop a comprehensive plan of action once the inspection results of those industrial areas suspected of containing pollutants have been reviewed.

The EPA last year assisted local areas in the promotion of a plan to comprehensively inspect industrial park soil and groundwater quality, but this plan's implementation has been postponed to the end of this year because subsidies have been temporarily frozen by the Legislative Yuan.

The proposed plan will cover the sampling of ground water and soil to trace organic compounds produced, used or stored in industrial parks, oil refineries, pesticide factories, and so on, in key industrial centers and other areas. According to plans, thirty sites island-wide will undergo inspection, including those in twenty different industrial parks such as petrochemical industry zones, science parks, scrap metal industrial parks and oil refinery industrial parks.

Under the proposed plan, the inspection of the areas will be divided into two stages of implementation. In the first stage, areas with potentially high concentrations of pollution will be identified primarily through soil gas analysis and, if necessary, through soil and groundwater sampling and analysis. The second stage will involve conducting more detailed inspections and analyses of groundwater and soil in these areas.

There are currently 203 planned samplings and analyses of groundwater quality and 657 for samplings and analyses of soil planned, and this number is expected to increase in the near future. The analyses will focus on 60 types of volatile organic compounds such as dichloroethylene, 32 semi-volatile organic compounds such as phenol, and heavy metals such as lead, cadmium, and mercury. At several factories or industrial parks, analyses to trace organochlorine compounds, organophosphates, salts of carbamic acid and other pesticide related compounds will be conducted.

Up to the present, 513 soil and 151 groundwater analyses have already been planned and initial inspection will be completed for these by the end of June of this year. Based upon final analysis results, the EPA will target those areas suspected of contamination and assist industrial park authorities and local environmental agencies in implementing related follow-on tasks.

Before implementation of the plan, on February 11 of this year the EPA called together related industrial park authorities such as the Industrial Development Bureau (IDB), under the Ministry of Economic Affairs, and the Taiwan Province Construction Office for a coordinating meeting. The EPA has asked these agencies to pay considerable attention to the results that follow from the plan, and coordinate their activities with the policy measures implemented after the inspection procedures have been completed. The EPA will also advise the IDB and related organizations by fiscal year 2001 to develop remediation plans for those industrial parks that have been found through the analyses to have a high potential of being affected by pollutants. This will lead to thorough improvements in the quality of groundwater and soil in those areas.

Further Large-scale Amendments Proposed for Waste Disposal Act

The EPA recently completed drafting further amendments to Taiwan's Waste Disposal

Act. Originally planned amendments included extensive changes to management structure and content of the Act, including the addition of criminal liability and significant tightening of penalties. The current draft of the amended Act contains ten chapters and 101 articles. Added provisions include those for recycling management, control of polluting behavior, awards and incentives, and government-sponsored assistance. In order to further industry responsibility for end-of-waste-life-cycle responsibility, the draft includes policy strategies such as industrial park internal waste treatment and the establishment of pollution control funds. The draft has been submitted to and awaits approval by the Executive Yuan.

In October of last year, the EPA submitted an amended *Waste Disposal Act* to the Executive Yuan (EY). Shortly thereafter, however, the EY instructed the EPA to comprehensively reconsider and strengthen the current solid waste management system, especially in light of recent serious regulatory violations. As a result, the EPA recently made significant revisions to the original amendments reinforcing the structure and content of the Act.

The original draft amendment's 36 articles have been expanded to ten chapters and 101 articles in the new draft. Provisions concerning general waste clearance and treatment and industrial waste management have all been strengthened, and the legal basis for control mechanisms such as data reporting requirements, site auditing, suspension of operations and permit revocation has been reinforced. Punishments have also been made significantly more severe.

The new draft also includes new stipulations on management and control of waste recycling and polluting activities, and provisions concerning awards and incentives and government-sponsored assistance. Criteria for enforcing recycling activities and punishing pollution activities have also been made more thorough.

In response to frequent public calls for strengthening waste management, the EPA has added provisions supporting the principles of industry responsibility for end-of-waste-life-cycle responsibility and internal industrial park waste treatment. In the future, firms and relevant industry competent authorities will be held much more closely responsible for the waste they produce.

Moreover, in order to promptly deal with the myriad cases of illegal waste dumping, the new amendments will establish pollution prevent funds. The draft stipulates that the EPA may, according to the characteristics, quantity and treatment methods of waste produced or imported, collect industrial waste pollution control fees and establish a related fund.

In terms of recycling and activities which generate general and industrial waste, the draft greatly strengthens criteria for levying fines. The draft expands the EPA's scope of authority to include production processes and raw material selection. Under the

following conditions, the EPA will cooperate with other relevant authorities to order the firm at issue to modify, within a designated time frame, its production process, use different raw materials, decrease pollutant content, or other make other modifications if --

1. during the production process, a firm produces waste which is seriously polluting or difficult to clear and treat;
2. a firm produces or imports materials with high pollution characteristics, thereby making waste clearance and treatment difficult;
3. a firm produces waste which is potentially carcinogenic, teratogenic, mutagenic, or has the potential to cause infertility or otherwise seriously endanger human health; or
4. a firm has the potential to create other forms of serious environmental pollution.

Additionally, in order to encourage industry to increase investment in waste treatment facilities and technology, the draft stipulates that firms which invest in such items, as well as in related research and development, can deduct 5% to 20% of related expenses from annual operating taxes. Details regarding deduction applicability, time frames, and deduction rates will be reviewed and set every two years by the EPA in conjunction with other relevant agencies.

Another major characteristic of the draft is the strengthening of penalties. Thirty-five articles concerning punishment have been added or revised. Amendments include expanding the scope of criminal liability, buttressing penalties on illegal behavior, and raising fine levels. For example, if a regulatory violation regarding hazardous industrial waste causes the death of an individual, the person committing the offense can be sentenced to between seven years and life imprisonment. The punishment for committing a single act of illegal industrial waste dumping is up to three years in prison, forced labor, and/or a fine of between 60 thousand and 3 million NTD.

Before May 20, the EPA expects to return the draft amendments to the Executive Yuan for approval.

Future Soil Pollution Control Standards to Incorporate Land Use Considerations

The EPA previously invited scholars to draw up a set of soil contamination control standards. Preliminary results recommend listing eight heavy metals for restriction and setting separate control standards according to the three land zoning categories in the ROC, namely agricultural, residential & park, and industrial/commercial. Furthermore, an initial 97 organic pollutants have been listed.

The draft of the *Soil Pollution Control Act* was formally submitted to the Executive

Yuan for deliberation. This act is intended to provide a foundation upon which to implement administrative control over soil pollution prevention work in Taiwan. This draft Act includes soil pollution monitoring trigger values, control standards, and remediation standards. The EPA requested the assistance of National Taiwan University to research standards appropriate to soil pollution issues faced in the ROC. This research is nearing completion and initial findings were submitted recently to the EPA.

This report sets control standards that distinguish between the three major land use categories of agricultural, residential & park, and industrial/commercial. Research was conducted based on information gathered from the Taiwan Area Soil Contaminants Database and from local environmental conditions and made use of various other countries' experiences in soil pollution control.

Control Standards for Heavy Metals in Soil (draft) [mg/kg]								
Land Use Category	Arsenic	Cadmium	Chromium	Copper	Mercury	Nickel	Lead	Zinc
Agricultural	40	5	400	200	2	200	500	500
Residential & Parks	50	5	250	400	2	200	2000	1000
Industrial / Commercial	50	20	800	500	10	500	2000	1500

The report recommends that control measures start from a baseline of total quantity control as this is the approach taken by most countries when setting soil pollution control standards. Other scholars working on the research also recommended that concentrations of bioeffectiveness should be established, however the Taiwan University team suggested that a date be set later, based on actual need.

German, Dutch, and British standards served as principal references in setting heavy metal control standards for agricultural land. Also taking into consideration the upper limits of heavy metals in Taiwan's background environment, the results of over 9,000 sample analyses conducted between 1992 and 1997, and practical concerns regarding the effects of controls implementation, the report lists an initial eight heavy metals. These metals are arsenic, cadmium, chromium, copper, mercury, nickel, lead, and zinc.

German standards were used as the principal resource and Canadian standards as a supplemental resource to set the maximum permitted levels of listed heavy metals by land use category. In general, land used for residential and park purposes is controlled more strictly than land zoned for industrial or commercial activity. Similarly, land intended for agriculture is controlled more strictly than residential and park land. (refer to the chart below for details)

Control standards for organic pollutants were set at equivalent levels for all land use categories in light of the research program principle that the focus of controls on organic compounds would be to protect groundwater quality and to prevent harm to human health only. The current research separates organics into six major categories. These categories include: simple aromatic hydrocarbons, poly-aromatic hydrocarbons, phenol compounds, chlorinated hydrocarbons, pesticides, and other organic pollutants.

Research on the control of organic pollutants also examined relevant controls used in the United States, Canada, and the Netherlands. Priority was given to those organic compounds that already had fixed control standards. When discrepancies between standards in all three countries occurred, the standards range used concurrently by various US States was adopted. The research also took into consideration the US Resource Conservation and Recovery Act (RCRA), and following the principles of RCRA, the report currently recommends a total of 97 organic pollutants be listed for further consideration.

The EPA will await issuance of the final report on research results, slated for June, to call a public hearing to solicit the opinions of various sectors.

Broader Fly Ash Disposal Regulations to Encourage Resource Recovery

The EPA has agreed to extend the grace period permitted local authorities to improve disposal provisions for incinerator fly ash. The EPA also approved a number of new options for temporary and permanent disposal of fly ash, including encapsulated burial, resource recovery, liquefaction, and solidification, to facilitate local level improvement work.

The collapse of the ash landfill in Wu Ku Township, Taipei County in October 1998 drew the focus of public concern to the problem of incinerator ash disposal. It is estimated that currently operating incinerators on Taiwan produce around 1,000 tons of bottom ash and 300 tons of fly ash each day. Once the next 21 incinerators currently planned or under construction come on line, these figures will increase to 4,000 tons and 1,000 tons, respectively.

To address the issues posed by these large volumes of ash, EP authority practice has always been to gather all ash together for transport to a landfill, where the ash is either buried under the soil or otherwise safely landfilled. However, recognizing the higher heavy metals content in fly ash, current regulations prohibit fly ash to be mixed together with bottom ash. Furthermore, if a TCLP test indicates concentrations of toxic materials in excess of standards set under hazardous industrial waste regulations, ash must be either recycled or disposed of in another manner specifically approved by the EPA.

The EPA has already required that all new waste incinerator facilities incorporate an on-site fly ash solidification plant. *Regulations Governing Storage, Removal, and Disposal of General Wastes*, announced in April 1997 specifies that fly ash disposal problems faced by existing incinerator facilities must be improved within a two-year time frame. Local authorities have recently indicated that they are unable to comply with this timetable and have been submitting applications to extend the deadline.

While agreeing to local governments' extension requests, the EPA has stipulated that a second extension will not be granted and that all improvement work must be completed by April 2001. In the meantime, the EPA has actively pursued efforts to revise the current *Regulations Governing Storage, Removal, and Disposal of General Wastes* and has approved a number of new options for temporary and permanent disposal of fly ash, including encapsulated burial, resource recovery, liquefaction, and solidification, to facilitate local level improvement efforts.

In the draft revision of the aforementioned Regulations, leach test results on fly ash which show levels of toxic chemicals above hazardous industrial waste standards, must be handled either by solidification, high temperature liquefaction, or other such method approved by the EPA. In disposing of the stabilized waste material, priority consideration should be given to resource recovery uses. If the solidified material is buried in a sanitary landfill, the new draft regulations stipulate that it must be segregated from other wastes.

The EPA has also relaxed regulations forbidding the mixing of bottom and fly ash. Now, a combination of two used as ground cover in conjunction with two layers of waterproof plastic and appropriately enhanced pollution control measures will be considered a "reuse" of this material.

Additionally, the EPA now permits encapsulated burial as a method of disposal with the draft revision making separate regulations. If hazardous wastes are to be disposed of in this manner, then rules regarding such should be referenced in the *Methods for Storing, Removing, and Disposing of Industrial Waste and Facilities Standards*.

Establishment of Greenhouse Gas Control Act to be Studied

The EPA contracted research on laws to control green house gas emissions. Research results argue that a separate act be established to define clearly control methods, enforcement tools, and balanced measures. With regard to enforcement tools, the report recommends that both total quantity control requirements and a carbon emissions tax be implemented simultaneously. The EPA is currently considering expansion of the scale of research next year to address such issues as emission levels and the allotment of emission rights.

In recent years, the reduction in use of greenhouse gases has been a focus of attention for many countries. At the conference in Buenos Aires last year, all attending nations signed a plan for action which called for an implementation timetable to be set for each item raised at the Kyoto conference by the year 2000. Host Argentina spoke out in support of a system for developing countries to voluntarily reduce their use of greenhouse gases. Such a voluntary system promises to place a fair amount of pressure on developing countries.

While neither a signatory to the UN FCCC nor the Kyoto Protocol, the ROC accepts the necessity for it too to cut back on greenhouse gases based on its role as a member of the international community of nations. The accord on Greenhouse Gases, in contrast to most other international environmental protection agreements, poses a direct challenge to key industries including power generation, manufacturing, and transportation. Implementation will necessitate fundamental changes in a nation's industrial infrastructure and greatly impact upon industrial operations.

However, at the present time, the ROC has no laws or regulations relating to control standards, control methods, or allotment of emission permits for greenhouse gases. From a legal standpoint, attempting to control greenhouse gases under air pollution control guidelines is not feasible, as carbon dioxide is not a regulated pollutant and thus not subject to air pollution control measures. The Energy Act covers only energy, with greenhouse gas emissions beyond its scope. Thus, the EPA commissioned the National Taiwan University to conduct research into laws and regulations relating to the control of greenhouse gas emissions. Research is scheduled to wrap up in June of this year with initial findings already submitted on May 10 and submitted to the Conference on Environmental Change.

Research analysis indicates that control of greenhouse gases may be accomplished either by revising current regulations or by establishing a new set of relevant regulations. Due to the broad scope and impact of any greenhouse gas control regime, touching on many administrative departments, care must be taken in the development of such regulations that various interests are consulted and support the initiative. If current regulations are to be revised to incorporate greenhouse gas control, different rates of revision progress could lead to a breakdown in cooperation among the various government elements, a loss of spirit, and inability to achieve projected policy effectiveness.

Japan is one of the few countries that now have a dedicated set of regulations addressing greenhouse gas control. The report indicates that the pressures to reduce volumes resulting from the Kyoto Protocol spurred Japan in 1998 to pass the "Statute to Address Global Warming Issues". A unique attribute of this set of regulations is that it does not rely on a command and control model or economic incentives model, but

rather a model driven by national education and enhancement of public awareness.

In light of differences in political culture, administrative organization, and international position between the ROC and Japan, the ROC must look beyond the Japanese reliance upon division of responsibilities and public awareness to set forth regulations that can achieve effective control. Only by clarifying a control system can the benefits and conflicts of all parties be balanced out, greenhouse gas emission targets be met, and an unequivocal message be sent to the international community regarding the ROC's position on reducing greenhouse gases.

In its initial findings, the research recommends that the greenhouse gas control law be written as a "framework" law. This is to say that, with regard to such issues as control methods and enforcement tools, only rudimentary, baseline rules should be specified. Furthermore, the contents of such as law should consider and incorporate policy statements, fundamental methods, control tools, provisions for equitable implementation, and enforcement procedures.

The report recommends that, in terms of basic measures, laws should be enacted which clearly state that the Executive Yuan has made climate change a key national agenda issue. Local authorities should set their own action plans based on the basic framework set at the national level. Action plans should incorporate measures to reduce emissions from relevant industries as well as communications strategies.

With regard to control instruments, the report recommends a combination of total emissions volume control and a carbon tax. This topic sparked lively debate at the Climate Change Conference, with many academics arguing that only one of the two should be implemented. Their argument is that, while both total emissions volume control (with its implications for emissions "quotas" and trade in these quotas on the open market) and an energy-use tax should achieve similar environmental results, attempting to administer both simultaneously would require a very costly administrative infrastructure and impose a double burden upon businesses.

Once the formal report is submitted in June, the EPA will consider the next step for research, taking into consideration control-related issues such as emissions criteria and principles for emission rights allocation.

EPA Promotes Integrated Climate Change Research

The EPA recently sponsored a conference to examine potential climate change impacts on Taiwan and strategy options that have been put forward in recent years for dealing such impacts. Discussions focused on three main topic areas, namely policy and regulation development; climate, coastal areas, and water resources; and agriculture, forestry, and public health. The result of this conference was many concrete suggestions which will be organized and submitted to the Executive Yuan for their future reference in setting

relevant policy.

Global Climate Change is one of the most serious environmental issues now facing our planet. As its effects strike to the very heart of a nation's natural environment and industrial infrastructure, the EPA has set about to formulate a response over the past two year period by inviting specialists and scholars from various fields to conduct appropriate investigations and research work. This year has already seen the submission of preliminary results from many of the research projects and, on May 10, the EPA sponsored a conference to evaluate different response strategies. It is hoped the results will help lead to a future government response to climate change that embraces a full range of ideas and interests.

Nearly every research presentation pointed to the lack of comprehensive data on climate change in the ROC. The key point underlined was that theoretical arguments would be greatly strengthened if environmental monitoring systems in the ROC were enhanced over the long term and shared a common format with similar global climate change monitoring equipment stationed in other countries. However, even with the limited monitoring data available, researchers noted an apparently steady trend of change. For example, research conducted by Cheng Kung University and the Chia Yi Technical College on tidal data recorded between 1926 and 1994 show that the ocean surface has risen around Taiwan. Also, an analysis of shoreline data taken between 1958 and 1977 demonstrate that shorelines have retreated in Yun-Lin, Chia-Yi, Tainan, and Kaohsiung Counties. Kaohsiung County recorded the most serious losses to the sea with as much as a 73.2-meter difference.

Another research project run by the Public Health Department at the National Taiwan University shows dengue fever outbreaks in Northern Taiwan during recent years as well as persistence of dengue even during winter months. Rising general temperatures may have allowed the fever to spread past the former "climate barrier" into the north of the island and to persist even in the winter. An expansion of territory for viral strains has led to a notable increase in infectious disease transmissions.

Researchers noted also the potential for increases in plant proliferation due to higher temperatures, raising airborne pollen and bacteria levels and leading to a rise in asthma and allergy cases. Warming trends also promise more cases of diseases of the bronchial tubes and arteries due to increased air pollution levels.

Some of the scholars attending the meeting have assessed that, in addition to an accommodation strategy aimed to adapt to warmer climactic conditions, the government in its selection of policy should consider strategies targeted to reduce greenhouse gas use volumes. While the cost of both would be borne by ROC citizens, the latter would benefit the global community as a whole, while the former would benefit those living in Taiwan alone. Implementation, they say, should be done in the

spirit of the Kyoto agreement, which was primarily global in scope and intent, and set in accordance with the requirements of the market in greenhouse gas emissions. The accommodation strategy, on the other hand, may be set based upon an assessment of cost / benefit.

After the discussions, attendees broke out into topic groups to recommend implementation strategies for each topic area. For example, the coastal land group was charged to make recommendations on such issues as zoning and making emergency provisions for endangered coastlines, the creation of databases of sea animals, shoreline maps, and coastal ecosystems. The climate group made recommendations in such areas as strengthening monitoring and modeling capabilities.

The objective of this conference differed from most scholarly meetings. The EPA will collate the opinions submitted during the course of the conference. These opinions will be submitted to the Executive Yuan for their use as reference when setting relevant national policy.

News Briefs

Establishment of Greenhouse Gas Control Act to be Studied

The EPA contracted research on laws to control green house gas emissions. Research results argue that a separate act be established to define clearly control methods, enforcement tools, and balanced measures. With regard to enforcement tools, the report recommends that both total quantity control requirements and a carbon emissions tax be implemented simultaneously. The EPA is currently considering expansion of the scale of research next year to address such issues as emission levels and the allotment of emission rights.

EPA Announces 4th Round of Firms Required to Report Waste-related Data Online

On 9 April, the EPA announced a fourth group of companies approved to submit solid waste disposal applications online. This most recent group includes companies with registered investment capital under NT$50 million in the following categories: electrical / electronic components manufacturing & repair; chemical production; basic metals industries; leather, fur, and their products manufacturing; chemical products manufacturing; metal product manufacturing, and common or joint waste disposal systems. Online applications by businesses in these categories will be accepted from 15 April 1999.

EPA Readies Secure Internet Reporting Mechanisms

The EPA launched access to electronic service by PIN on 30 April. As of that date, members of the public holding authorized PIN accounts can apply to the EPA over Internet for permits, certification, or information regarding submissions. In June of this year, the Administration will issue a list of five EPA services for which electronic applications will be given priority

consideration. These five will include air pollution control certification for imported automobiles, technician licensing, industrial solid waste reporting, Green Mark applications, and resource recycling reporting. All EPA public application procedures are expected to be available on line by December 2002.

EY to Execute Staged Improvements to the Efficiency of Electrical Equipment

Acting on conclusions reached by the ROC National Energy Conference, the EPA and the Energy Commission of the MOEA, submitted a concrete action plan to the Executive Yuan on 6 May which included a staged improvement in energy use in Taiwan by setting efficiency standards for refrigerators, fluorescent lamps, air conditioners, certain types of electrical equipment, and clothes dryers. The EY Review Committee approved the draft in order to demonstrate the government's commitment to energy saving and kept the timetable unchanged, but moved the effective date for revised energy consumption standards forward to June 2000.

Provincial EPB to be Reorganized as EPA Central Taiwan Office

Initial plans called for the Taiwan Provincial Dept. of Environmental Protection (DEP) and its three subordinate regional centers to be combined with the EPA's three major inspection teams around the island to create a new Regional Environmental Management Bureau. However, with the announcement of Premier Siew halting all plans to create new government agencies, the EPA decided to re-christen the Provincial EPB as its new office in Central Taiwan. The former DEP's regional centers will be integrated into the three, already existing, EPA inspection teams. On 5 May, the EPA completed work on the details of the new configuration, including responsibility and staffing distribution, planning for future regulations to be implemented fully nation-wide, policy planning, project implementation, and central control over all future international EP activities. In the future, the EPA's Central Taiwan Office will take the lead on the monitoring and inspection of inter-county/municipal EP work. The EPA inspection teams will take responsibility for inter-county/municipal work related to pollution control, technical guidance/education, and auditing. Local EP work will remain in the hands of EPB authorities at the county and municipal level.

Environmental Police Force to be Established

The EPA and the National Police Administration hammered out the details on 4 May on an initial plan to establish an environmental police force in Taiwan. The decision was taken to use a task force model and for the Police Administration to assign an initial 96 officers to provide support on implementing environmental protection work. The task force will still be under the Police Administration, but would accept directives and oversight from the EPA. To prepare police for EPA duties, the EPA will arrange 90 hours of professional training for task force members focusing on EP law and waste processing procedures. It has been agreed that the

ratio between environmental police and EPA inspectors will be 1:2. Because of insufficient police resources, the future EP police will endeavor to strengthen contacts with local police organizations.

First Round of Intensive Inspections of Hazardous Waste Complete

To deal with continued illegal dumping of hazardous industrial waste, the EPA in March began its first program of strengthened auditing activities. This program concluded at the end of April. Of the nearly 300 industrial enterprises and waste clearance and treatment organizations audited, 37 were found to be conducting illegal activities and punished. Also, the EPA identified four waste clearance and treatment firms to be audited around the clock by on site EPA inspectors. One of these haulers shut down for a period of time due to equipment failure. The other three all, to one degree or another, exceeded their approved handling quota. In the next scheduled cycle of audits, waste clearance and transport firms will continue to be a focus of inspector scrutiny.

EPA Issues Contingency Measures in Response to the Jih-You Medical Waste Case

To punish Taiwan's largest medical waste treatment organization, Jih-You, the EPA considered pulling its waste treatment license. However, fears regarding the implications for the volumes of medical waste requiring disposal led to many days of negotiations with the Department of Health, Doctors' Association, and many local government agencies. The result was an agreement to relax area controls, allow temporary cold storage, and set up an appropriate market price. permit hauling rates to more accurately reflect market realities targeted at minimizing the impact of the loss of Jih-You's hauling capacity. The agreed-upon actions involved revision of significant regulations and the close cooperation of local authorities. To make most effective use of time, the EPA recently announced that a new article had been added to the law to address similar problems in the future. The new article, Article 41-1 in *Methods for Storing, Removing, and Disposing of Industrial Waste and Facilities Standards*, states clearly that, in the event of natural calamity, emergency, or serious punishment by the Competent Authority which makes existing facility capacity insufficient to handle industrial waste storage, removal, and disposal needs *and* threatens to contaminate the environment or threaten human health, the EPA may consult with target industry competent authorities in the effected sector(s) to designate an appropriate response. Furthermore, this response is to be exempted from current regulatory stipulations.