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In this issue . . .

- EPA Promotes Monitoring of Fine Particulate Matter
- Air Emission Standards for Power Generation Facilities to be Amended
- New Facilities in Industrial Parks to be Exempt from EIA Requirements
- EPA Drafts Tougher Motorcycle Emission Standards
- Guidelines for Releasing Publicly Held Land in Water Source Zones Formally Announced
- Water Pollution Control Act Enforcement Rules to be Amended
- Method for Calculating Construction Project Air Pollution Fee Rates to be Amended
- Inspection Efforts of Toxics-using Facilities to be Intensified
- Guidelines for Toxics Use Registration Formally Announced
- Environmental Protection Market Enjoys Steady Growth
- EPA Urges Petrochemical Industry to Improve VOC Emissions
- News Briefs

EPA Promotes Monitoring of Fine Particulate Matter

The monitoring of suspended particles as an index of air quality in Taiwan has been limited to total suspended particles (TSP) and particulate matter where particle diameter is less than 10 microns (PM₁₀). Many researchers have noted however that matter with particle diameter of less than 2.5 microns (PM_{2.5}) could cause greater harm to the human respiratory system by penetrating deeper than PM₁₀ into respiratory organs.

In June, 1997, the US EPA formally announced PM_{2.5} air quality standards while other countries launched related monitoring research. To establish local background information on PM_{2.5}, the Taiwan EPA's Bureau of Environmental Monitoring and Data Processing installed PM_{2.5} automated monitoring stations in five regions of Taiwan last year and commenced PM_{2.5} monitoring.

The Bureau said that in order to understand the relationship between PM_{2.5} and PM₁₀ and to research fine particles generated through secondary reaction mechanisms, regions with heavy suspended particle concentrations or severe photochemical smog were given priority in locating the first batch of monitoring stations. Final selection included Gu-ting and San-chung in Taipei County, Chung-ming in Taichung County,

and Feng-shan and Lin-yuan in Kaohsiung County. Formal monitoring operations in these areas began in July, 1997.

After six months of monitoring, preliminary findings using daily average concentration standards in the US as a benchmark indicated that concentrations in Southern Taiwan still exceeded the standard by a relatively high percentage. Figures for Northern areas at the San-chung station also exceeded the standard by a relatively high percentage of 10% on average. In the North, PM_{2.5} concentrations exceeded the standard by a greater margin than those of PM₁₀. Concentration levels of the two indexes compared with the standard were comparable in Central Taiwan. In the South, PM₁₀ concentrations exceeded the standard by a greater margin than those of PM_{2.5}. The Bureau attributed these results in part to different pollution sources in each region.

As the stations were directly exposed to direct pollution emissions, average monthly concentrations of PM_{2.5} recorded at monitoring stations located in heavy traffic areas usually exceeded the standard. Preliminary findings also indicated an extremely high interrelationship between the PM_{2.5} and PM₁₀ indexes.

Bureau officials said that suspended particle monitoring work will move ahead and that an understanding of the interrelationship between PM₁₀ and PM_{2.5} in Taiwan will serve as a reference for setting related standards and control measures in the future.

Air Emission Standards for Power Generation Facilities to be Amended

In recent years, the Ministry of Economic Affairs (MOEA) has been promoting the privatization of power generation facilities in Taiwan, and to date, there are a total of 11 companies building such facilities. As the volume of pollution from power generation facilities is relatively high and the number of facilities will increase as private facilities continue to be built, the EPA drafted an amendment to the *Power Generation Facility Air Pollution Emission Standards* that will tighten limits on sulfur oxide (SO_x) and nitrogen oxide (NO_x) emissions (see table). The EPA's Bureau of Air Quality Protection and Noise Control discussed the draft with relevant agencies and industry representatives on April 26.

Bureau officials noted that according to current standards, power generation facilities that use different fuels have been held to different SO_x and NO_x emission limits. As emission limits for solid and liquid fuels were looser than those for gas, firms have been indirectly discouraged from using the (latter) cleaner fuel.

The draft amendment will apply the same standard no matter what type of fuel is used; facilities that use coal or oil will face tougher limits than before. Officials noted that this will further the policy of encouraging the use of cleaner fuels.

In addition to tightening controls on new power generation facilities, the EPA will also gradually do the same for existing facilities. Of these, several limits will be tightened in 2001 while those on SO_x and NO_x emissions of facilities that use solid fuels will be significantly tightened in January, 2006.

According to officials, planned facilities in the process of performing an environmental impact assessment (EIA) would have already made commitments to lower emission levels and thus will not be affected by the draft amendment.

Proposed Air Pollution Emission Standards for New Power Generation Facilities ¹			
	Steam	Steam Turbine and Rotary ²	Cogeneration (over150MW)
SOx (ppm)	80	50	80
NOx (ppm)	80	50	80

Notes:
¹The emission limits undertaken in the EIA of a party that is approved prior to the formal announcement of the proposed standards shall remain in effect.
²The concentration of NOx in the air emission of steam turbine and rotary facilities is based on an oxygen content of 15%.

New Facilities in Industrial Parks to be Exempt from EIA Requirements

In line with the ROC Government's policy of easing regulations, the EPA drafted an amendment to the *Standards for Determining Detailed Items and Scope of Environmental Impact Assessments for Development Activities* and held a related public hearing on April 1.

According to the Bureau of Comprehensive Planning, current standards prescribe different EIA implementation regulations for development of industrial parks and individual facilities in the parks. When an EIA examination is performed in an industrial park, the conclusions usually involve setting a total limit on pollution emission for the park as a whole. If limits were properly allocated to each planned facility, total environmental loading in the park would not exceed original EIA requirements. Requiring each facility to perform an EIA would therefore be redundant.

According to the draft amendment, new facilities may be exempt from performing an EIA in industrial parks that have completed an EIA review and adopted total volume control if such facilities do not exceed original pollution limits set for the park. The exemption is pursuant to approval by competent environmental and industry authorities.

Given little opposition from participating organizations, the Bureau said the amendment would be finalized, formally announced and implemented following further discussion in the near future.

EPA Drafts Tougher Motorcycle Emission Standards

Following numerous discussions with industry, the EPA finally completed a draft of the *Motorcycle Emission Control Standards*. In addition to tightening emission limits, these standards regulate two- and four-stroke motorcycle models separately and require cold-engine emissions testing. The new standards will tighten limits on carbon monoxide (CO), hydrocarbons (HC) and nitrogen oxides (NO_x) by as much as 80%. (see table).

EPA Bureau of Air Quality Protection and Noise Control officials said they proposed the cold engine approach to emission testing mainly because 70% of rides average less than five kilometers. Hence most emissions are produced under cold engine conditions and therefore better reflect the actual state of motorcycle emission. The new standards

may be formally announced after the end of June this year and will come into force on December 31, 2003.

Current and Proposed Emission Limits for Motorcycles ¹				
Engine testing condition	Pollutant	Current (3 rd Stage)	Dec. 31, '03	Dec. 31, '03
		2-, 4-stroke (warm test)	2-stroke (cold test)	4-stroke (cold test)
Driving cycle test	CO (g/km)	3.5	7.0	7.0
	HC + NO _x (g/km)	2	1	2
Idle test	CO (%)	4.0	3.0	3.0
	HC (ppm)	6,000	2,000	2,000
In-use test	CO (%)	4.5	3.5 ²	3.5 ²
	HC (ppm)	9,000	2,000 ²	2,000 ²

Note: Average cold engine tested values of CO and HC + NO_x were 2.5 times those of warm engine tested values.
¹Includes scooters and mopeds.
²Limits for warm-engine test conditions.

Guidelines for Releasing Publicly Held Land in Water Source Zones Formally Announced

The Ministry of Interior (MOI), Ministry of Economic Affairs (MOEA), Council of Agriculture and EPA formally announced the Guidelines for Determining the Impact on Water Source Conservation, Soil Erosion and Nature Conservation of Releasing Publicly Held Land on April 8. The guidelines will serve as the legal basis for approving the release for private use of publicly held land.

According to the guidelines, the releasing of public mountain slopes, national farm and range land that impact water source conservation, soil erosion control or nature conservation will be prohibited in the future. The following is a list of specific zones or geographical areas that are prohibited from being released for private use:

1. Ecological Reserves or Nature Reserves as specified in the Cultural Asset Preservation Act.
2. Wild Animal Reserves or Major Wild Animal Habitats as specified in the Wild Animal Protection Act.
3. Erosion-protected Forests as defined in the Forestry Act.
4. Special Water and Soil Conservation Zones as specified in the Water and Soil Conservation Act.
5. Conservation Improvement Zones as specified in the Mountain Slopes Conservation and Utilization Statutes.
6. The land area within the watershed boundary above a reservoir or dam.
7. Tap Water Source Water Quality Protection Zones in the Tap Water Act.

8. Water Table Control Zones containing untapped illegal wells, as defined in the Water Utilization Act.
9. Drinking Water Source Water Quality Protection Zones and areas within a specific distance of drinking water collection points in the Drinking Water Management Statutes.

The relevant competent authority shall be responsible for determining the above guidelines according to the scope of its authority.

According to statistics from the MOI Construction & Planning Administration, a total of 57,000 hectares of publicly held mountain slopes in Taiwan can be released. The aforementioned restrictions reduce the amount of land that can be released to approximately 17,000 hectares.

Water Pollution Control Act Enforcement Rules to be Amended

In line with the central government's policy of streamlining regulations, the EPA's Bureau of Water Quality Protection drafted an amendment to the *Water Pollution Control Act Enforcement Rules* that simplifies regulatory controls. The EPA discussed the draft with environmental bodies on April 9.

In terms of expanding or changing the scale of manufacturing or services where project time exceeds 90 days, Article 23, Item 2 of the current regulations requires that businesses apply for registration modification and make a progress report to relevant environmental bodies every 90 days during execution or trial-run. Bureau officials said the registration information was of limited practical value to environmental bodies and hence eliminated Item 2 from the enforcement rules.

Regarding emission permit application and issuance, Article 34-1 requires that the water pollution prevention measures plan of a business is signed by a certified engineer during permit application and issuance. To simplify the process, Article 34-1 is amended whereby a business is exempted from obtaining the second signature on the plan if its contents remain the same between the first and second submissions.

In terms of wastewater storage, Article 41 is amended whereby wastewater storage records must be declared semi-annually rather than monthly. Leakage must be reported to the competent authority immediately rather than within three hours, and a written report of leakage volume and emergency response measures taken must be submitted within five rather than ten days.

Officials said the draft should be finalized, submitted to the Executive Yuan for approval and formally announced shortly after a public hearing is held.

Method of Calculating Construction Project Air Pollution Fee Rates to be Amended

Since construction project air pollution fee rates were first levied in July last year, there has been public sentiment that some of the fees are unreasonable. This has prompted the EPA to draft an amendment revising the way fees are calculated. A public hearing on the draft followed on March 18.

According to the EPA's Bureau of Air Quality Protection and Noise Control, the main thrust of the draft is to base fees on the actual surface area of structures rather than on 40~60% of site surface area as has been the standard. Since the surface area of some structures such as a farm residence is less than 20% of the site area, air pollution fees calculated according to such a percentage range are clearly too high. The EPA then doubled the pollution fee rates for standard construction projects in consideration of the proposed fee basis (see table).

The amendment should clear up concerns on the way fees are calculated. In the future, project time will be based on working and non-working calendar days. The lower limit above which regional development projects must pay fees will be reduced to five hectares.

Apart from standard construction projects, the EPA also amended the fee rates for other construction projects whereby they are calculated at a uniform 0.3% of contract funds. Bureau officials noted that either surface area multiplied by project time, or a fraction of project budget were originally used as the basis for calculation in the hope that businesses would shorten work time and thus reduce pollution emission. However, actual estimates showed too many cases where the fees of some projects calculated by surface area multiplied by project time actually exceeded those calculated by contract amount or were even equal to total project budget.

Officials said the draft will be completed and formally announced following a final round of study and revision. Fee rates will likely be formally implemented after July 1, 1998.

Current and Proposed Air Pollution Fee Calculation Basis and Rates for Construction Projects		
	<i>Current</i>	<i>Proposed</i>
Fee calculation basis	Total work site land area X project months	Land area on which structure is built X project months
Concrete and rebar structure	NT\$1.63/m ² per month	NT\$3.26/m ² per month
Steel frame structure	NT\$1.56/m ² per month	NT\$3.12/m ² per month
Large-scale (infrastructural) development projects	Fees required if work site areas is over 10 ha.	Fees required if work site area is over 5 ha.
Other construction projects	Work site land area X project months, OR 0.3% of project budget	0.3% of project budget

Inspection Efforts of Toxics-using Facilities to be Intensified

R.O.C. Premier Vincent Siew recently requested that overall public and industrial safety be improved within six months. The Executive Yuan followed up with five categories of factory operations including toxics as priority targets. The EPA responded

with a draft of the *Toxic Chemical Substance Management Discussion Plan* soon to be implemented.

The EPA said the plan re-evaluates government strategy and earmarks key and substantive measures. Strengthened promotion and implementation of the plan is to take place within six months and includes the following tasks:

1. Announce and implement regulations related to the management of ten toxics.
2. Complete management and guidance on release volume reporting for six categories of companies that use toxics including epoxy ethane. Divide into phases and finish investigation and auditing of major factories first.
3. Employ a system akin to the *Responsible Care Program* whereby companies that use toxics are counseled on how to lead upstream suppliers in the effort to establish standard work procedures.
4. Update the basic data information files of factories that use, manufacturer, store, etc. potentially disaster-causing toxics.
5. Supplement and revise toxics disaster prevention and rescue manuals, emergency prevention and rescue procedure cards, and a Chinese language toxicology database.
6. Strengthen the organizational training work of the Toxics Disaster Prevention and Coordination Task Force. Conduct spot tests and regional disaster prevention drills (five each).
7. Strengthen inspection of electroplating industry.
8. Strengthen education and training of toxics management so that specialized and management personnel charged with toxics management will possess a correct understanding of toxics management and disaster prevention.

Guidelines for Toxics Use Registration Formally Announced

The *Toxic Chemical Substance Control Act* amended last year designates three systems of toxic chemical substance (hereinafter referred to as “toxics”) control: permitting, registration and automatic qualification. When the *Guidelines for the Implementation of the Toxic Chemical Substance Control Act* were formally announced on April 8, the EPA further stipulated that registration must be made to the local competent authority prior to using, storing or disposing of such substance. To ensure that local governments process registration applications according to the same standard, the EPA formally announced the *Toxic Chemical Substance Use Registration Work Guidelines* (hereafter referred to as “registration guidelines”) on April 17 and annulled the *Toxic Chemical Substance Use Control Measures*.

According to the registration guidelines, in the future any stationary pollution source, business or institution as designated in the *Air Pollution Control Act*, *Water Pollution Control Act* or *Waste Disposal Act* that uses or stores toxics must prepare a copy of the operator and emission permit, or approval document as basic user information for registration. Users not designated as such must possess a copy of the factory registration certificate, company license, or business registration certificate as basic user information.

The EPA has also specifically stipulated that all toxics storage facilities located in areas zoned for residential and commercial use will not be allowed to legally operate. In the spirit of local autonomy, the EPA authorized local governments to set registration standards on their own initiative according to their own needs. These will be implemented after EPA approval.

Users of toxics that have legally obtained an authorization or registration document previously shall apply to have the documents renewed in accordance with the time limit announced by the local competent authority as stipulated in the registration guidelines.

Environmental Protection Market Enjoys Steady Growth

To better understand the changes taking place among environmental protection related businesses in Taiwan, the EPA's Statistics Office used information gathered from the commercial and service sectors in the Taiwan region in 1996 to provide an overview. The industry is currently comprised of the following business segments:

1. Pollution control equipment manufacturing and repair within the machinery equipment manufacturing and repair industry.
2. Environmental sanitation and pollution control services within the services industry sector.
3. Environmental protection engineering within the civil engineering industry.

In terms of the overall industry, the number of enterprises and personnel in environmental protection related businesses totaled 4,285 and 43,534 respectively at the end of 1996, up 112% and 39.83% since 1991. The total production value and revenues of such businesses was NT\$48.9 billion and NT\$50.5 billion respectively in 1996, up 112% and 107% since 1991. Profitability among the three business segments amounted to 8.95% in 1996, up 3.1% since 1991 (see table).

Performance of the pollution prevention equipment manufacturing and repair segment was particularly outstanding. Personnel grew 72.22% from 1991 to 1996, a considerable margin compared with 18.04% for the entire manufacturing industry over the same period of time. Production value was some NT\$4.24 billion in 1996, an increase of 221% on a value of some NT\$2.91 billion in 1991. This was the highest margin among Taiwan's "top ten burgeoning industries." Total revenues and expenses were NT\$4.45 billion and NT\$4.06 billion in 1996. Profitability was 8.87%, an increase of 2.85% on 1991. This rate exceeds the average profits of the entire machinery manufacturing industry and shows the considerable profitability of the segment.

There were 3,642 enterprises in the environmental sanitation and pollution control services segment at the end of 1996, up 106% from 1,874 in 1991. Personnel totaled 35,892 at the end of 1996, up 35.04% from 9,314 in 1991, and accounted for 6.3% of the workforce in service industries. Production value was NT\$32.55 billion in 1996, an increase of 136% on NT\$18.45 billion in 1991. This was the third highest margin in local service industries, second only to broadcast television and arts and entertainment.

In terms of income and profitability, the combined revenues of the environmental sanitation and pollution prevention services segment and the pollution prevention equipment manufacturing and repair segment were NT\$33.63 billion in 1996, up NT\$18.75 billion from 1991. With combined outlays of NT\$30.39 billion in 1996,

profitability was 9.63%, up 2.99% on 1991. This exceeded average profitability of the services industry and illustrates the impressive profitability of the segments when combined.

There were 488 enterprises in the environmental protection engineering segment at the end of 1996, an increase of 326 firms or 201% on 1991. A total of 5,194 personnel were employed, an increase of 1,753 or 50.94% on 1991. Production value totaled NT\$12.16 billion in 1996, up NT\$4.21 billion or 53.05% since 1991.

Overview of Environmental Protection Related Businesses in 1996				
	equipment	services	engineering	combined
Firms	155	3,642	488	4,285
Personnel	2,448	35,892	5,194	43,534
Total revenues (NT\$ bil)	4.456	33.636	12.406	50.497
Total expenses (NT\$ bil.)	4.066	30.395	11.516	45.976
Total profits (NT\$ bil.)	0.390	3.241	0.890	4.521
Avg. profit per firm (NT\$ mil.)	2.51	0.89	1.82	1.05
Avg. profit per employee (NT\$ thousands)	159.1	90	171	104

EPA Urges Petrochemical Industry to Improve VOC Emissions

To improve volatile organic compound (VOC) emission in the petrochemical industry, the EPA formally announced the *VOC Air Pollution Control and Emission Standards* in February of last year. According to the standards, many petrochemical companies have already submitted pollution improvement plans and are expected to complete the improvement work over the next two years. To better understand industry efforts, the EPA recently analyzed the plans submitted by industry to determine VOC emission trends in the petrochemical industry.

The EPA's Bureau of Air Quality Protection and Noise Control said that a total of 84 petrochemical companies have already submitted improvement plans. The VOC emissions volume of these companies accounts for over 80% of the emission volume of all those targeted for control. The Kaohsiung-Pingtung Air Quality Area has the greatest number of factories and an emission volume of over 47,000 metric tons or nearly half of Taiwan's total emission volume.

Companies that submitted improvement plans had a total of 72 exhaust oxidizers, 508 process emission points, 1,408 organic fluid storage tanks, 151 organic fluid storage facilities, and nearly 40,000 equipment components. Waste incinerators had the highest rate of improvement at 96% followed by petrochemical process components at 79%. According to improvement plan forecasts, future completion of VOC emission volume improvement has been divided into three stages. Of these, the highest reductions will occur in the second half of this year when improvements to petrochemical process emission points are completed. The total reduction volume of businesses will reach approximately 55,000 metric tons or about 6.7% of total VOC emissions. The highest reduction volumes by region will be in the Kaohsiung-Pingtung Air Quality Area and will account for over 90% of total reductions. If the total VOC emission volume of the Kaohsiung-Pingtung Area was deducted, the reduction proportion would be near 30%

(see table). According to Bureau estimates, air quality in the Kaohsiung-Pingtung Air Quality Area will benefit greatly if businesses complete improvements according to plan.

In terms of improvement expenditures, total business investment is forecast to reach NT\$690 million. The largest proportion of the funds will go toward improving emission points and equipment components respectively in the petrochemical process at approximately NT\$330 million and NT\$220 million.

To ensure that the petrochemical companies complete the improvements, the Bureau said it would intensify its efforts in the following areas:

1. Step up factory visits and utilize random sampling, infrared remote detection, and odor sensing methods to ascertain reduction effort results.
2. Continue to carry out factory assistance programs to help with pollution control improvement.
3. Arrange training on inspection and control for environmental agency personnel using personnel from various environmental bodies to strengthen knowledge of regulations and inspection and testing techniques.

Total VOC Emission and Petrochemical Industry Reduction by Region					
	Current total emission volume (metric tons)	Number of firms*	Emission volume of firms (metric tons)	Emission reduction volume of firms (metric tons)	Emission reductions as a proportion of total emission volume (%)
Northern Taiwan	316,585	17	18,532	2,443	0.77
Hsinchu and Miaoli	64,021	11	15,217	1,439	9.50
Central Taiwan	139,457	5	2,573	260	0.19
Yunlin, Chiayi and Nantou	126,441	8	13,205	217	1.60
Kaohsiung-Pingtung	172,353	41	47,283	51,168	29.70
Yilan	14,342	2	1,274	6	0.02
Total	833,199	48	98,084	55,530	6.70

* firms that submitted VOC improvement plans

News Briefs

Recycling of Spent Ni-Cd Batteries to Begin in July

The EPA formally announced on March 23 that recycling of spent Nickel Cadmium (Ni-Cd) batteries would begin on July 1 and related businesses must complete registration work prior to September 1.

Environmental Agent Users Required to Install Specialized Personnel

The EPA formally announced the *Regulations Governing Installation of Professional Personnel by Environmental Agent Users* on April 15. According to the regulations, environmental agent manufacturers, vendors and disease vector control firms will be required to install specialized personnel.

Regulations Governing Disease Prevention Businesses Formally Announced

On April 29, the EPA formally announced the *Regulations Governing Disease Vector Control Firms*. These firms will be brought into the scope of regulation in the future.

Environmental Agent Control Act Enforcement Rules Formally Announced

The EPA formally announced the *Environmental Agent Control Act Enforcement Rules* on March 25. Officials from the EPA's Bureau of Environmental Sanitation and Toxic Chemicals Control said that businesses intending to engage in activities involving the use of environmental agents including manufacture, import and export, and vending must apply for a permit in accordance with the announced guidelines.

Substances Prohibited as Environmental Agent Ingredients Formally Announced

On April 20, the EPA formally announced substances prohibited as environmental agent ingredients. Further information on such substance can be obtained from the EPA's Bureau of Environmental Sanitation and Toxic Chemicals Control.

Future Recyclers and Recycling Organizations to be Exempt from Permit Requirements

To encourage participation in recycling work at all levels, the EPA amended the *Regulations Governing the Management and Counseling of Public and Private Waste Collection and Treatment Organizations*. According to the amendment, "resource factories" and future recyclers of items listed in Article 10-1 of the *Waste Disposal Act* will not need to apply for a waste collection and treatment permit. In terms of dangerous items, however, the EPA will continue to decide on an item-by-item basis whether a permit will be required.

Taiwan-Canada Environmental Cooperation Project Proposals Finalized

The EPA and Canada's Environment Ministry recently held a third meeting on the *Taiwan-Canada Memorandum of Environmental Cooperation and Understanding* to finalize their bilateral agenda for fiscal year 1999. The six areas of environmental cooperation the two sides discussed included cleaner production, advanced oxidation process for wastewater treatment, analyses of the economic impact of energy and industrial adjustments necessitated by greenhouse gas reduction commitments, environmental impact assessments, climate change, and the upcoming 1999 international environmental exhibition (Enprotech 99).