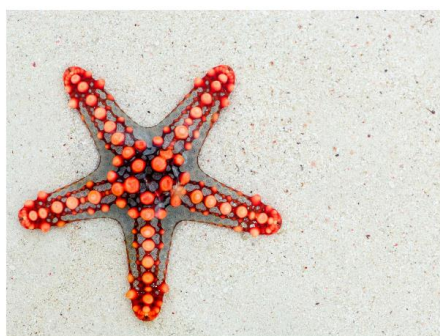


Environmental Hormones Management Plan in Taiwan (the Second Term) 2019 Implementation Results



-  Environmental Protection Administration, Executive Yuan
-  Ministry of Economic Affairs
-  Ministry of Health and Welfare
-  Council of Agriculture, Executive Yuan
-  Ministry of The Interior
-  National Treasury Administration, Ministry of Finance
-  Ministry of Education

September 2020

Contents

Environmental Hormones Management Plan (the Second Term)

Summary for 2019 Implementation Results	1
I. environmental hormones Management Methods in Our Country	1
II. Important Achievements by Various Ministries in Our Country	2
(I). Regulation Addition and Revision	2
(II). Monitoring and Sampling Results	7
(III). Education and Promulgation	8
III. Strive to Protect People's Health	11

Environmental Hormones Management Plan (the Second Term)

2019 Implementation Results (Detailed Version).....	13
I. What are environmental hormones	13
II. Plan Basis.....	13
III. Plan Objectives.....	14
IV. Strategy Implementation and Promotion Group Members.....	15
V. Plan Schedule	17
VI. 2019 Plan Implementation Results by Various Agencies.....	17
VII. Conclusions.....	118

Appendix 1 “Environmental Hormones Management Plan (the Second Term)” Table of 2019 Implementation Results	119
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Appendix 2 Implementation Results regarding environmental hormones Substances by Various Ministries in the Past	154
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Environmental Hormones Management Plan in Taiwan

(the Second Term)

Summary for 2019 Implementation Results

I. Environmental Hormones Management Methods in Our Countries

Environmental hormones are certain artificial chemical substances that can imitate the effects of natural hormones in the body. They may enter humans or other organisms through environmental distribution or food chain, and then affect the physiological regulatory functions of the body, such as imitating the effects of human hormones, changing the concentration of secreted hormones in the body, changing the concentration of the active secreted hormone substances in the body, causing harm to human fertility or health.

With the increase in chemical substances, the types of environmental hormones also increase. To protect people's health in our country, the Environmental Protection Administration of the Executive Yuan convened relevant agencies to form a promotion group, and according to the "Environmental Hormones Management Plan" and the extended "Environmental Hormones Management Plan (the Second Term)", through cross-ministerial cooperation, clearly defined the competent authorities regarding environmental hormones in our country. The relevant ministries implement control over environmental hormones according to the legal basis and international trends. For example, the Ministry of Health and Welfare is in charge of foods, food containers and medical equipment, the Council of Agriculture of the Executive Yuan is in charge of pesticides, livestock feeds and agricultural products, and the Ministry of Economic Affairs is in charge of general commodities (not charged by other competent authorities), toys and children products, and the Environmental Protection Administration of the Executive Yuan is in charge of toxic chemicals,

environmental agents, drinking water and indoor air quality, and the Ministry of Interior is in charge of green buildings and green building materials, and the Ministry of Finance is in charge of wines and liquors; besides, new competent authorities are added in response to new developing issues.

The implementation of this plan can effectively integrate the capacities of various ministries, strengthen regulations regarding environmental hormones management, and conduct sampling and monitoring of domestic supplies, products, foods, and environment background, so that people can be kept away from the interference of environmental hormones substances and live a safe and non-toxic life.

II. Important Achievements by Various Ministries in Our Country

The promotion group members collaborate according to the plan to start the tasks for regulation strengthening, market products sampling and monitoring, and promulgation of public awareness of correct information. The key tasks for each ministry in 2019 are summarized as follows:

(I) Regulation Addition and Revision

A. the Environmental Protection Administration of the Executive Yuan

(A) On March 5, 2019, decabromodiphenyl ether was revised as Category 1 and Category 2 toxic chemical substance in response to international regulatory trends, and the control concentration was revised to 1%, and the mass operation criteria was 50 kg, and prohibited operations and permitted uses were added.

(B) It was publicized on July 5, 2019 that the management of mercury toxic chemicals was revised in the Appendix Table 2 "Prohibited Operations" of the "Toxic Chemical Substances and Their Operation Management", and added that mercury is prohibited to be used in the manufacture of batteries, switches and relays,

fluorescent lamps, high-pressure mercury lamps and non-electronic measurement instruments, with the exclusions of the regulations in the convention, effective January 1, 2021, In addition, in conjunction with the amendments to Table 2, Table 3 “Permitted Uses” was slightly revised accordingly. In addition, mercury-containing products for the manufacture of calibration instruments or reference standards were added.

- (C) In 2019, the government completed the data collection and compilation of the latest control information of the Stockholm Convention, studied and proposed the revised uses of PFOS, and revised the Chinese and English names of tetrabromodiphenyl ether, and added the CAS registration numbers of tetrabromodiphenyl ether and pentabromo diphenyl ether to comply with the Convention.
- (D) In 2019, the labels and specifications for 12 environment-friendly products were added (revised), including two-stage water-saving toilets, original toner cartridges, monitors, computer servers, notebook computers, desktop PCs, ink cartridges, recycled toner cartridges, printers, image output devices, small cars, motorcycles, among which the definitions of polybrominated biphenyls and polybrominated diphenyl ethers were added for printers and image output devices. The control values and the product items have not been changed. The remaining items do not include the revision for environmental hormones substances.
- (E) Domestic status investigation, foreign standard collection, and domestic on-site investigation and interview were completed in 2019, and based on feasible control technologies and emission

status data, revision to air pollutant emission standards for the cement industry was drafted and discussed with the industry.

(F) On April 29, 2019, the "Discharge Water Standards" was amended regarding the applicable conditions to waste incineration facilities, to remove the limitation for their treated and produced wastewater to enter the wastewater treatment facility. In addition, the steam supply industry was added in compliance with the classification and definition of the water pollution prevention and control businesses. Based on the process of producing steam in the industry, with respect to the dioxin pollutants containing wastewater generated by those who use wet treatment for emission gas, the applicable dioxin standard has been established.

(G) In accordance with Minamata Convention on Mercury, a seminar on the drafted restrictions on imported mercury-containing products was held on September 23, 2019. On February 3, 2020, the drafted "restriction on imported mercury-containing products" has been publicized and it was stipulated that from January 1, 2021, it is prohibited to import mercury-containing switches and relays, high-pressure mercury lamps for general lighting, and non-electronic measurement instruments (barometers, hygrometers, pressure gauges, thermometers and sphygmomanometers, etc.) to strengthen domestic mercury management.

(H) In 2019, the sampling method for dioxin and furan in water was revised (NIEA W790.51B) (Publication No. 1080006959 by the Environmental Protection Administration of the Republic of China on November 20, 108). This method is applicable to the sampling of dioxin and furan (PCDDs/PCDFs) in drinking water, drinking

water sources, and surface water, groundwater, and drainage water.

- (I) On May 21, 2019, the test method of metals and trace elements in water - inductively coupled plasma atomic emission spectrometry (NIEA W311.54C) was revised and publicized. The revised contents include scope of application, interference, reagents, sampling and storage, and procedures and quality control, to enhance data quality.
- (J) On May 23, 2019, the test method of metals and trace elements in water-inductively coupled plasma mass spectrometry (NIEA W313.54B), was revised and publicized. The revised contents include scope of application, interference, reagents, sampling and storage, procedures, quality control, precision, and accuracy to enhance data quality.

B. Ministry of Economic Affairs

- (A) CNS 691 "Fluorescent tubes (for general lighting)" was revised to add mercury content limit.
- (B) CNS 15047 "Fragrance" and CNS 15095 "Gold and Silver Joss Paper" were revised to add mercury content limit and revise lead and cadmium limits.
- (C) CNS 16095 "Child Care Products-Diaper Changing Tables in Public Places" was established to include lead content limit.
- (D) CNS 16116 "Mattresses for infant beds and cradles" was established to include the content limits for lead, cadmium, and mercury.
- (E) CNS 15290 "Safety Specifications for Textiles (General Requirements)" was revised to add PFOS content limit.
- (F) The commercial product test standards for "automatic data processing system monitors, automatic data processing system

head-worn displays, monitors, and televisions" were revised. The new version of CNS 15598-1 will include the mercury content limit for electronic display cold cathode fluorescent lamps and electrodeless fluorescent lamps. It is planned in the end of 2020 that the new revision of test standards will be publicized.

(G) In 2019, the revision on the electronic products such as wireless chargers and electronic toilet seats that should be tested was added to include the label requirement for the restricted substances in CNS 15663 Section 5 (lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls and brominated diphenyl ether).

(H) In 2019 "relevant tests should be implemented for household infant beds and foldable products" was publicized to include the test for the migration of specific elements (including lead, cadmium, and mercury).

C. Ministry of Health and Welfare

(A) On August 15, 2019, in conjunction with the release of the hygiene standards for the contaminants and toxins in foods, 7 standards regarding general food hygiene were revised, and 12 standards regarding egg hygiene, were revoked, and the identical contents were deleted.

(B) On November 6, 2019, the "Tolerance Standard for Pesticide Residues in Animal Products" was revised, and the tolerance (0.1 ppm) of "Nanaide" in bee pollen was added.

(C) In 2019, "Collecting Literatures on Evidences of influences of environmental plasticizers on health " was completed, to review the exposure routes, metabolic pathways, and health effects of different phthalate esters (PAEs).

D. The Council of Agriculture of the Executive Yuan

(A) The compliance with "Criteria to Identify Pesticide Residues in Livestock Feeds" was reviewed and there was no need for revision.

(B) Domestic use and international risk assessment results of glyphosate substance was reviewed, and two-stage assessment reports were completed on May 15 and October 14, 2019 and published on the "Pesticide Information Service Network/Information Disclosure" webpage for public reference. According to the assessment results, the current approved range and method of use will not cause exposure risks to human health and environmental safety. However, the use quantity of the chemical substance is significant, we will continue to investigate the exposure risks in our country.

E. The Ministry of the Interior

On August 19, 2019, Article 321 of the "Building Technical Regulations" regarding building design and construction was revised and publicized, to increase the use of green building materials (from 45% to 60%), and it will be implemented on January 1, 2021.

(II) Monitoring and Sampling Results

The various ministries carried out work regarding environmental hormones substance test indicators or related tasks according to the specified authorities and responsibilities. The test indicator substances include: nonylphenols, heavy metals, phthalates, pesticides, polychlorinated benzene, dioxin, bisphenol A and pentachloride phenol; the sampling items include: certified environment-friendly products, batteries, toys, baby walkers, game mats, luggage, textiles, fragrances, paper money, wood panels, edible crops, edible honey, aquatic products, agricultural products, pork, dairy products, livestock feeds, green building materials and wine products, in the total of

about 124, 699 audited or sampled products and a the total of 17,776 audited companies.

EPA focused on key domestic rivers and tested short-chain chlorinated paraffin, hexachlorobutadiene, nonylphenol and bisphenol A, phthalate esters, polybrominated diphenyl ethers and hexabromobiphenyls, polycyclic aromatic hydrocarbon compounds, heavy metals (lead, cadmium) and methyl mercury polycyclic chlorinated paraffin for their environmental distribution investigation, in the total of about 15,180 pieces of test data from sediments samples. In addition, with focus on air quality, environmental water bodies, drinking water, soil, flues of fixed pollution sources, industrial discharged water, the test was conducted on dioxin and furans, polychlorinated biphenyls, polybrominated diphenyl ethers, heavy metals, nonylphenol, bisphenol A, phthalate esters, perfluorooctanoic acid and perfluorooctanoic sulfonic acid.

(III) Education and Promulgation

A. The Environmental Protection Administration of the Executive Yuan

(A) Continued to update and maintain the "persistent organic pollutants information website", the "Minamata Convention on Mercury information website" and the "environmental hormones information website", and set up a Chem Life Facebook page and issue a booklet of "Chemical Substances in Life" to provide people with the knowledge about environmental hormones in everyday life subjects.

(B) Compile the "Handbook of Environmental Distribution Investigation Results for Toxic Chemical Substances" (2009-2019) and publish it on the website for environmental distribution investigation of toxic chemical substances for the public to review.

- (C) In 2019, the government held three environmental hormone seminars, two events of seeded teacher training and two college elite camps to advocate the correct knowledge about environmental hormones to the public.
- (D) Publish 2 messages on the addition and revision of specifications for certified environment-friendly products on the "Green Life Information Website".

B. Ministry of Economic Affairs

- (A) Link to the "environmental hormones Information Website" from the "Industrial Green Technology Information Web" (URL <https://proj.ftis.org.tw/eta/>).
- (B) Promote awareness of environmental hormones through the environmental regulations and technical seminars, and release 373 copies of handouts.
- (C) Use the non-environmental hormones environment-friendly plasticizer (1, 2-cyclohexane dimethyl; DINCH) technology developed by Material and Chemical Research Laboratories, ITRI and through the "Key Chemical Material Chain Gap Project (Pilot Plant Project)" to assist UPC Group to start trial production R&D and mass production.
- (D) Promote the environment-friendly fluorine-free water repellent, which was developed by the Textile Research Institute and does not contain any perfluorocarbon octyl (PFOS/PFOA) compounds, to the textile industry for the treatment of finished fabrics, and replace the use of fluorine-containing water repellents progressively.
- (E) Conduct the press releases to publish the test results for products sampled from the market such as building block toys, clays, baby

walkers, luggage and game mats, on the website of Bureau of Standards, Metrology and Inspection, MOEA.

C. Ministry of Health and Welfare

- (A) In 2019, National Cheng Kung University was entrusted to conduct the "Environmental Health Impact Research on Sensitive Ethnic Groups" project. It has provided 100 women of pregnancy age with dietary health awareness services and continue to conduct the dietary health education and awareness services in 2020.
- (B) From the National Food Consumption Database, obtain the food consumption and body weight data of all age groups in the northern Taiwan (Taoyuan City, Hsinchu County (city), and Yilan County) and the southern Taiwan (Chiayi County (city), Tainan City, Kaohsiung City, Pingtung County, Penghu County). In combination with the 2019 investigation regarding the toxic equivalent concentration data of dioxin compounds in various foods in Yilan and offshore islands, estimate the Life-time Average Daily Dose (LADD) were 0.108 and 0.344 pg WHO-TEQ_{PCDD/F+PCB}/kg BW/day.

D. The Council of Agriculture of the Executive Yuan

- (A) Municipal and county (city) governments sent people to 172 conferences by animal husbandry industry with animal drug companies to promote the awareness.
- (B) In 2019, the experimental nursery and improvement sites and the county and city governments jointly held about 200 sessions to promote the awareness of prevention and control of crop diseases and insect pests and the safe and reasonable use of pesticides.
- (C) Complete two education and training courses for the production

and marketing of aquatic products; three education and training courses for fish farms exporting to EU.

(D) Publish "Ensure the safety of aquaculture products-please use animal drugs correctly according to the prescription of the veterinarians" in 10 advertisements.

(E) Hold 16 seminars on "Aquatic Animal Disease Prevention and Control and Correct Medication".

E. Ministry of the Interior

(A) In 2019, 40 seminars on green building promotion and education have been conducted.

(B) Strengthen and promote the green building materials label, continue to update relevant information on the green building materials label information webpage, and hold three seminars on "Green Building Materials Label System".

F. Ministry of Education

In 2019, there were 6 sessions of "School Chemical Substance Management and Report System Operation" (approximately 680 attendees), 4 seminars on "2019 Campus Invasive Species and Plant Diseases and Pests and Black Mosquito Prevention and Control" (over 400 attendees) and "Joint Meeting of College Supervisors on Environment, Safety and Hygiene" (approximately 200 attendees), to promote the types, sources, exposure routes of environmental hormones and plasticizers, the hazards to humans, and the environmental precautions for using RIFA.

III.Strive to Protect People's Health

Our “environmental hormones management plan” has been implemented for more than a decade since 2009. To improve our environmental hormones

management system, for a long time through the cross-ministrial collaboration, besides collecting and compiling international regulatory information, we also conducted rolling review and improved management measures regarding internationally and domestically concerned environmental hormones substances or related issues, and in collaboration with market products, uses, foods, cosmetics and environment conducted monitoring investigation, and provided timely education and advocating, to raise public awareness of environmental hormones and reduce people's concerns and implement self-prevention to reduce exposure in life. This plan was effective and rapid to strengthen the environmental hormones management regulations, reduce the exposure of environmental hormones substances, and lower the exposure risk in diet, and has found outstanding outcomes.

In the future, the promotion group will continue to promote cooperation in control and monitoring, effectively protect the health and safety of the public and consumers and build a healthy and sustainable environment.

Environmental Hormones Management Plan

(The Second Term)

2019 Implementation Results (Detailed Version)

I. What are environmental hormones

"Environmental hormones" is also known as "Endocrine disrupter substance (EDS)". According to the definition in the report of US Environmental Protection Agency, "environmental hormones" refers to the foreign substances to interfere with the endogenous hormones that are responsible for maintaining biological homeostasis, reproduction, development or behavior, and affect the synthesis, secretion, transmission, combination, action and elimination of hormones." In short, environmental hormones refers to artificial substances that could interfere with the secretion, metabolism and function of natural hormones in animals, thereby interfering with physiological effects such as metabolism, reproduction, growth and development of animals.

II. Plan Basis

According to the Executive Yuan's Consumer Protection Letter No. 0980009983 on October 30, 2009 and the 170th meeting of the Consumer Protection Committee of the Executive Yuan, the Environmental Protection Administration of the Executive Yuan was designated as the management and convening agency of "Domestic environmental hormones Management Mechanism" and was entrusted to convene a promotion group among relevant agencies to jointly develop the domestic "Environmental Hormones Management Plan" and implement it accordingly and progressively.

The implementation period for the "Environmental Hormones Management Plan" is from January 1, 2010 to December 31, 2015. Since then, in view of the possible adverse health effects of environmental hormones substances and

increasing international concerns over the issues of environmental hormones, our country continues to carry out the related Management Plan to ensure people's health. Through cross-ministerial cooperation and the promotion group members, the Environmental Protection Administration led the relevant ministries to jointly draft and promote the "Environmental Hormones Management Plan (the Second Term)", covering the promotion tasks planned from 2016 to 2021, continuing the implementation of environmental hormones management.

In 2018, the Environmental Hormones Management Plan (the Second Term) was revised in accordance with the domestic management status, to include the "suggested watch list of environmental hormones" for our country, as the basis for the implementation results in the annual report.

III. Plan Objectives

- (I) Through various competent authorities, a cross-ministerial promotion group is established to implement real-time background sampling, monitoring and promulgation for commodities, supplies, products, foods and the environment, and effectively and quickly strengthen environmental hormones management regulations, and reduce the exposure of environmental hormones, and lower the exposure risk in people's diet, and ensure a healthy living environment, and create a healthy and sustainable living environment.
- (II) Coordinate with various ministries to confirm the list of environmental hormones substances, the types of objects used in life and the public exposure risk, and then implement the mitigation or prevention methods in accordance with the responsibilities and authorities of the relevant ministries, and promote the awareness of the concept of environmental hormones and the public preventive methods in daily life, to protect people's safety and health.

IV. Strategy Implementation and Promotion Group Members

(I) Implementation Strategy

- A. Establish a cross-ministerial promotion group: The Environmental Protection Administration of the Executive Yuan is planned to be the convening authority of the Environmental Hormones Management Plan.
- B. Confirm environmental hormones substance types: collect the international lists of environmental hormones substances (U.S., Japan, and Europe), provide a confirmed list of environmental hormones substances to the relevant ministries, the types of objects used in life, and the people's exposure risk, and implement the mitigation or prevention methods in accordance with the responsibilities and authorities of the relevant ministries.
- C. Implementation and revision of laws and regulations: Promote group members review and revise relevant laws and regulations at any time in accordance with their authorities and responsibilities, and in timely respond to international trends maintain the health of people.
- D. Sampling and monitoring: conduct sampling and monitoring for products (commodities), foods and environment background.
- E. Strengthen promulgation: The competent authorities with respect to supplies, products, foods and environment strengthen promulgation in accordance with their authorities and responsibilities, and timely communicate and promote the awareness with the media and the public to reduce public convenes.
- F. Rolling review and management: collect the yearly updated international regulations, key convened substances and specific strategies to control the environmental hormones substances, in response to international trends, and as references for collaboration under the Environmental

Hormones Management Plan (the Second Term), and continue to strengthen the cross-ministerial rolling review and management.

(II) Promotion Group Members

A. Due to the wide distribution and medium of environmental hormones, no control can be implemented by a single decree or a single agency. This is also the case internationally. This plan clearly defines the competent authorities with respect to the environmental hormone's substances in the daily life in our country:

(A) Environmental Protection Administration of the Executive Yuan: Toxic chemicals, environmental agents, drinking water, indoor air quality.

(B) Ministry of Economic Affairs: consumer goods that are not supervised by other competent authorities.

(C) Ministry of Health and Welfare: foods, food containers, medical equipment.

(D) Ministry of the Interior: Green Building Materials.

(E) Council of Agriculture of the Executive Yuan: pesticides, livestock feeds, agricultural products.

(F) Ministry of Finance: Wines and liquors hygiene.

(G) Ministry of Education: Promote awareness and environmental education.

B. Promotion Group Members

(A) The Environmental Protection Administration of the Executive Yuan is the convening agency responsible for the convening of meetings.

(B) The promotion group members include: Environmental Protection Administration of the Executive Yuan (Toxic and Chemical Substances Bureau, Department of Environmental Sanitation and

Toxic Substance Management, Committees for Legal Affairs, Petitions and Appeals, Public Nuisance Arbitration, Department of Waste Management, Department of Air Quality Protection and Noise Control, Department of Water Quality Protection, Soil and Groundwater Remediation Fund Management Board, Environmental Analysis Laboratory, Bureau of Environmental Inspection), Ministry of Health and Welfare (Food and Drug Administration, National Health Agency), Ministry of the Interior (Construction and Planning Agency, Architecture and Building Research Institute), Ministry of Economic Affairs (Bureau of Standards, Metrology and Inspection, Industrial Development Bureau), Council of Agriculture of the Executive Yuan (Bureau of Animal and Plant Health Inspection and Quarantine, Department of Animal Industry, Department of Farmers; Service Fisheries Department, Fisheries Agency, Agricultural Chemicals and Toxic Substances Research Institute), Ministry of Finance (National Treasury Administration) and Ministry of Education (Department of Information and Technology Education), and other added agencies in response to the development of the subject.

V. Plan Schedule

- (I) Short term : January 1, 2016 to December 31, 2017
- (II) Mid to long term : January 1, 2018 to December 31, 2021

VI. 2019 Plan Implementation Results by Various Agencies

(I) Establish cross-ministerial promotion group

A. Environmental Protection Administration of the Executive Yuan

- (A) Form “Environmental Hormones Management Plan” (the Second Term) promotion group, with the Environmental Protection

Administration of the Executive Yuan as the convening agency.

During the implementation period of the “Environmental Hormones Management Plan (the Second Term)” (2016-2021), cross-ministerial promotion group meetings continue to be held, to discuss and confirm the implementation result with respect to the Environmental Hormones Management Plan, and inter-ministrial work lists and the yearly implementation results for each ministry with respect to the environmental hormones substances. (Toxic and Chemical Substances Bureau)

(B) Establish collaboration on environmental hormones control in our country.

In view of increasing attention and concerns with respect to environmental hormones internationally, our country continues to implement the management plan to ensure people’s health. In 2015, the Environmental Protection Administration convened relevant ministries to jointly formulate the "Environmental Hormones Management Plan (the Second Term)". In addition to compiling the implementation results of the previous year, each competent authority is to confirm collaboration work list, as the basis for future work. (Toxic and Chemical Substances Bureau)

(II) Strengthen management system, implement, and revise related laws and regulations

A. Environmental Protection Administration of the Executive Yuan

(A) Collect related international control information to environmental hormones substances, and investigate and propose control, analysis, and suggestions.

Continue to collect and update the latest management status for

the European Union, the United States and Japan, and the list of environmental hormones, as a reference for evaluation and inclusion in the suggested watch list of environmental hormones by our country. (Toxic and Chemical Substances Bureau)

- (B) Evaluate the feasibility of including the environmental hormones substances into the publicized list of toxic chemical substances in accordance with the operational principles of screening and identifying toxic chemical substances by the Environmental Protection Administration of the Executive Yuan.

In response to the international management trend under the Stockholm Convention, PFOA was publicized as a Category IV toxic chemical substance on June 28, 2018. (Toxic and Chemical Substances Bureau)

- (C) With respect to environmental hormones substances that have been publicized in the list as toxic chemical substances, review the relevant regulations on their prohibited use and controlled concentration.

a. The controlled concentration of nonylphenol and nonylphenol polyethoxy alcohol was revised on December 31, 2015, from 10% to 5%, and the controlled concentration of PFOS was revised on June 28, 2018, from 1% to 0.01%, to expand the management scope. (Toxic and Chemical Substances Bureau)

b. On July 12, 2018, experts and scholars in the related fields were convened to an environmental agent management consultation meeting. The preliminary resolution was based on the United Nations and the European Union's ban on mercury and its compounds in insecticidal and fungicidal products, and mercury

and its compounds were added as the prohibited substances for environmental agents. At present, the relevant information required for the legislation process is being investigated, and it is expected to complete the announcement of the prohibition of mercury and its compounds in the environmental agents before December 31, 2020. (Toxic and Chemical Substances Bureau)

- c. On March 5, 2019, decabromodiphenyl ether was revised as a Category I and Category II toxic chemical substance in response to international trends, and the controlled concentration was revised to 1%, and the mass operation criteria was 50 kg. The prohibited operations and possible uses were also added. (Toxic and Chemical Substances Bureau)
- d. It was publicized on July 5, 2019 that the management of mercury toxic chemicals was revised in the Appendix Table 2“Prohibited Operations” of the "Toxic Chemical Substances and Their Operation Management", and added that mercury is prohibited to be used in the manufacture of batteries, switches and relays, fluorescent lamps, high-pressure mercury lamps and non-electronic measurement instruments, with the exclusions of the regulations in the convention, effective January 1, 2021, In addition, in conjunction with the amendments to Table 2, Table 3 “Permitted Uses” was slightly revised accordingly. In addition, mercury-containing products for the manufacture of calibration instruments or reference standards were added. (Toxic and Chemical Substances Bureau)
- e. In 2019, the government completed the data collection and compilation of the latest control information of the Stockholm

Convention, studied and proposed the revised uses of PFOS, and revised the Chinese and English names of tetrabromodiphenyl ether, and added the CAS registration numbers of tetrabromodiphenyl ether and pentabromo diphenyl ether to comply with the Convention. (Toxic and Chemical Substances Bureau)

(D) In accordance with the regulations on the prohibition (restriction) of environmental hormones substances by various competent authorities, the environment-friendly label product specifications and standards are revised on a rolling basis.

To reduce environmental pollution and resource consumption, and promote waste reduction and recycling, the Environmental Protection Administration promotes the environmental protection label system and revises the specifications for environment-friendly label products yearly. In 2019, the labels and specifications for 12 environment-friendly products were added (revised), including two-stage water-saving toilets, original toner cartridges, monitors, computer servers, notebook computers, desktop PCs, ink cartridges, recycled toner cartridges, printers, image output devices, small cars, motorcycles, among which the definitions of polybrominated biphenyls and polybrominated diphenyl ethers were added for printers and image output devices. The control values and the product items have not been changed. The remaining items do not include the revision for environmental hormones substances. A total of 48 environment-friendly label products in 12 categories have been added (revised) from 2015 to 2019, of which 14 products have been added and revised in 2018 (Figure 1). In the recent five years

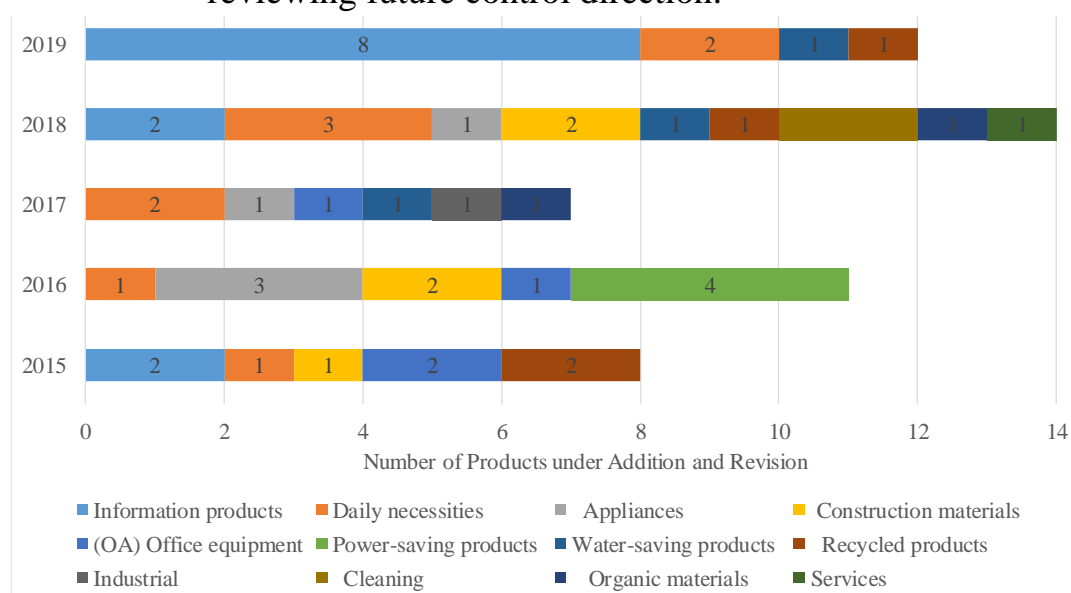
(2015-2019), in the revised environment-friendly label products, the information products received the most environment-friendly labels (21%) (Figure 2). The above-mentioned products have included the relevant environmental hormones in standard evaluation, including heavy metals (lead, cadmium, mercury), polybrominated biphenyls type, polybrominated diphenyl ethers (tetra-to octabromodiphenyl ether, decabromodiphenyl ether), organotin (tributyltin), phthalates (DEHP, DNOP, BBP, DINP, DIDP, DEP, DMP, DBP), short-chain chlorinated stones and alkyl phenol polyoxyethylene ethers. (Committees for Legal Affairs, Petitions and Appeals, Public Nuisance Arbitration)

(E) Study the feasibility of including the environmental hormones substances in control standards.

a. Emission control measures for dioxin and furan. (Department of Air Quality Protection and Noise Control, Department of Water Quality Protection, Department of Environmental Sanitization and Toxic Substance Management)

To strengthen dioxin emission control, Department of Air Quality Protection and Noise Control of the Environmental Protection Administration has released the "Dioxin Control and Emission Standards for Waste Incinerators", and the "Dioxin Control and Emission Standards for Small and Medium-sized Waste Incinerators" , and the "Dioxin Control and Emission Standards for Electric Arc Furnace in Steelmaking Industry", and the "Dioxin Control and Emission Standards for Sintering Plants in Iron and Steel industry", and the "Dioxin Control and Emission Standards for High-Temperature Smelting Facilities in

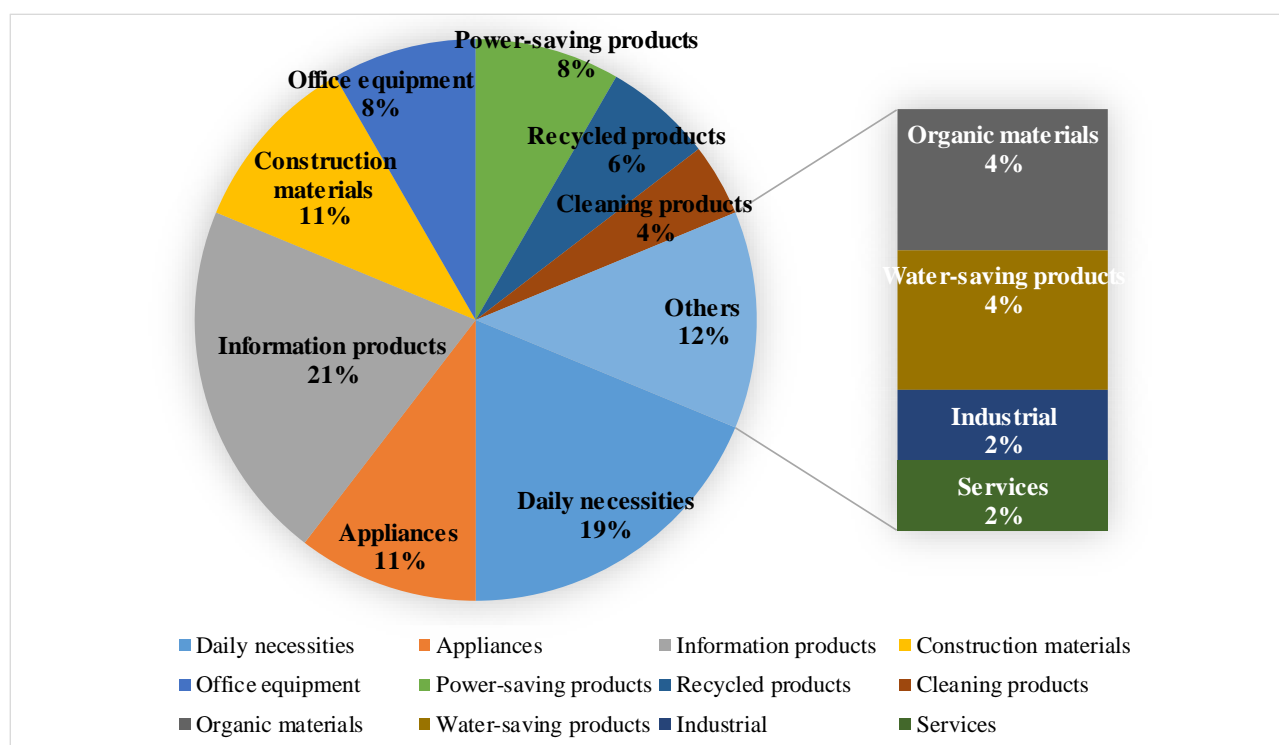
Iron and Steel Industry", and the "Dioxin Emission Standards for Stationary Sources of Pollution" to put all fixed sources of pollution of dioxin and furan emission under control. The control measures for dioxin and furan mainly focus on strengthening the inspection and tests of pollution sources and implementing regulatory control, in accordance with the domestic emissions inventory and ambient air monitoring, to understand domestic emissions and air quality status and trends, as a reference for reviewing future control direction.



Notes :

1. 2015: Information products (external hard drives, UPS system), daily necessities (carpets), construction materials (adhesives), (OA) office equipment (office desks, office chairs), recycled products (recycled plastic films, biomass fuel).
2. 2016: Daily necessities (footwear), home appliances (electric ovens, electric coffee makers, vacuum cleaners), construction materials (doors and windows, wallpapers), (OA) office equipment (electric paper shredders), energy saving products (chargers, LED street lighting, LED display, indoor lighting).
3. 2017: Daily necessities (air filters, pillows), appliances (dishwashers), (OA) office equipment and supplies (digital copier paper), water-saving products (shower heads), industrial products (low voltage bus), organic materials (biomass plastic).
4. 2018: Information products (ink cartridges, original toner cartridges), daily necessities (mops (assembly), fresh-keeping boxes, fire extinguishers), appliances (washing machines), construction materials (paints, Portland cement), water-saving products (two-stage water-saving toilets), recycled products (recycled plastic film products), cleaning products (industrial and commercial cleaners, household cleaners), organic materials (plastic medical infusion containers), services (restaurant industry).
5. 2019: Information products (original toner cartridges, monitors, servers, notebook computers, desktop PC, ink cartridges, printers, image output devices), daily necessities (small cars, motorcycles), water-saving products (two-stage water-saving toilets), recycled products (recycled toner cartridges).

Fig. 1 Addition and Revision of Environment-Friendly Label Products in 2015-2019



Notes :

1. Information products: ink cartridges, original toner cartridges, external hard drives, UPS systems, monitors, servers, notebook computers, desktop PC, printers, image output devices.
2. Daily necessities: mops (group), air filters, carpets, freshness-keeping boxes, fire extinguishers, pillows, footwear products, small cars, motorcycles.
3. Home appliance products: household dishwashers, washing machines, electric ovens, electric coffee makers, vacuum cleaners.
4. Water-saving products: shower heads, two-stage water-saving toilets.
5. Industrial: low voltage bus.
6. Recycled products: recycled plastic film products, biomass fuel oil, recycled toner cartridges.
7. Construction materials: coatings, doors and windows, adhesives, wallpaper, Portland cement.
8. Cleaning products: industrial and commercial cleaners, household cleaners.
9. Organic materials: plastic medical infusion containers, biomass plastic products.
10. (OA) Office equipment: digital copier, electric paper shredder, office table, office chair.
11. Power-saving products: chargers, LED Street lighting, LED display, indoor lighting fixtures.
12. Services: restaurant industry.

Fig. 2 Addition and Revision of Environment-Friendly Label Products in recent five years (2015-2019)

To strengthen the control of dioxin in discharge water, the Department of Water Quality Protection of the Environmental Protection Administration revised the "Discharge Water Standard" on April 29, 2019, and revised the applicable conditions for the waste incineration facilities, which are not limited to those with treated and produced wastewater into the wastewater treatment facilities. In addition, in accordance with

the classification and definition by the Water Pollution Prevention and Control Law, the steam supply industry was added. Based on the process to produce steam by the industry, wet treatment is adopted to treat the exhaust gas and the generated wastewater contains dioxin and other pollutants. The applicable dioxin standard was established. In addition, the Department of Environmental Sanitization and Toxic Substance Management of the Environmental Protection Administration has included dioxin and furan into the drinking water quality control standards and scheduled water quality sampling every year. (Drinking water management administration has been transferred from the Department of Environmental Sanitization and Toxic Substance Management to the Department of Air Quality Protection and Noise Control since June 2019)

- b. Management measures for phthalates, nonylphenol and bisphenol A. (Department of Environmental Sanitization and Toxic Substance Management, Department of Waste Management)

For drinking water management, the Department of Environmental Sanitization and Toxic Substance Management of the Environmental Protection Administration has included DMP, BBP, DNOP, nonylphenol, and bisphenol A in the "collection list" for the screening operation under drinking water quality control standards, and DEP in the "preliminary collection list", DBP in the "watch list", DEHP in the "candidate list", and continued to conduct local water quality testing and evaluation.

Regarding the management of plastic bags for shopping, cosmetics and personal cleaning products, the Department of

Environmental Sanitization and Toxic Substance Management of the Environmental Protection Administration publicized on August 15, 2017 the revised "Restrictions on the Use of Plastic Bags with respect to Users, Implementation Methods and Implementation Dates" to expand the control of plastic shopping bags with additional 7 categories under control, including pharmacies, medical equipment shops, 3C equipment retailers, books and stationery retailers, laundry service, beverage shops, and pastry bakeries. Since January 1, 2018, no free plastic shopping bags will be provided. On August 3, 2017, the "Restriction on manufacture, import and sale of cosmetics and personal cleansing products containing plastic particles" was publicized and implemented to control 6 types of cosmetics and personal cleaning products containing plastic particles, including shampoo cosmetics, face wash and makeup removers, bathing personal cleaning, soaps, scrubbing creams, and toothpastes, which will be prohibited from manufacture or import for our country from January 1, 2018, and prohibited from selling from July 1, 2018.

- c. Management measures for PCBs and heavy metals (lead, cadmium, mercury). (Soil and Groundwater Remediation Fund Management Board, Department of Water Quality Protection, Department of Waste Management, Department of Air Quality Protection and Noise Control)

Regarding the management of contaminated sites, to effectively manage domestic soil and groundwater contaminated sites, in 2001, the Soil and Groundwater Remediation Fund Management Board of the Environmental Protection Administration established soil pollution control standards for PCBs, lead, cadmium, and mercury, and revised and issued lead control standard in 2013. The groundwater pollution control standards and conducted pollution site control in accordance with the regulations. As of December 31, 2019, the publicized addition and removal of control of heavy metals (lead, cadmium, and mercury), dioxin and PCBs from contaminated soil and groundwater sites are shown in Fig. 3.

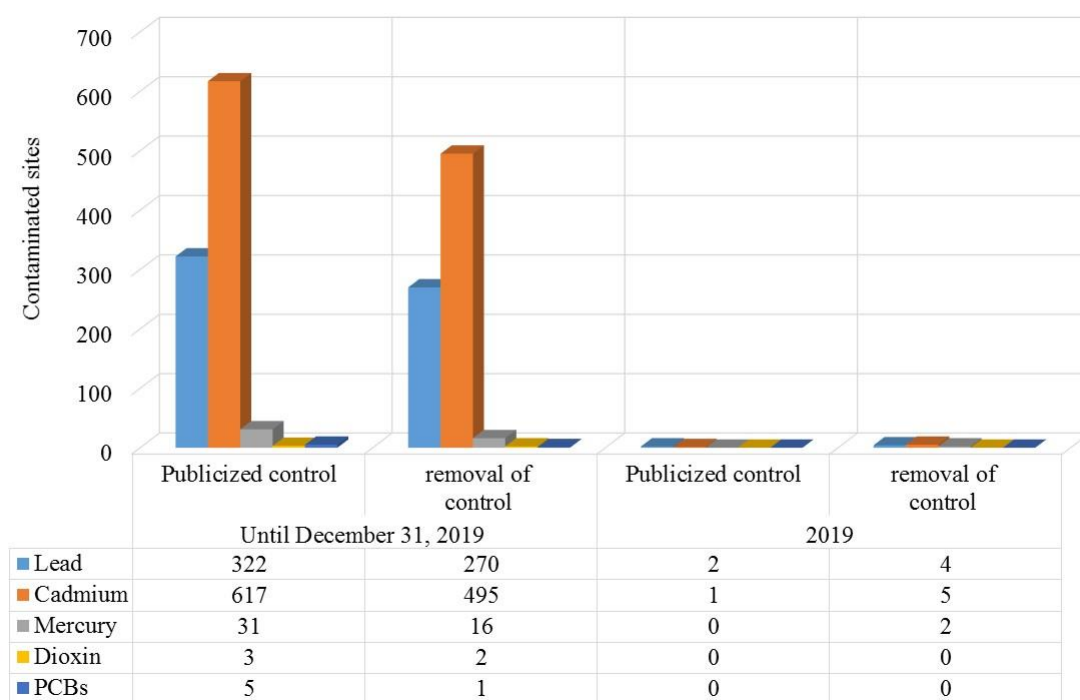


Fig. 3 Publicized addition and removal of control of Lead, Cadmium, Mercury, Dioxin and PCBs

Regarding the management of environmental water bodies and industrial discharge water, during 2017-2018, the Department of Water Quality Protection of the Environmental

Protection Administration has publicized or revised a number of regulations regarding environmental hormones in discharged water and environmental water bodies, as follows:

- (a) On December 25, 2017, the discharged water standard is revised to have a stricter total mercury control standard for power plant discharged water, from existing industrial limit 0.005 mg/L to 0.002 mg/L, which will be implemented on January 1, 2021.
- (b) On December 27, 2017, the revised Article 49-8 of the “Water pollution prevention and control measures and inspection and reporting management measures” was publicized to implement total mercury control measures for coal burning power plant, including recording the sources and total mercury for each purchase, and daily (each time) and monthly coal consumption; when the total mercury in each purchase is higher than 0.45 mg/kg on dry basis or the weighted average of the total mercury in the coal purchased last year is higher than 0.3 mg/kg on dry basis, Management Plan for Total Mercury should be proposed and subject to approval of municipal, county (city) competent authority and implemented accordingly.
- (c) Considering that the concentration of most substances in sea waters is at a trace level ($\mu\text{g/L}$) and assessing existing publicized test method, technique and limit for sea water quality, on February 13, 2018 the revised “Marine environmental classification and marine environmental quality standards” was publicized to revise some water

quality standards and units, and include total mercury in environmental hormones, to improve the accuracy of sea water quality.(regarding marine water quality management, since April 28, 2018, it has been taken over by the Ocean Conservation Administration of the Ocean Affairs Council)

- (d) On December 22, 2018, the revised “Water quality standards for water injected into groundwater and types and limits of hazardous substances” was publicized with a new name “Types and limits of hazardous substances prohibited from being injected into groundwater bodies”. The revision was mainly due to the fact that the Water Pollution Prevention and Control Law has completely banned the injection of waste (polluted) water into groundwater bodies, so it is necessary to delete the provisions of the water quality standards and their applicable items. There are 61 hazardous substances (including total mercury), with undetectable as the control limit.

With respect to market products, the Department of Waste Management of the Environmental Protection Administration in accordance with Minamata Convention on Mercury, held a seminar on the drafted restrictions on imported mercury-containing products on September 23, 2019. On February 3, 2020, the drafted “restriction on imported mercury-containing products” has been publicized and it was stipulated that from January 1, 2021, it is prohibited to import mercury-containing switches and relays, high-pressure mercury lamps for general lighting, and non-electronic measurement

instruments (barometers, hygrometers, pressure gauges, thermometers and sphygmomanometers, etc.) to strengthen domestic mercury management. Besides, on March 2, 2015, the revised “Restriction on the manufacture, import and sale of dry batteries” was publicized to specify that the mercury and cadmium content limits for button-type batteries (alkaline manganese batteries, mercury oxide batteries, silver oxide batteries) should be under 5 ppm and 20 ppm from January 1, 2017 to conform to the convention.

Regarding emission management for stationary pollution sources, the Department of Air Quality Protection of the Environmental Protection Administration in 2018 has taken reference to the regulations of cement industry from many countries, and drafted the air pollutant emission standards for cement industry, to add the mercury emission standard. In 2019 domestic status investigation was completed as well as international data collection and on-site producer investigation and interview, and drafted and discussed the revision with the industry with respect to the feasible control technology and emission status.

d. Pesticide management measures (Department of Water Quality Protection)

Considering that the concentration of most substances in sea waters is at a trace level ($\mu\text{g/L}$) and assessing existing publicized test method, technique and limit for sea water quality, on February 13, 2018 the revised “Marine environmental classification and marine environmental quality standards” was

publicized to revise some water quality standards and units, and include DDT, Pentachlorophenol in environmental hormones, to improve the accuracy of sea water quality. (regarding marine water quality management, since April 28, 2018, it has been taken over by the Ocean Conservation Administration of the Ocean Affairs Council)

(F) Add and revise environmental test standard method, improve environmental test technical capability, ensure national test data quality. (Environmental Analysis Laboratory)

In 2017-2019 the related test methods to 13 environmental hormones revised and publicized by the Environmental Analysis Laboratory of the Environmental Protection Administration are summarized in Table 1.

Table 1 Publicized or revised environmental test standard methods in recent years

Test method(number)	Publicized application range or revised contents	Publicized or revision date
Detection method of metals and trace elements in water-inductively coupled plasma atomic emission spectrometry (W311.54C)	The revision is publicized to include : scope of application, interference, reagents, sampling and storage, procedures, and quality control with respect to enhanced data quality.	May 21, 2019
Detection method of metals and trace elements in water-inductively coupled plasma mass spectrometry (W313.54B)	The revision is publicized to include : scope of application, interference, reagents, sampling and storage, procedures and quality control, precision, and accuracy, with respect to enhanced data quality.	May 23, 2019
Sampling method of dioxin and furan in water (NIEA W790.51B)	The revision is publicized to include applicability to the sampling for the detection of dioxin and furan (PCDDs/PCDFs). In drinking water, drinking water sources, surface water, groundwater and discharged water.	November 20, 2019
Dioxin and furan test method-isotope label dilution gas chromatography/tandem mass spectrometer method (NIEA M805.01B)	Applicable to the contents of 17 chemicals, including 2, 3, 7, 8-tetrachlorodioxin (2, 3, 7, 8-Tetrachlorinated dibenzo-p-dioxin, 2, 3, 7, 8-TeCDD), 2, 3, 7, 8-tetrachlorofuran (2, 3, 7, 8-Tetra chlorinated dibenzofuran, 2, 3, 7, 8-TeCDF) and 2, 3, 7, 8-chlorinated pentachloride (Penta-), hexachord (Hexa-),	December 11, 2018

Test method(number)	Publicized application range or revised contents	Publicized or revision date
	heptachlor (Heptad-) and octachloro (Octa-) dioxin and furan, in the discharge water of environmental base materials, drinking water quality, drinking water source water quality, soil, sediments, wastes, biological tissues, environmental agents and other base material samples.	
Method for detecting heavy metals in soil-microwave-assisted aqua regia digestion method (NIEA S301.61B)	The revision is publicized to include the environmental hormones, such as lead, cadmium and mercury, and the revised content includes equipment and materials, sampling and storage, procedures, and quality control, etc. with respect to enhanced data quality.	November 8, 2018
Method for detecting heavy metals in soil-aqua regia digestion method (NIEA S321.65B)		
Semi-volatile organic compounds detection method-gas chromatography mass spectrometer method (NIEA M731.02C)	It is applicable to the determination of DDT, hex chlorobenzene, and pentachlorophenol in various types of industrial wastes, toxicity characteristic leaching procedure (TCLP) extracts, soil and sediments, and other different base material extracts.	June 5, 2017
Detection method of semi-volatile organic compounds in water-gas chromatography mass spectrometer method (NIEA W801.53B)	It is applicable to the detection of DDT, hex chlorobenzene, polychlorinated biphenyls, and pentachlorophenol in drinking water, drinking water sources, surface water, groundwater, discharge water, TCLP extracts and process cooling water tower cooling water.	June 8, 2017
Detection method of organic compounds in toxic chemical substances-gas chromatography mass spectrometry method (NIEA T706.24B)	It is applicable to the detection of DDT, hex chlorobenzene, polychlorinated biphenyls and pentachlorophenol in toxic chemical substances or toxic and hazardous industrial waste samples.	September 27, 2017
Detection method of polychlorinated biphenyls in water-liquid/liquid extraction/gas chromatograph/electron capture detector method (NIEA W601.53B)	It is applicable to the detection of PCBs in drinking water sources, drinking water quality, surface water, groundwater, and discharged water.	February 9, 2017
Detection method of PCBs in water-solid phase extraction/gas chromatograph electron capture detector method (NIEA W602.52B)		
Detection method of PCBs in soil, sediments, and	It is applicable to the detection of PCBs in soil, sediments, industrial wastes (including liquid) or	October 19, 2017

Test method(number)	Publicized application range or revised contents	Publicized or revision date
industrial waste-gas chromatograph method (NIEA M619.04C)	other base material sample extracts.	
Dioxin and furan test method-isotope label dilution gas chromatography/tandem mass spectrometer method (NIEA M805.00B)	Applicable to the contents of 17 chemicals, including 2, 3, 7, 8-tetrachlorodioxin (2, 3, 7, 8-TeCDD), 2, 3, 7, 8-tetrachlorofuran (2, 3, 7, 8-TeCDF) and 2, 3, 7, 8-Chloride penta-, hexa-, hepta- and octa-chlorodioxin and furan in discharged water of general environmental base materials, drinking water quality, drinking water source water quality, groundwater, soil, bottom mud, waste (such as ash, bottom residues, dust ashes), biological tissues (fish), environmental agents and others in base material samples.	December 7, 2017

B. Ministry of Economic Affairs

(A)Continue to collect the test standards and regulatory information related to environmental hormones substances from Europe, US and Japan, and review on rolling basis to revise the CNS national standards related to the environmental hormones substances and conduct assessment and planning, and publicize to include the required test.

a. Review and revise on rolling basis the CNS national standards related to the environmental hormone's substances. (Bureau of Standards, Metrology, and Inspection)

In 2019, 6 additional revisions and 1 corrective revision were completed regarding the specified contents of the environmental hormones substances in the related CNS national standards, which are described as follows:

- (a) CNS 691 "Fluorescent tubes (for general lighting)" was revised to add mercury content limit.
- (b) CNS 15047 "Fragrance" and CNS 15095 "Gold and Silver Joss Paper" were revised to add mercury content limit and revise lead and cadmium limits.

- (c) CNS 16095 "Child Care Products-Diaper Changing Tables in Public Places" was established to include lead content limit.
- (d) CNS 16116 "Mattresses for infant beds and cradles" was established to include the content limits for lead, cadmium, and mercury.
- (e) CNS 15290 "Safety Specifications for Textiles (General Requirements)" was revised to add PFOS content limit.
- (f) The commercial product test standards for "automatic data processing system monitors, automatic data processing system head-worn displays, monitors, and televisions" were revised. The new version of CNS 15598-1 will include the mercury content limit for electronic display cold cathode fluorescent lamps and electrodeless fluorescent lamps. It is planned in the end of 2020 that the new revision of test standards will be publicized.

In 2015-2019, 34 CNS national standards (Fig. 4) were formulated or revised, and publicized to include revised or added tests such lead, cadmium, mercury, nonylphenol (NP) and nonylphenol polyoxyethylene ether (NPEO), phthalate ester plasticizer, bisphenol A, perfluorooctanoic sulfonate (PFOS) and organic tin compounds.

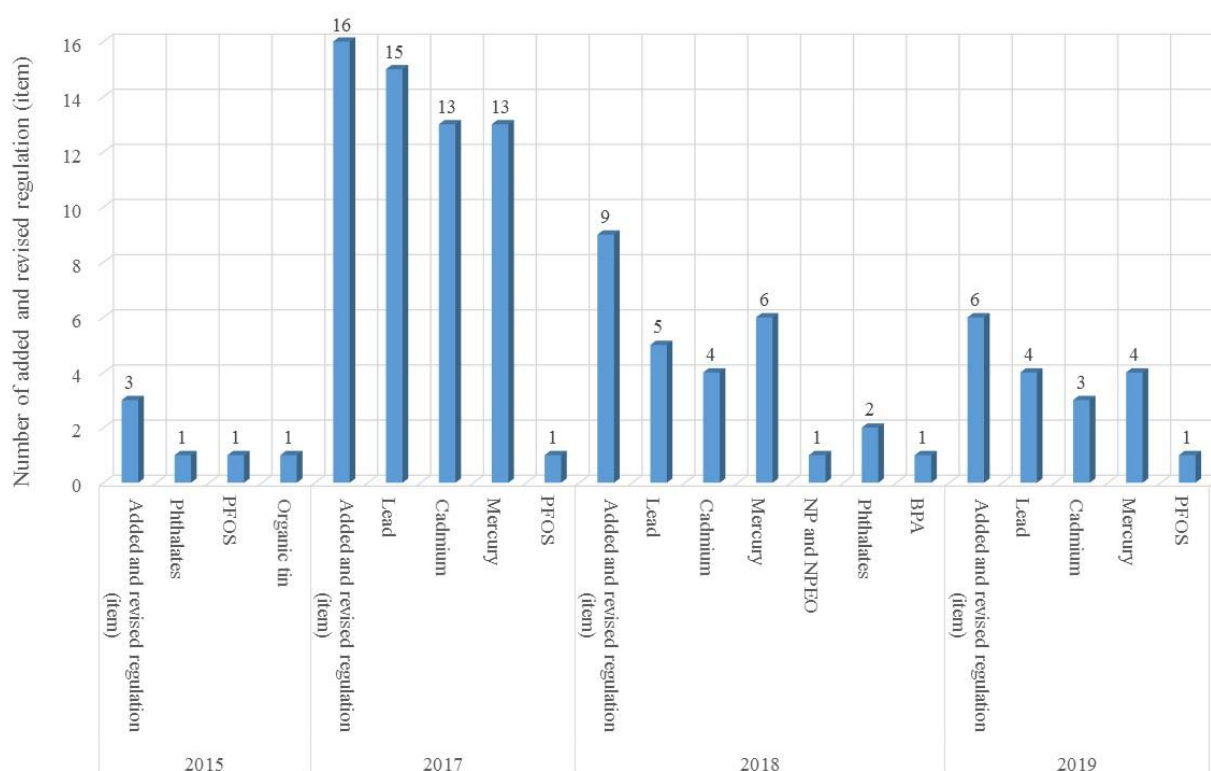
- b. Assess, plan, and publicize the national standards to include the required tests for the materials containing environmental hormones substances in the required. (Bureau of Standards, Metrology, and Inspection)

In 2019, 2 completed revisions and 1 notice were publicized

regarding the required tests for environmental hormones substances:

- (a) In 2019, the revision was publicized that electrical and electronic products, such as wireless chargers and electronic toilets (toilet), should be inspected, and a label is required on the products to indicate the content of the restricted substances in Section 5 of CNS 15663 (lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls and polybrominated two phenyl ethers).
- (b) The 2019 notice stipulated that "the required inspection for household infant beds and folding bed products should be implemented", and the inspection should include the migration of specific elements (including lead, cadmium, and mercury).

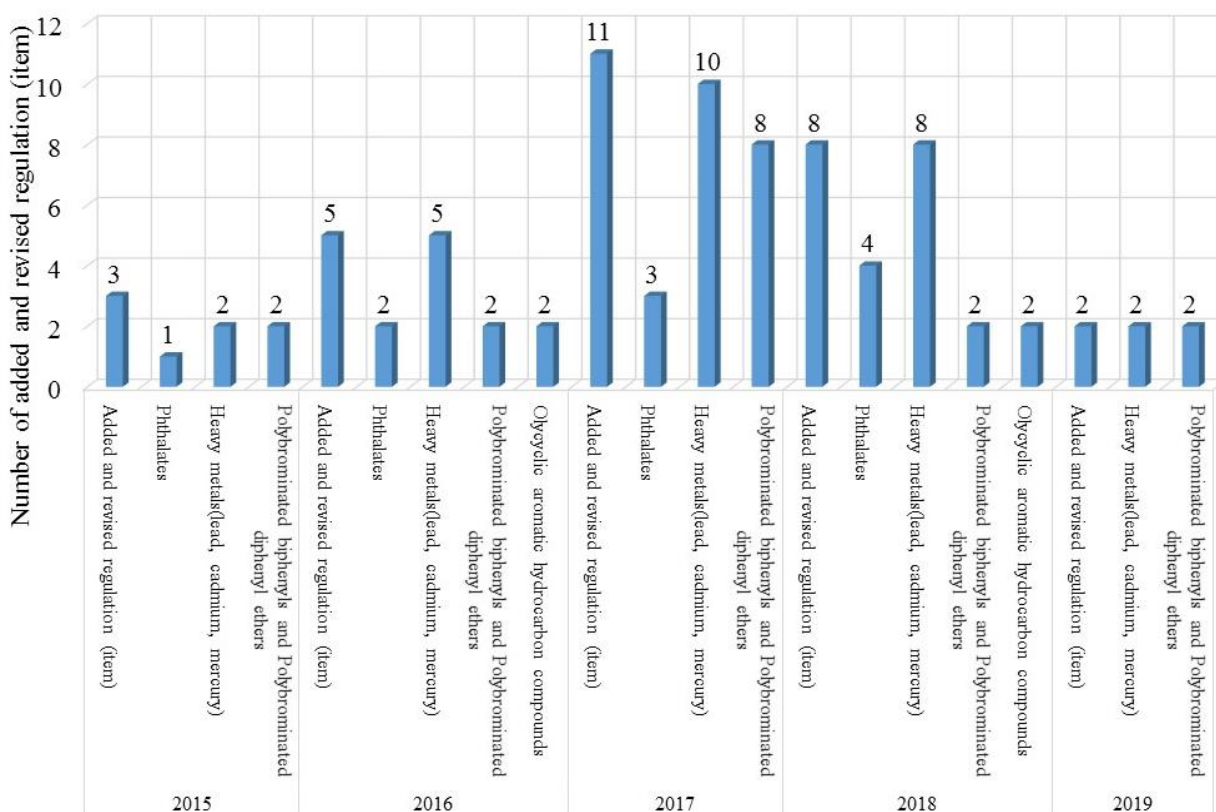
In 2015-2019 in the publicized revisions, there were 29 required tests for regulated commodities or voluntary products (Figure 5), and there were additional tests in the revisions regarding environmental hormones substances, including phthalate plasticizers, heavy metals (lead, cadmium, mercury), polybrominated biphenyls and polybrominated diphenyl ethers, polycyclic aromatic hydrocarbon compounds (PAHs).



Notes : the following are the revision years for CNS national standards :

- 1.2015:(1) Organotin: CNS15853-1 Footwear-Hazardous Substances in Footwear and Components-Part 1: Determination of Organotin Compounds in Footwear Materials. (2) Phthalates: CNS15853-2 Footwear-Hazardous Substances in Footwear and Components-Part 2: Determination of phthalates in Footwear Materials. (3) PFOS: CNS 15808 perfluorooctanoic sulfonate (PFOS) determination-liquid chromatography mass spectrometry (LC/MS) method.
- 2.2017:(1) Lead, cadmium, mercury: CNS 11676 household infant beds and folding beds, CNS 12990 household baby cradles and cradles, CNS 15973 child care products-baby swing, CNS 15978 child care products-bicycle child seats, CNS 15982 Child Care Products-Reclining Cradle, CNS 15987 Child Care Products-Household Changing Table, CNS 16004 Child Care Products-Household Playpens, CNS 16005 Child Care Products-Safety Fence, CNS 16006-1 Child Care Products-Baby Carrier-Article Part 1: Sling baby carrier, CNS 16006-2 Child Care Products-Baby Carrier-Part 2: Soft Sling, CNS 16007 Child Care Products-High Seat, CNS 16008 Child Care Products-Baby Jumper, CNS 15441 Correction Fluid. (2) Lead: CNS 16024 childcare products-baby bath chair, CNS 16025 childcare products-baby bathtub. (3) PFOS: CNS 15808 perfluorooctanoic sulfonate (PFOS) determination-liquid chromatography mass spectrometry (LC/MS) method.
- 3.2018:(1) Mercury: CNS 14576 compact fluorescent tube (for general lighting), CNS 15479 fluorescent lamp mercury content measurement method. (2) Lead: CNS 16045 children care products-children chairs and stools. (3) Lead, cadmium, mercury: CNS 16042 childcare products-child safety belts, leashes and similar products, CNS 16043 childcare products-household beds, CNS 16083 childcare products-portable infant beds and tripods. (4) NP and NPEO: CNS 15290 Textile Safety Specification (general requirements). (5) 6 kinds of phthalate plasticizers (DINP, DEHP, DNOP, DIDP, BBP, DBP): CNS15503 general safety requirements for children products. (6) 6 kinds of phthalate plasticizers (DINP, DEHP, DNOP, DIDP, BBP, DBP), bisphenol A, lead, cadmium, and mercury: CNS 16041 children care products-pacifier clip.
4. 2019: (1) Mercury: CNS 691 fluorescent tube (for general lighting). (2) Lead: CNS 16095 childcare products-changing tables for public places. (3) Lead, cadmium, mercury: CNS 15047 fragrance, CNS 15095 gold, silver paper, CNS 16116 infant beds and mattress. (4) PFOS: CNS 15290 Textile Safety Specification (General Requirements).

Fig. 4 Additions and Revisions of CNS National Standards in Recent Years



Notes : the additions and revisions of related test regulations in recent years for the required products or voluntary products are as follows :

- 1.2015 : (1) Heavy metals (lead, cadmium, mercury), polybrominated biphenyls and polybrominated diphenyl ethers: conduct tests for six products, such as automatic data processors, and conduct the relevant tests for the network multimedia players and projectors; (2) phthalates (DEP, DMP, DEHP, DBP, BBP, DINP, DIDP, DNOP): conduct the relevant tests for children raincoat products.
- 2.2016 : (1) Phthalic acid esters (DEP, DMP, DEHP, DBP, BBP, DINP, DIDP, DNOP), heavy metals (lead, cadmium, mercury), polycyclic aromatic hydrocarbon compounds: conduct the relevant tests for luggage products, and "Children's playground spring shaking equipment" and the voluntary products; (2) Heavy metals (lead, cadmium, mercury): conduct the relevant tests for drinking water faucets; (3) Heavy metals (lead, cadmium, mercury), polybrominated biphenyls and polybrominated diphenyl ethers: conduct relevant tests for beverage dispenser products, and wiring connectors and power cord products.
- 3.2017 : (1) phthalates (DEP, DMP, DEHP, DBP, BBP, DINP, DIDP, DNOP): conduct relevant tests for children bicycles; (2) phthalates (DEP, DMP, DEHP, DBP, BBP, DINP, DIDP, DNOP), heavy metals (lead, cadmium, mercury): conduct relevant tests for children bedside guardrail products, and baby strollers; (3) Heavy metals (lead, cadmium, mercury), polybrominated biphenyls and polybrominated diphenyl ethers: conduct relevant tests for 92 items, such as radio keyboards, and fluorescent lamps with built-in ballasts; conduct relevant tests for 63 commodities, such as electric blankets; conduct relevant tests for drinking water supply machines, and 32 commodities, such as electric motors; conduct relevant tests for seven commodities, such as power supplies; conduct relevant tests for eight commodities, such as air conditioners and lighting, and conduct relevant tests for hot cathode fluorescent lamps and their AC ballast products.
- 4.2018 : (1) phthalates (DEP, DMP, DEHP, DBP, BBP, DINP, DIDP, DNOP), heavy metals (lead, cadmium, mercury): conduct relevant tests for baby walkers, and "Children's playground components" and voluntary products; (2) Heavy metals (lead, cadmium, mercury): conduct relevant tests for blended paint (synthetic resins), enamels, water-based cement paints and solvent-based cement paints, and conduct relevant tests for building fireproof coatings; (3) phthalates (DEP, DMP, DEHP, DBP, BBP, DINP, DIDP, DNOP), heavy metals (lead, cadmium, mercury), polycyclic aromatic hydrocarbon compounds: conduct relevant tests for "children playground ladder components" and "Children's playground floor mats"; (4) Heavy metals (lead, cadmium, mercury), polybrominated biphenyls and polybrominated diphenyl ethers: conduct relevant tests for digital cameras on automobiles, and conduct relevant tests for power supplies for automobile cigarette lighting.
- 5.2019 : Heavy metals (lead, cadmium, and mercury), polybrominated biphenyls and polybrominated diphenyl ethers: conduct relevant tests for wireless charger products, and conduct relevant tests for electronic toilet products.

Fig. 5 Additions and Revisions for the Required Commodities in Recent Years

C. Ministry of Health and Welfare

(A) Continue to review the "Pesticide Residue Limits" in foods; collaborate in the management of banned or restricted pesticides publicized by the agricultural administration; revoke or revise the relevant regulations.

To strengthen the management of pesticide residues in crops, the Ministry of Health and Welfare continues to revise the "Pesticide Residue Limits" to ensure food safety. The additional and revised residue limits for relevant environmental hormones are described below. In addition, in accordance with the provisions of the Food Safety and Hygiene Management Law, those whose residual pesticide content exceeds the safety limits should not be manufactured, processed, blended, packaged, transported, stored, sold, imported, exported, given as gifts or displayed publicly. (Food and Drug Administration)

- a. On February 12, 2015, the residue allowance (0.05 ppm) of "Permethrin" and "Permethrin" in sesame was updated.
- b. On June 24, 2015, the residue allowance was revised for "2, 4-D" in crops such as wheat and small berries, "Alachlor" in other crops (cereals), and "Cypermethrin" in crops such as melons and vegetables, "Giaphosate" lentils (dry) and other crops, "Malathion" in wheat flour and other crops, "Metribuzin" in other crops (vegetables and fruits), "Permethrin" in soybean oil and other crops, "Trifluralin" in other crops (cereals), and "VINCLOZOLIN" in other crops (cereals).
- c. On August 20, 2015, the residue allowance of "Permethrin" in soybean sprouts, jicama, and set aria root, and "Malathion" in

cantaloupe and other crops were updated.

- d. On December 22, 2015, the residue allowance of "Permethrin" in potato and other crops, and "Permethrin" in hops and other crops were updated.
- e. On July 14, 2016, the residue allowance of "Permethrin" in lily, chrysanthemum and chrysanthemum was updated.
- f. On October 26, 2016, the residue allowance of "Carberry" in root vegetables and other crops was revised.
- g. On December 12, 2016, the residue allowance of "Methyl" in lilies and other crops was updated.

In addition, on November 6, 2019, the "Pesticide Residue Allowance Standard in Animal Products" was revised, and the residue allowance of "Methyl" in bee pollen (0.1 ppm) was revised. (Food and Drug Administration)

- (B) In accordance with international trends, continue to review the hygienic standards of all types of foods, utensils, containers, or packaging.

On May 8, 2018, to strengthen the management of food hygiene and safety, the "Hygienic Standards for Contaminants and Toxins in Food" was formulated for cereals, vegetables, fruits, plants, algae, mushrooms, edible oils and fats, aquatic animals, poultry and livestock products, milk and dairy products, beverages, bottled and packaged drinking water, canned food, baby foods, salts, edible ice, honey, meat and meat products, dietary supplements with respect to total mercury or methyl mercury, lead, cadmium and benzene limit value. On August 15, 2019, in accordance with the release of the Health Standards for contaminants and toxins in foods, 7 general

food sanitary standards were revised, and 12 Health Standards including eggs were revoked to delete the same parts. (Food and Drug Administration)

(C) Continue to collect and analyze relevant information about environmental hormones and health risk management domestically and internationally.

To understand the influence of environmental hormones on human health, the Health Promotion Administration of the Ministry of Health and Welfare has started relevant research projects in recent years, as references for policy implementation, as described below (Health Promotion Administration) :

- a. In 2015, the "Environmental Distribution of Bisphenol A and Nonylphenol" was completed, and the data on health hazards from environmental pollution caused by perfluorooctanoic sulfonic acid (PFOS) were collected and compiled.
- b. In 2016, the literature review on the health effects of environmental hormones was completed, and the health hazard data of Hexabromobiphenyls and DDT was collected.
- c. In 2017 the report on the health effects of decabromodiphenyl ether was completed.
- d. In 2019, the literature evidence of the health effects of plasticizers on the environment was collected to review the exposure pathways, metabolic pathways, and health effects of different types of phthalate esters (PAEs).

D. Council of Agriculture

(A) Pesticides:

- a. Based on the watch list of environmental hormones in our

country, screen out the ones as pesticides and commission experts and scholars to conduct safety assessment on the agents with respect to environment and ecological risks, and review control measures.

- (a) Continue to implement control measures for the newly registered and suspected environmental hormones pesticides, including the relevant toxicological and environmental impact tests before registration. (Bureau of Animal and Health Plant Health Inspection and Quarantine)
- (b) Conduct expert review meetings from time to time (pesticide advisory meeting), conduct safety assessment on environmental and ecological risks, and registration and approval for commercialization is only given to those without convenes about the assessment. (Bureau of Animal and Health Plant Health Inspection and Quarantine)
- (c) Re-evaluate the domestic use of glyphosate and the results of the international risk assessment, and complete the assessment reports in two stages respectively on May 15 and October 14, 2019 and publish it on the "Pesticide Information Service Network/Information Disclosure" webpage for public reference. According to the evaluation results, the current scope of approval and methods of use will not cause exposure risks to human health and environmental safety. However, due to high level use of the agent, we will continue to watch the exposure risks in my country. (Bureau of Animal and Health Plant Health Inspection and Quarantine)

(d) For the assessment of high-risk pesticides, the manufacture, import and processing has been prohibited since January 1, 2016, and the sale and use of highly toxic finished pesticide 24% Methyl solution has been prohibited since January 1, 2017. On September 28, 2017, it was publicized that Permethrin pesticides are suspected of causing tumors, and applications for new use methods and their scope of application will be restricted immediately from the publication date. The Council of Agriculture of the Executive Yuan will continue to conduct risk assessment, and review the results, and formulate pesticide prohibition (restriction) measures. (Bureau of Animal and Health Plant Health Inspection and Quarantine)

(B) Animal medicines: According to the suspected environmental hormones listed in the United States, Japan and Europe, the ingredients contained in approved animal medicines are screened, and domestic and foreign scientific literatures are collected to investigate and evaluate the safety of the medicine.

The Bureau of Animal and Health Plant Health Inspection and Quarantine of the Council of Agriculture, mining at the environmental agents such as disinfectants with suspected environmental hormones used in livestock farms, continues to implement plans to investigate and analyze the data from Europe, the United States, Japan and other countries, to collect and assess related safety, health, exposure risks, and environmental and ecological risk data, as references for drug inspection, registration and examination. In 2016-2018, the risk assessment for 6 suspicious

environmental hormones ingredients was completed, and described as follows:(Bureau of Animal and Health Plant Health Inspection and Quarantine)

- a. In 2016, the risk assessment and analysis for Propoxur and Dichlorvos within drug effectiveness period was completed.
- b. In 2017, the risk assessment report for Benthocarb and toluene was completed.
- c. In 2018, the risk assessment report for animal drugs, diflubenzuron, and miconazole, was completed.

(C) Livestock feeds : Review and formulate the related regulations to the prohibited ingredients in livestock feeds and livestock feeds additives, and management and registration.

- a. “Criteria to identify residual pesticides in livestock feeds” was reviewed and no revision was needed. (Department of Animal Industry)
- b. Continue to collect international information about environmental hormones substances. When necessary, revise existing regulations with respect to the prohibited ingredients in livestock feeds and livestock feeds additives, registration and management. (Department of Animal Industry)
- c. In view of the multiple incidents of dioxin contaminating livestock and poultry products in our country over the past ten years, to prevent dioxin and dioxin-like PCBs from entering the animal body through livestock feeds or livestock feeds additives, affecting health and causing entering of dioxin residues into animal body, on July 27, 2017, the revised Article 1-1 of the Implementation Rules for Livestock Feeds Management Law

was publicized, to add the limits for the contents of dioxin and dioxin PCBs in livestock feeds or livestock feeds additives, and those that exceed the limits in the appendix table are regarded as the substances sufficient to damage the health of livestock, poultry and aquatic animals, as stated in Paragraph 4, Article 1 of the Livestock Feeds Management Act. (Department of Animal Industry)

E. Ministry of the Interior

(A)Continue to review the regulations regarding the usage rate of green building material, expand the applications of green building materials.

Building technical regulations and green building materials design technical specifications mandate that buildings for public use should use a certain percentage of green building materials. On August 19, 2019, Article 321 of Building Design and Construction in the “Building Technical Regulations” was publicized to increase the usage rate of green building materials (from 45% to 60%), which implementation will be on January 1, 2021. (Construction and Planning Agency)

F. Ministry of Finance

(A)Collaborate with Ministry of Health and Welfare to jointly revise relevant regulatory standards to alcohol product hygiene.

In addition, based on the drinking habits in our country, international alcohol product hygiene regulations, the characteristics of the raw materials of wines and sweet potato distilled spirits, and the needs of alcohol product management, the "Alcohol Product Hygiene Standards" were jointly revised and

publicized in 2016 with the Ministry of Health and Welfare.
(National Treasury Administration)

(III) Conduct sampling and monitoring for commodities, products, foods, and environment background

A. Environmental Protection Administration of the Executive Yuan

(A) Conduct sampling for market products (including environment friendly label) containing environmental hormones.

a. According to the regulations governing the management of toxic chemical substances and their operations, nonylphenol and nonylphenol polyethoxy alcohol are prohibited from being used in the manufacture of household cleaners, and tributyltin oxide is prohibited from being used in the manufacture of marine antifouling paints. From 2015 to 2018, the Toxic and Chemical Substances Bureau conducted sampling for "household cleaners" and "marine antifouling paints", and the above environmental hormones were tested by the Environmental Analysis Laboratory of the Environmental Protection Administration, and all the tested products met the regulations of the Toxicity and Chemical Substances Management Regulations, except for a nonylphenol polyethoxy alcohol that was detected in 2016, it was not deliberately added after subsequent audit by the Environmental Protection Administration. The distribution of the tests per year is shown in Figure 6. (Toxic and Chemical Substances Bureau)

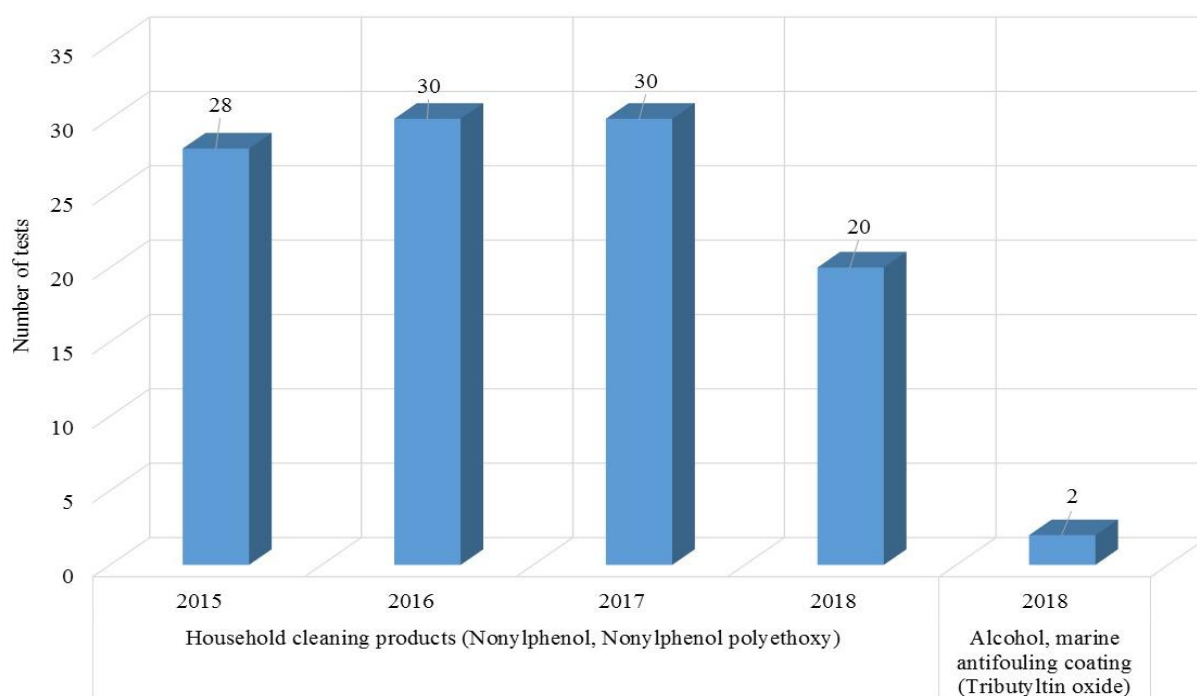


Fig. 6 Market products tested by Toxic and Chemical Substances Bureau in Recent Years

b. In 2019, various local environmental protection bureaus publicized the mercury and cadmium content of specified batteries for a total of 344 cases, and conducted audits on the manufacture, import and sales of dry batteries. A total of 16,391 companies were regulated and 95,684 specified batteries were audited, and 2,816 cases including specified battery were audited, and there was no violation. In 2017-2019, various local environmental protection bureaus publicized the mercury and cadmium content of specified batteries for a total of 1,204 cases, and a total of 46, 410 companies were audited. Only one company was audited in 2018 to find labeling not compliant with the regulations; another 120 cases were randomly inspected, with a pass rate 100%, For details, see Table 2. (Department of Waste Management)

c. In 2019, various local environmental protection bureaus

conducted audits of mercury thermometers, which a total of 1,385 companies were regulated, and conducted 3,423 audits and found no violations. In 2015-2019, various local environmental protection bureaus conducted audits on mercury thermometer input and sales, and a total of 28,856 audits, with a pass rate of 100%. (Department of Waste Management)

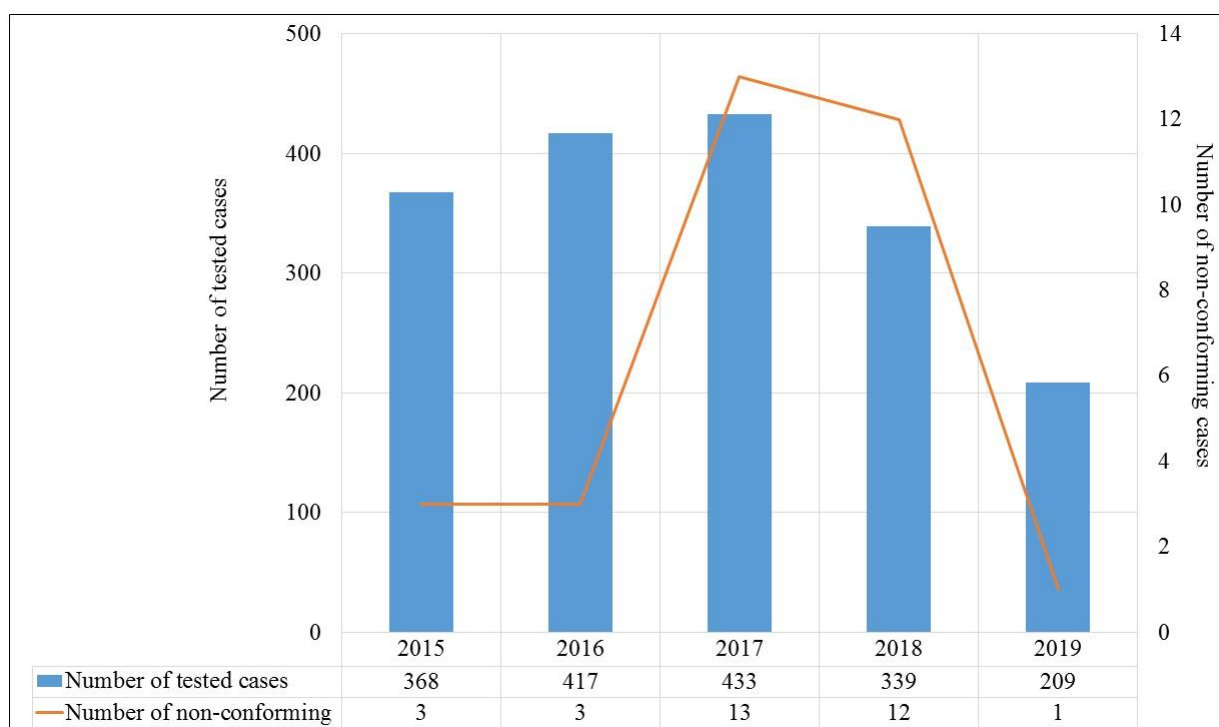
Table 2 Issuing of confirmation and audits on mercury and cadmium in specified batteries in 2017-2019

Year	Type		Issued and confirmed cases	Audited cases	Number of audited companies	Pass rate
2017	specified battery	non-button type	293 cases	165,437 cases	18,808	100%
		button type	258 cases	cases		
	Including specified battery objects		—	6,810 cases		
2018	specified battery	non-button type	209 cases	105,063 cases	11,211	99.9%(only one company has violation)
		button type	100 cases	cases		
	Including specified battery object		—	6,409 cases		
2019	specified battery	non-button type	232 cases	95,684 cases	16,391	100%
		button type	112 cases	cases		
	Including specified battery		—	2,816 cases		

d. In 2019, a total of 209 environment friendly labelled products were sampled, including 3 wood products, 6 recycled textiles, 19 recycled toner cartridges, 2 pieces of plastic foam packaging materials, and 3 recycled plastic film products, 13 pieces of household cleaners, 5 pieces of skin and hair cleaners, 15 pieces of computer hosts, 21 monitors, 16 pieces of notebook computers, 39 pieces of original toner cartridges, 8 pieces of electric fans, 6 pieces of two-stage water saving toilet, 3 pieces of water-saving faucets and equipment accessories, 1 piece of drinking fountain, 9 pieces of water dispenser, 2 pieces of storage type electric water heater, 2 pieces of biodegradable plastics, 3 pieces of plastic medical infusion containers, 13 pieces of non-kiln building materials, 4 plastic pipes, 6 electric motorcycles, 4

mattresses, 5 power distribution transformers, 1 low-voltage busboy; the tests include formaldehyde in products, formaldehyde in textiles, phthalates (DEHP, DNOP, BBP, DINP, DIDP, DEP, DMP, DBP), azo dyes for color toners, plastic products and heavy metal lead, cadmium, hexavalent chromium in plastic parts, and heavy metal lead, hexavalent chromium in paints, formaldehyde in cleaning products... etc. In the test results, one original toner cartridge plastic was found lead content did not meet the standard control limit by the product specification, and its environment friendly label has been revoked. In 2015-2019, a total of 1, 766 environment friendly labeled products were randomly sampled and inspected. Among all, 700 were information products. The number of environment friendly labeled products tested per year is detailed in Figure 7. The tests include product energy consumption, noise, ozone and dust, hygroscopicity and dispensability of sanitary paper, Azo dyes for color toners, phthalates for plastic products (DEHP, DNOP, BBP, DINP, DIDP, DEP, DMP, DBP), polybrominated biphenyls and polybrominated diphenyl ethers (tetra-octabromodiphenyl ether) phenyl ether, decabromodiphenyl ether), heavy metal lead, cadmium and mercury, organotin, hexavalent chromium, formaldehyde in plastic parts and coatings, and formal Hyde, ethoxyalkylphenol, benzophenone in cleaning products, pH value etc. Among all, in 2015-2019, there were 32 cases which violated the control limit for environmental hormones by the environment friendly label regulations. All the environment friendly product labels have been revoked. (Committees for Legal Affairs,

Petitions and Appeals, Public Nuisance Arbitration)



Note: in 2015, a total of 3 pieces, including 1 piece of computer mainframe plastic parts regarding polybrominated diphenyl ether content and 2 pieces of air conditioner plastic parts regarding lead content; in 2016, a total of 3 pieces, including 2 pieces of air conditioner plastic parts regarding lead content and 1 piece non-kiln-fired building materials regarding total cadmium ; in 2017, there were 13 pieces in total, including 1 piece of recycled textile product regarding phthalates, and the remaining 12 pieces were all plastics whose lead content did not meet the regulatory limit of the specifications and standards, including 8 pieces of original toner cartridge and 1 portable projector, 2 pieces of air conditioners and 1 piece of electric fans; in 2018, a total of 12 pieces, including 1 piece of recycled textile regarding phthalates, 3 pieces of display plastic parts regarding lead content, and 8 pieces of original toner cartridge plastic parts regarding lead content; in 2019, a total of 1 piece of original toner cartridge plastic parts which lead content did not meet the product specifications and standard control limits.

Fig. 7 Tests for Environment Friendly Labelled Products in 2015-2019

(B)Conduct investigation on the environment distribution of the sediments and fish bodies from key domestic rivers.

In 2015-2019, the Toxic and Chemical Substances Bureau of the Environmental Protection Administration conducted investigation on the environmental hormones for river sediments and fish bodies, and the results indicate that there is a trend for the concentration of many chemical substances to decrease. Regarding the river investigation and environmental hormones over the years, the data are summarized in Table 3. The following investigation on river sediments and fish bodies environmental distribution regarding

phthalates, bisphenol A, nonylphenol, polycyclic aromatic hydrocarbon compounds, heavy metals (lead, cadmium, mercury, and methyl mercury) and other environmental hormones is described respectively later. The test results are detailed from Figure 8 to Figure 18. (Toxic and Chemical Substances Bureau)

a. Phthalate esters (PAEs)

In 2019 river sediments investigation regarding PAEs was conducted for 15 rivers. The concentration range for 9 PAEs was ND~11.6 mg/kg dw, and the average was 0.01~0.56 mg/kg dw, among which DEHP has the highest detection rate (97.5%), and the average concentration was 0.56 mg/kg dw, while other 8 PAEs had relatively lower detection rate (0~26.2%), and the average concentration was all below the minimum concentration (0.05 mg/kg dw) or not detectable. In view of the PAEs environmental distribution investigation on 30 years in 2015-2019(for details, see Fig. 8 and Fig. 9). Over the years, among the 9 PAEs, DEHP had the highest detection rate, while the concentration for the other 8 PAEs was relatively lower. Among them, the rivers with higher DEHP value in the past include Banyan Creek, Efren Creek, Diana Creek, Dogging Creek and Hauling Creek, all of which had a decreasing trend. However, the average DEHP concentration in Zhenguang Creek, Nankeen Creek, Daan Creek and Puki Creek was higher than the previous measurement, and the measured DEHP of other river sediments was similar to the previous measurement. In the past 2 years, the DEHP concentration measured for Zhenguang Creek was relatively higher, and the average concentration has

exceeded the lower limit of DEHP sediments quality index of 1.97 mg/kg.

For river fish bodies, the concentration range of 9 PAEs from the fish bodies of 15 rivers in 2019 was ND~3.15 mg/kg ww, with an average of 0.001~0.142 mg/kg ww (see Figure 10). In summary, the detection rate of 9 PAEs in 30 rivers in the past years was the highest with DEHP, and the concentration of the other 8 PAEs was relatively lower. The average concentration of DEHP in fish body was higher than that of Jincheng Creek and Yandi Creek, and the average concentration exceeded 0.5 mg/kg wet weight, higher than that of fish bodies from other rivers.

b. Bisphenol A

In 2019, an investigation of river sediments and fish bodies was conducted in 15 rivers. The concentration of BPA in the river sediments ranged from $<0.0002\sim0.088$ mg/kg dw, with an average value of 0.011 mg/kg dw. The concentration range for BPA in river fish bodies was $<0.05\times10^{-3}\sim1.20\times10^{-3}$ mg/kg ww, and the average was 0.644×10^{-3} mg/kg ww. From the bisphenol an environmental distribution investigation for 30 rivers in 2015-2019, there have been bisphenol a data from at least 3 surveys (Figure 11 and Figure 12). Rivers with higher measurement values in the past, including Diana Creek, Banyan Creek, Efren Creek, Nankeen Creek and Zhenguang Creek, all have a decreasing trend. In the past two years, Diana Creek, Efren Creek, Bashing Creek and Banyan Creek had higher measurement values, and the average concentration exceeded 20 $\mu\text{g/kg}$ dry weight, and the average concentration of other rivers is

below 20 µg/kg dry weight. The average concentration of bisphenol A in fish bodies was higher than that measured for river freshwater, and the average concentration exceeded 2 µg/kg wet weight sample, which was higher than that in other rivers.

c. Nonylphenol

In 2019, the investigation on river sediments and fish bodies was conducted for 15 rivers. The concentration of nonylphenol in river sediments ranged from ND (method detection limit 0.161×10^{-3} mg/kg dw) to 0.175 mg/kg dw, with an average of 0.0420 mg/kg dw. The concentration of nonylphenol in river fishes ranged from ND (method detection limit 0.182×10^{-3} mg/kg ww) to 3.70×10^{-3} mg/kg ww, with an average of 0.941×10^{-3} mg/kg ww. From the nonylphenol environmental distribution investigation for 30 rivers in 2015-2019, there have been nonylphenol data from at least 3 surveys (Figure 11 and Figure 13). Rivers with higher measurement values in the past, including Diana River, Nankeen River, Efren River, Kaya River and Puki River, all had a decreasing trend. In the past two years, Zhaohui Creek, Jianjun Creek, Dohan Creek, Indian Creek, Danshui River Mainstream and Hualien Creek had higher measurement values. The average concentration exceeded 90 µg/kg dry weight, and the average concentration of other rivers was below 90 µg/kg dry weight. The average concentration of nonylphenol in fish bodies was higher from river freshwater and Xiuguluan Streams. The average concentration exceeded 10 µg/kg wet weight, which was higher than that from other rivers.

d. Polycyclic Aromatic Hydrocarbons (PAHs)

In 2019, an investigation of river sediments and fish bodies was conducted in 15 rivers. The concentration of 26 PAHs in river sediments was 0.035~1.022 mg/kg dw, and the average value was 0.189 mg/kg dw, and the concentration of 26 PAHs in river fish bodies ranged 0.285~2.853 mg/kg ww, and the average value was 1.385 mg/kg ww (Figure 11, 14 and 18).

From the PAHs investigation for 30 rivers in 2018-2019, there have been PAHs data from at least one investigation. The average concentration of 26 PAHs in river sediments from 30 rivers ranged 0.035~3.386 mg/kg dry weight, among all, the average concentration of Keelung River (3.386 mg/kg dry weight) was the highest ; among 26 PAHs in river sediments, Naphthalene had the highest detection rate (98.3%), and Pyrene had the highest average detected concentration (0.059 mg/kg dry weight). The sediments of five rivers including Zhaohui River, Bashing River, Beijing River, Wuxi River and Kaya River had a higher percentage of low-ring number PAHs, indicating that the source of PAHs in these river sediments was mainly the use and leakage of petroleum and related products, or low-temperature thermal decomposition products ; the remaining 25 rivers had a higher percentage of high ring numbers, indicating that the main source of PAHs pollution in these 25 rivers was mainly caused by burning hydrocarbons. Through the double ratio diagnosis results, it was found that, except for the PAHs in the sediments of Beigang Creek and Lanyang Creek, which were all from hydrocarbon combustion, the pollution sources of PAHs in the

sediments of the other 28 rivers included direct pollution of petroleum and related products and the combustion of hydrocarbons. The average and range of Total TEQ of 30 river sediments was 19.8 (1.5~155.3) $\mu\text{g/kg}$ dry weight, of which Keelung River 155.3 (28.4~409.6 $\mu\text{g/kg}$ dry weight) was the highest. Benzo[a]pyrene (38.6%) was the highest among 16 average TEQ ratio of the 16 PAHs. For river fish bodies, the average concentration of the total 26 PAHs in 30 rivers was between 0.543~12.668 mg/kg dry weight (0.118~2.853 mg/kg wet weight), of which the Kenai average concentration of 12.668 mg/kg dry weight (2.853 mg/kg wet weight) was the highest. Among the 26 PAHs, Benzo[c]fluorine and Cyclopean[c, d] pyrene had the highest detection rate (97.8%), and Fluoranthene had the highest average concentration 1.592 mg/kg dry weight (0.330 mg/kg wet heavy). The average and range of total TEQ of fish bodies in 30 rivers was 38.4 (12.0~108.0) $\mu\text{g/kg}$ dry weight, of which Xinchengxi had the highest concentration 108.0 (34.5~189.3) $\mu\text{g/kg}$ dw). Dib Enzo [a, h] anthracene (33.4%) had the highest average percentage of TEQ among all 16 PAHs.

e. Heavy metals (lead, cadmium)

In 2019, an investigation of heavy metals in river sediments was conducted in 15 rivers. The lead concentration in river sediments ranged from 5.16 to 467 mg/kg dw, with an average of 26.1 mg/kg dw, and the cadmium concentration was ND (the detection limit of the method was 0.097 mg/kg dw) ~ 1.68 mg/kg dw, with an average value of 0.090 mg/kg dw. Based on the investigation of environmental distribution of lead and cadmium

in 30 rivers from 2018 to 2019 (Figures 11, 15 and 16), there has been one investigation indicating the highest average concentration of lead and cadmium in 30 rivers appeared in Ernie (Lead: 217 mg/kg dw, wet period; Cadmium: 0.481 mg/kg dw, dry period), and it is higher than the upper limit of sediment quality index (lead: upper limit 161 mg/kg), and the average lead concentration of other river sediment samples was mostly lower than the lower limit of sediment quality index (lead: lower limit 48.0 mg /kg), the cadmium concentration in the sediment samples from 30 rivers was not higher than the lower limit of sediment quality index.

For river fish bodies, the lead concentration in fish bodies from 15 rivers in 2019 ranged from ND (detection limit was 0.0006 mg/kg ww) to 0.166 mg/kg ww, average value was 0.016 mg/kg ww, cadmium concentration ranged ND (method detection limit is 0.0002 mg/kg ww) ~ 0.004 mg/kg ww, with an average value of 0.0003 mg/kg ww. In summary, the detected concentration of cadmium in most fish samples from 30 rivers from 2018 to 2019 was ND or lower than the lowest point of the calibration line, indicating that the concentration of cadmium in fish was low. The detected concentration of lead and cadmium was not higher than the standard value set in the "Health Standards for Contaminants and Toxins in Foods" (depending on the fish species, the standard value for lead was 0.3 mg/kg, and the standard value for cadmium ranged from 0.05 to 0.25 mg /kg) (Figure 18).

f. Heavy metals (mercury and methyl mercury)

In 2019, an investigation of heavy metal mercury and methyl mercury in river sediments in 15 rivers was conducted. The mercury concentration in river sediments ranged from ND (method detection limit was 0.174 mg/kg dw) to 2.80 mg/kg dw, with an average value of 0.513 mg/kg dw, no methyl mercury concentration was detected (method detection limit is 0.011 mg/kg dw). Among all, the average mercury concentration (0.89 mg/kg dw) in the sediments of Da'an River was higher than the upper limit of mercury (0.87 mg/kg dw) of the sediment quality index, and the frequency of testing needed to be increased. (Figure 11 and 17).

In river fish bodies, the mercury concentration in fish bodies from 15 rivers ranged from ND (method detection limit was 0.0009 mg/kg ww) to 0.169 mg/kg ww, with an average value of 0.023 mg/kg ww, and methyl mercury concentration ranged ND (method detection limit was 0.0026 mg/kg ww) ~ 0.103 mg/kg ww, the average value was 0.023 mg/kg ww, all fish samples were not higher than the domestic "Health Standards for Contaminants and Toxins in Foods" (Other fishes 0.5 mg/kg ww) (Figure 18).

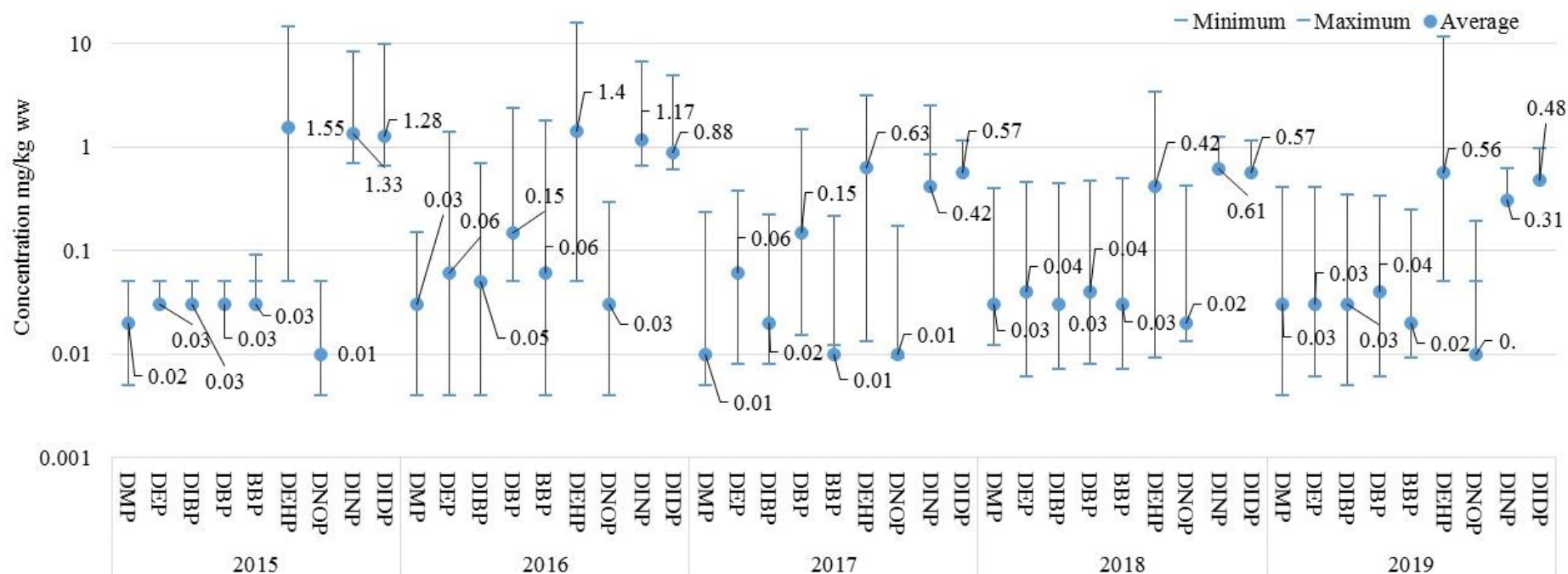
The Analysis Laboratory of the Environmental Protection Administration tested Hex chlorobenzene, DDT, PCBs, Dioxin and Furan, Tetrabromobiphenyl in the sediments from rivers and irrigation ditches in Jinan, Changhua, and Gaping areas from 2015 to 2019. The concentration of ether and pentabromodiphenyl ether, hexabromobiphenyls ether and pentabromodiphenyl ether are

shown in Figure 19. (Environmental Analysis Laboratory)

In 2019, the Soil and Groundwater Remediation Fund Management Board of the Environmental Protection Administration conducted an investigation of pesticide POPs (including DDT, hex chlorobenzene, etc.) and its derivatives, dioxin and furans, polychlorinated biphenyls, heavy metals (lead, cadmium, mercury), polycyclic aromatic hydrocarbons (Benzene (a) pyrene) and phthalate (including DEHP, DBP, DEP, BBP) in river sediments, and only a small part of the samples had the concentration exceeding the lower or upper limit of the sediment quality index, and all the rest met the standard. The results of environmental hormones in the sediment samples of domestic rivers and irrigation channels from 2015 to 2016 and 2018 to 2019 are summarized in Table 4. (Soil and Groundwater Remediation Fund Management Board)

Table 3 Environmental Distribution Investigation by the Administration Toxic and Chemical Substances Bureau of the Environmental Protection in 2015-2019

Year	environmental hormones Type	Sampled River	Type
2015	A total of 90 samples of river sediments were completed in the investigation of environmental distribution regarding acesulfame, nonylphenol, bisphenol A, phthalate esters, hexabromocyclododecane, polybrominated diphenyl ethers, organic arsenic, and inorganic arsenic. 1, 896 pieces of sample test data were completed.	10 key rivers	river sediments
2016	Murex, hexabromocyclododecane, nonylphenol and bisphenol A, phthalates, polybrominated diphenyl ethers, inorganic arsenic and organic arsenic, a total of 2, 160 pieces of river sediment sample test data.	10 rivers, including Keelung River, Toubia River, Kaya River, Daija River, Zhaohui River, Beijing River, Puki River, Jianjun River, Efren River, Xiuguluan River	river sediments
2017	Short-chain chlorinated paraffin (C10-13 with 55.5% chlorine content and C10-13 with 63.0% chlorine content), murex, nonylphenol and bisphenol A, phthalates (DMP, DEP, DBP), DIBP, BBP, DEHP, DNOP, DINP, DIDP), polybrominated diphenyl ethers (PBDEs) (25 PBDEs homologs) and hexabromobiphenyls (HBBs) (5 HBBs homologs), Inorganic arsenic and organic arsenic (trivalent arsenic, pentavalent arsenic, methyl methacrylate (MMA), dimethyl ace amide (DMA), in analysis of 6 categories and 54 kinds of substances, a total of 4, 374 pieces of river sediment sample test data	10 rivers, including Nankeen Creek, Zhenguang Creek, Hauling Creek, Da'an Creek, Wuxi, Saltwater Creek, Diana Creek, Dogging Creek, Anyang Creek, Jincheng Creek, etc. 10 rivers	river sediments
2018	Hexachlorobutadiene (HCBD), short-chain chlorinated paraffin (SCCPs), nonylphenol (NP) and bisphenol A (BPA), phthalates (DEHP, DNOP, BBP, DINP, DIDP, DEP), DMP, DBP, DIBP), polybrominated diphenyl ethers (PBDEs) and hexabromobiphenyls (HBBs), polycyclic aromatic hydrocarbon compounds (PAHs), heavy metals (lead, cadmium) and methyl mercury, in 7 categories and 97 kinds of substances, a total of 16, 005 pieces of samples test data	15 rivers, including Danshui River, Dohan River, Indian River, Ji-long River, Daija River, Zhaohui River, Bashing River, Rapids River, Jianjun River, Zen Gwen River, Gaping River, Libyan River, Hua Yun River, Xiuguluan River, Bei 15 rivers including Nandi	river sediments and fish bodies
2019	Hexachlorobutadiene (HCBD), short-chain chlorinated paraffin (SCCPs), nonylphenol (NP) and bisphenol A (BPA), phthalates (DEHP, DNOP, BBP, DINP, DIDP, DEP), DMP, DBP, DIBP), polybrominated diphenyl ethers (PBDEs) and hexabromobiphenyls (HBBs), polycyclic aromatic hydrocarbon compounds (PAHs), heavy metals (lead, cadmium) and methyl mercury, in 7 categories and 92 kinds of substances, a total of 15, 180 pieces of sample test data.	15 rivers, including Nankeen Creek, Toubia Creek, Kaya Creek, Zhenguang Creek, Hauling Creek, Da'an Creek, Wuxi, Beijing Creek, Puki Creek, Banyan Creek, Efren Creek, Diana Creek, Dogging Creek, Anyang Creek and Jincheng Creek	river sediments and fish bodies



substance	2015			2016			2017			2018			2019		
	concentration range	average	method detection limit	concentration range	average	method detection limit	concentration range	average	method detection limit	concentration range	average	method detection limit	concentration range	average	method detection limit
DMP	ND~<0.05	0.02	0.005	ND~0.15	0.03	0.004	ND~0.23	0.01	0.005	ND~0.390	0.03	0.012	ND~0.406	0.03	0.004
DEP	<0.05	0.03	0.005	ND~1.39	0.06	0.004	ND~0.37	0.06	0.008	ND~0.450	0.04	0.006	ND~0.407	0.03	0.006
DIBP	<0.05	0.03	0.005	ND~0.69	0.05	0.004	ND~0.22	0.02	0.008	ND~0.440	0.03	0.007	ND~0.345	0.03	0.005
DBP	<0.05	0.03	0.005	<0.05~2.35	0.15	0.003	ND~1.46	0.15	0.015	ND~0.460	0.04	0.008	ND~0.334	0.04	0.006
BBP	<0.05-0.09	0.03	0.005	ND~1.75	0.06	0.004	ND~0.21	0.01	0.012	ND~0.490	0.03	0.007	ND~0.246	0.02	0.009
DEHP	<0.05-14.4	1.55	0.007	<0.05~15.6	1.4	0.007	ND~3.10	0.63	0.013	ND~3.34	0.42	0.009	<0.05~11.6	0.56	0.012
DNOP	ND~0.05	0.01	0.004	ND~0.29	0.03	0.004	ND~0.17	0.01	0.009	ND~0.420	0.02	0.013	<0.05~0.190	0.01	0.011
DINP	ND~8.14	1.33	0.695	ND~6.6	1.17	0.650	ND~<2.5	0.42	0.837	ND	0.61	1.22	ND	0.31	0.610
DIDP	ND~9.72	1.28	0.650	ND~4.8	0.88	0.593	ND	0.57	1.15	ND	0.57	1.14	ND	0.48	0.950

Notes : 1. Unit : mg/kg dw; 2. If minimum concentration is ND, the diagram is based on method detection limit (MDL) ; if concentration is below quantities detection limit (QDL), the diagram is based on QDL

Fig. 8 Environmental distribution investigation of PAEs in river sediments in 2015-2019

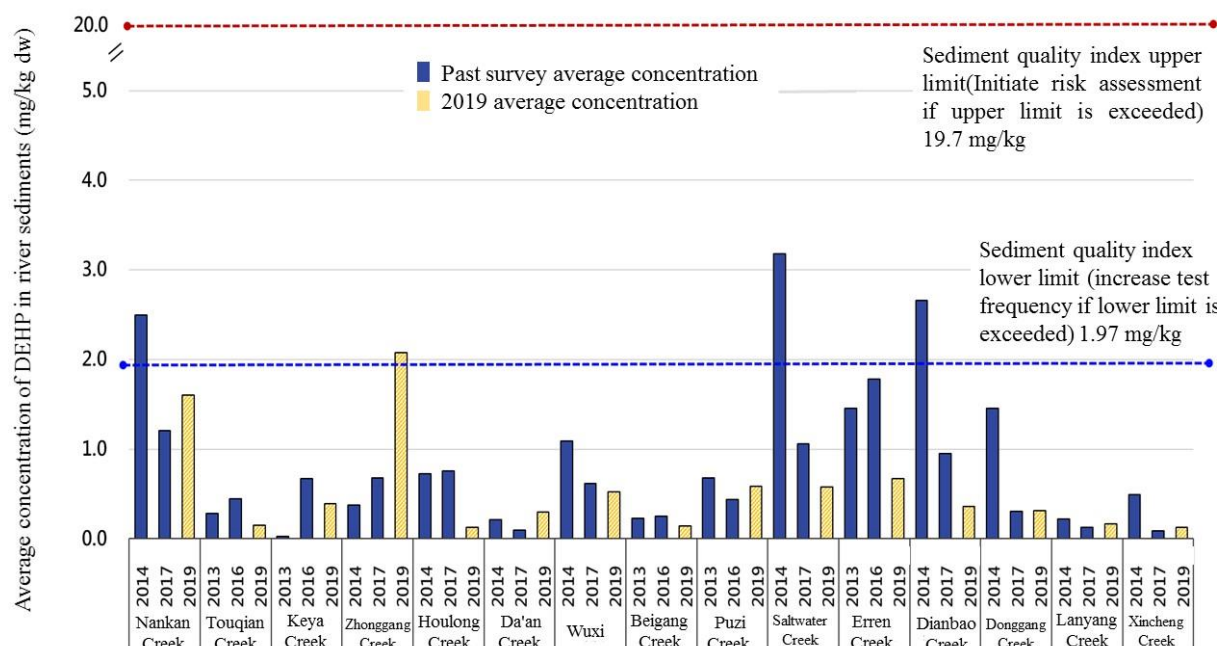
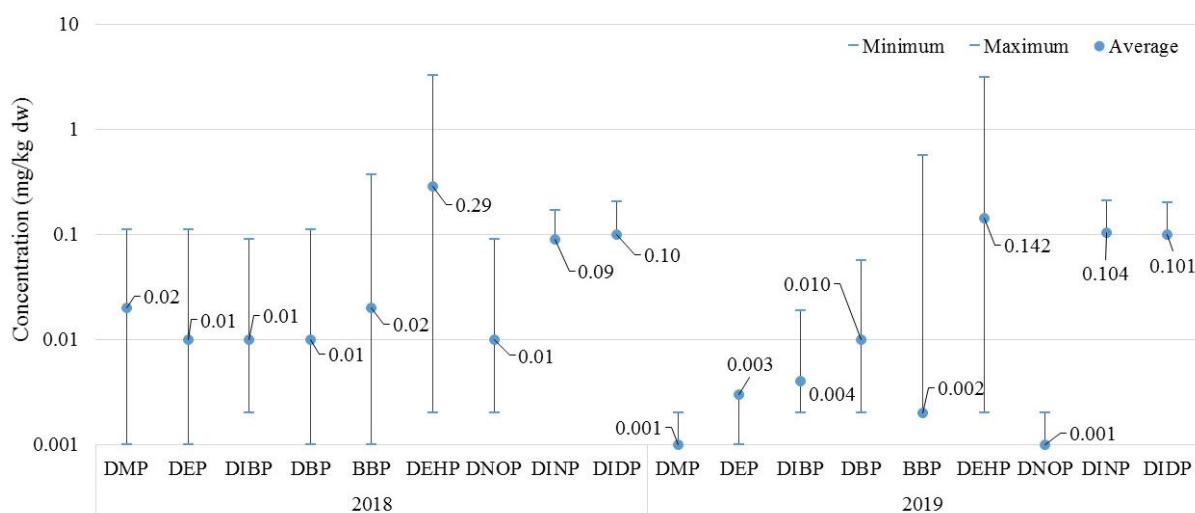


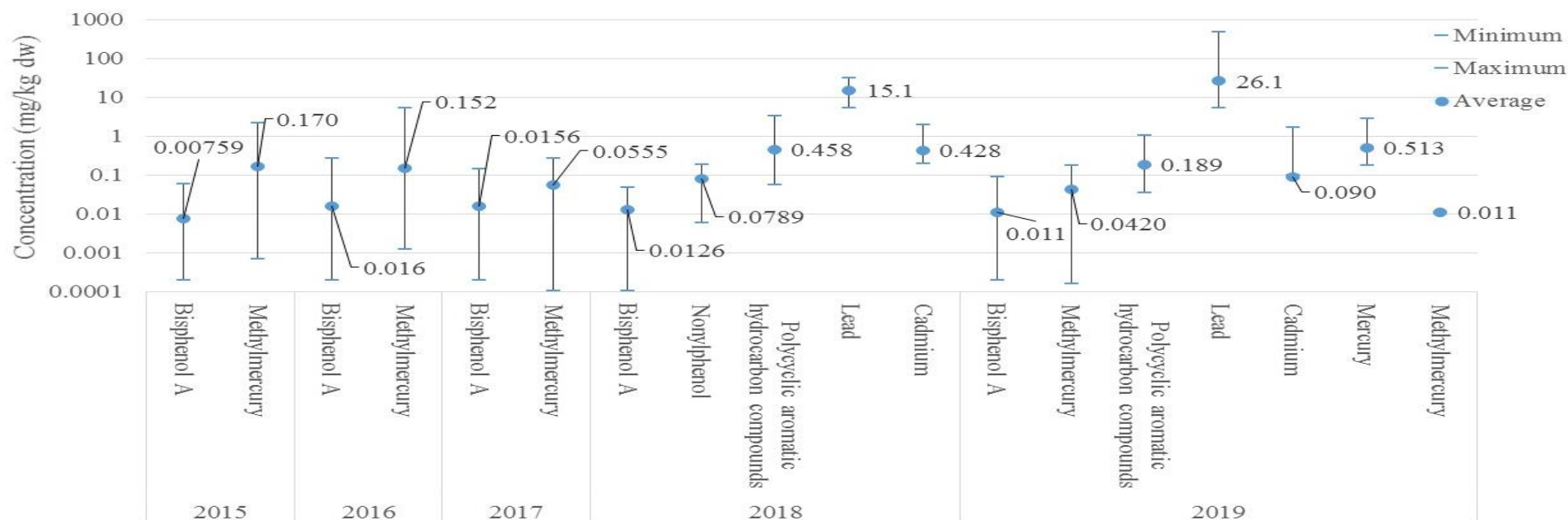
Fig. 9 Comparison of concentration distribution of DEHP in river sediments between 2019 and the Past Years



substance	2018			2019		
	concentration range	average	method detection limit	concentration range	average	method detection limit
DMP	ND~0.11	0.02	0.001	ND	0.001	0.002
DEP	ND~0.11	0.01	0.001	ND	0.003	0.001
DIBP	ND~0.09	0.01	0.002	ND~0.019	0.004	0.002
DBP	ND~0.11	0.01	0.001	ND~0.056	0.010	0.002
BBP	ND~0.37	0.02	0.001	ND~0.565	0.002	0.002
DEHP	ND~3.26	0.29	0.002	ND~3.15	0.142	0.002
DNOP	ND~0.09	0.01	0.002	ND	0.001	0.002
DINP	ND	0.09	0.170	ND	0.104	0.208
DIDP	ND	0.10	0.206	ND	0.101	0.201

Notes : 1. Unit: mg/kg ww; 2. if minimum concentration is ND, the diagram is based on method detection limit (MDL).

Fig. 10 Environmental distribution investigation of PAEs in river sediments in 2018-2019



substance	2015			2016			2017			2018			2019		
	concentration range	average	method detection limit	concentration range	average	method detection limit	concentration range	average	method detection limit	concentration range	average	method detection limit	concentration range	average	method detection limit
Bisphenol	<0.200x10 ⁻³ ~0.0596	0.00759	0.086x10 ⁻³	<0.2x10 ⁻³ ~0.267	0.016	0.097 x10 ⁻³	<0.2x10 ⁻³ ~0.142	0.0156	0.094 x10 ⁻³	ND~0.0479	0.0126	0.108 x10 ⁻³	<0.0002~0.088	0.011	0.086x10 ⁻³
nonylphenol	0.691x10 ⁻³ ~2.211	0.170	0.092x10 ⁻³	0.00122~5.165	0.152	0.128 x10 ⁻³	ND~0.275	0.0555	0.103 x10 ⁻³	5.88x10 ⁻³ ~0.189	0.0789	0.122 x10 ⁻³	ND~0.175	0.0420	0.161x10 ⁻³
PAHs	-	-	-	-	-	-	-	-	-	0.057~3.386	0.458	-	0.035~1.022	0.189	-
lead	-	-	-	-	-	-	-	-	-	5.40~31.3	15.1	0.346	5.16~467	26.1	0.238
cadmium	-	-	-	-	-	-	-	-	-	ND~<2.0	0.428	0.195	ND~1.68	0.090	0.097
mercury	-	-	-	-	-	-	-	-	-	-	-	-	ND~2.80	0.513	0.174
Methylmercury	-	-	-	-	-	-	-	-	-	-	-	-	ND	ND	0.011

Notes : 1. Unit : mg/kg dw, 2. If minimum concentration is ND, the diagram is based on method detection limit (MDL); if concentration is below quantities detection limit (QDL), the diagram is based on QDL.

Fig. 11 Environmental distribution investigation of bisphenol A, nonylphenol, polycyclic aromatic hydrocarbon compounds, heavy species (lead, cadmium, mercury and methyl mercury) in river sediments in 2015-2019

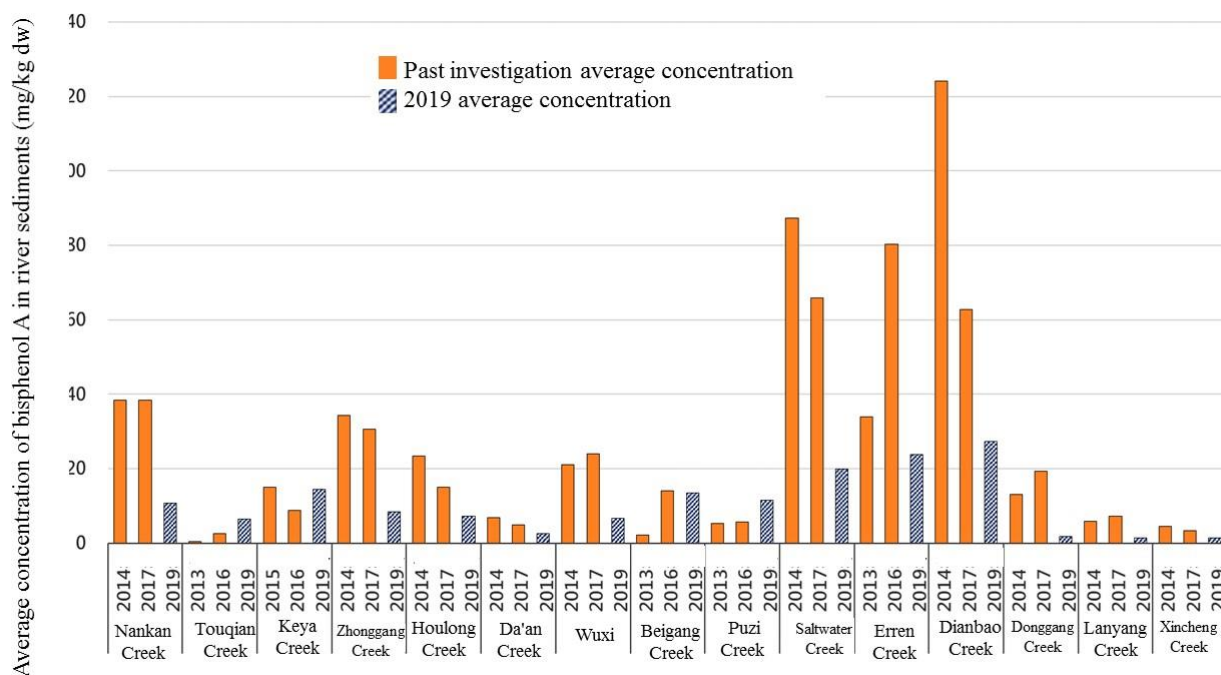


Fig. 12 Comparison of concentration distribution of Bisphenol A in river sediments between year 2019 and the Past Years

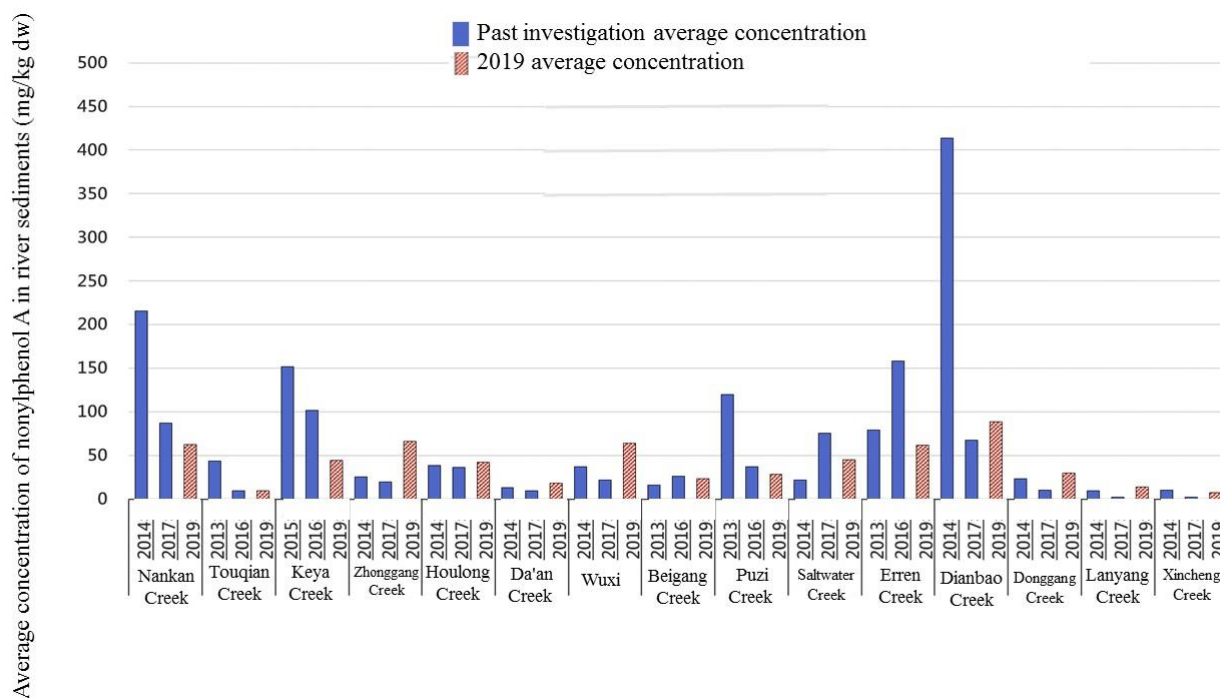


Fig. 13 Comparison of concentration distribution of Nonylphenol in river sediments between year 2019 and the Past Years

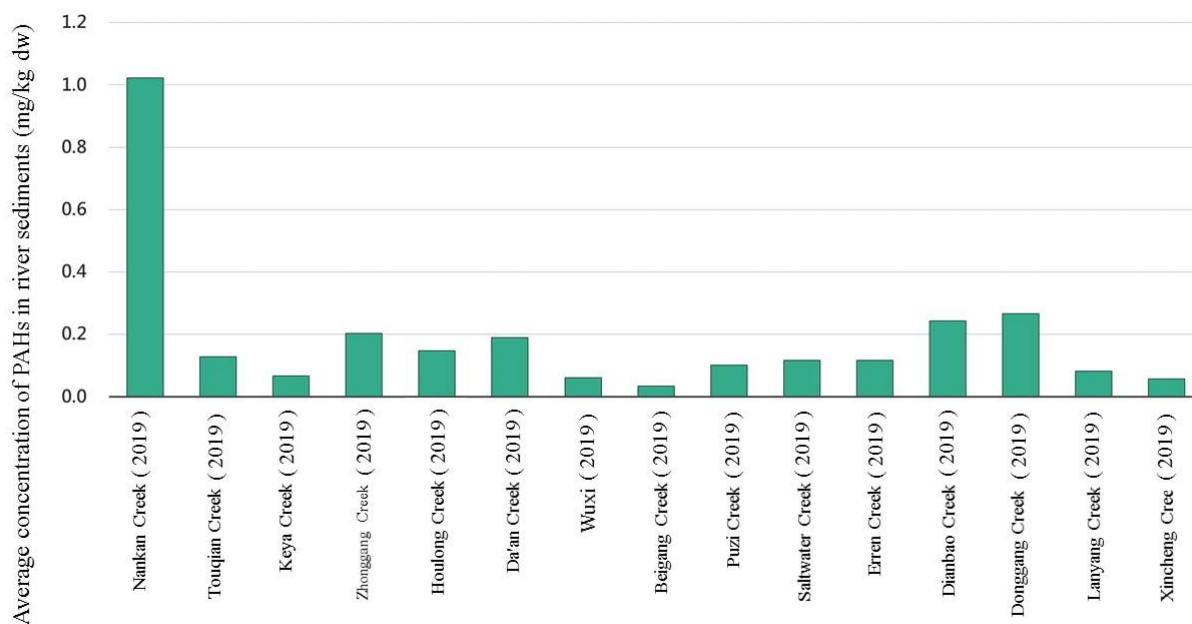


Fig. 14 Comparison of concentration distribution of PAHs in river sediments between year 2019 and the Past Years

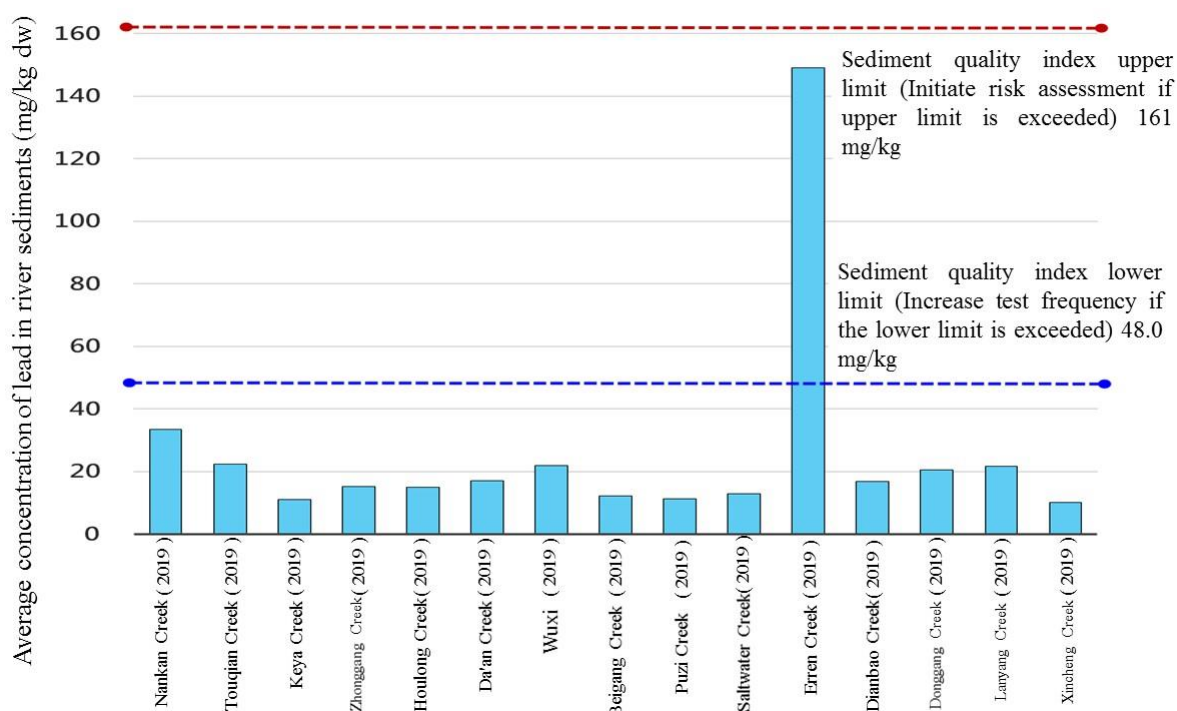


Fig. 15 Distribution of Average Lead Concentration in River Sediments from 2019 River Investigation

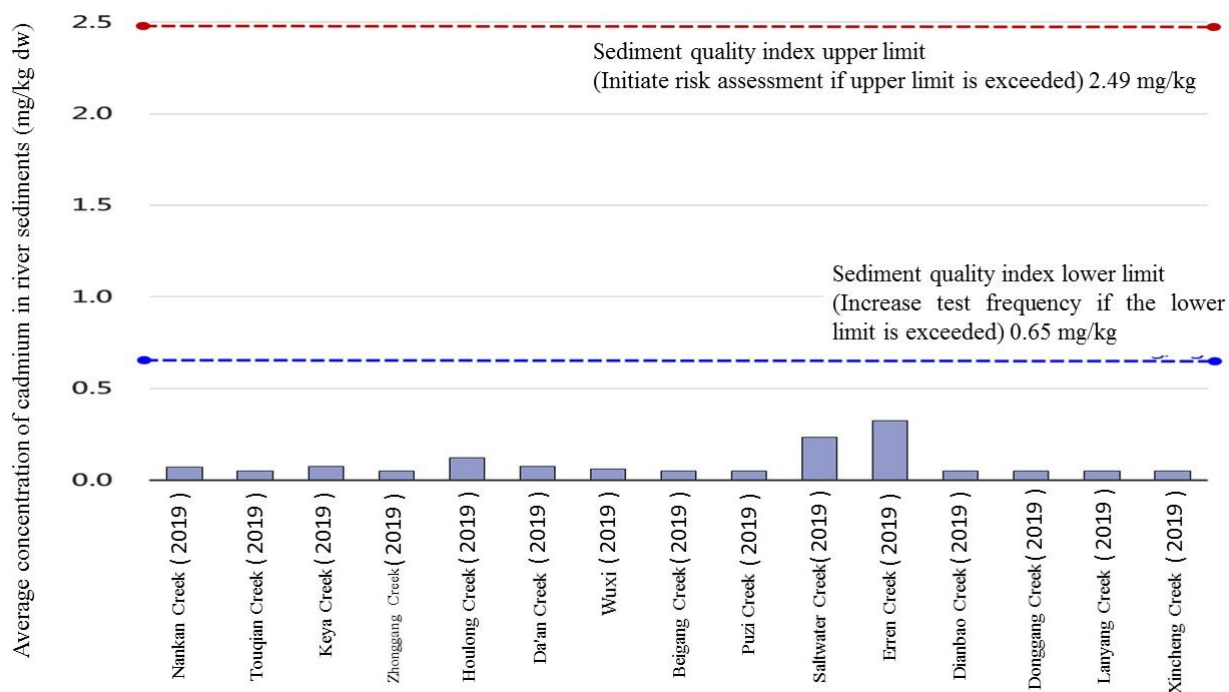


Fig. 16 Distribution of Average Cadmium Concentration in River Sediments from 2019 River Investigation

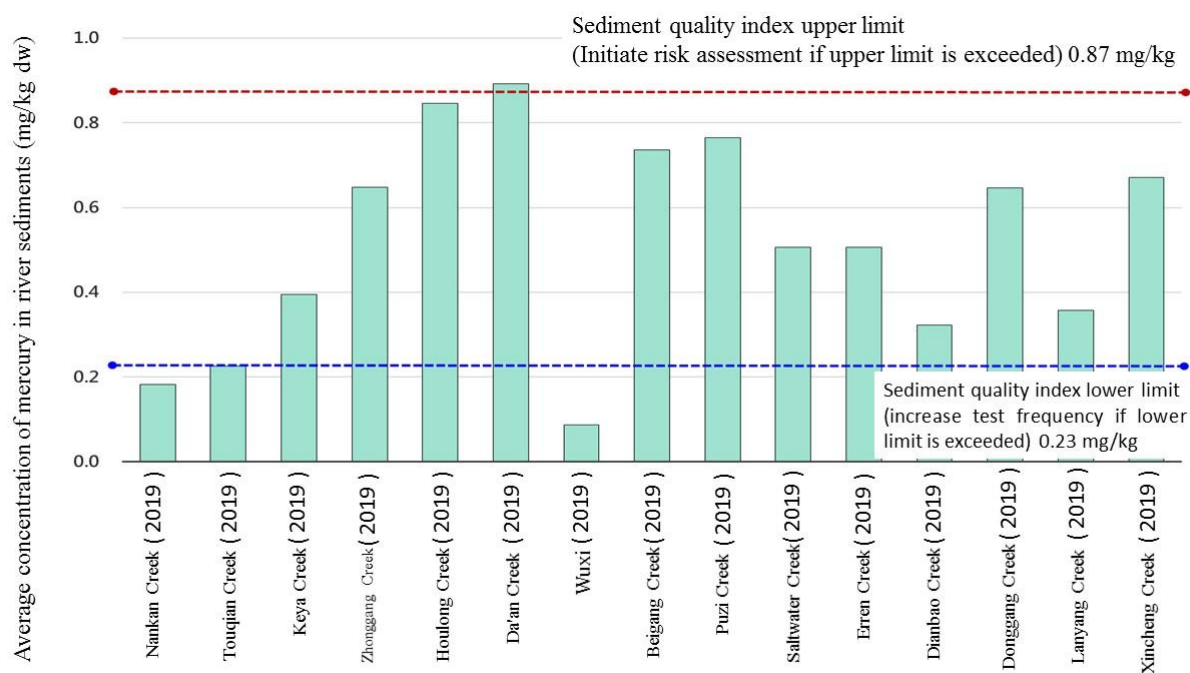
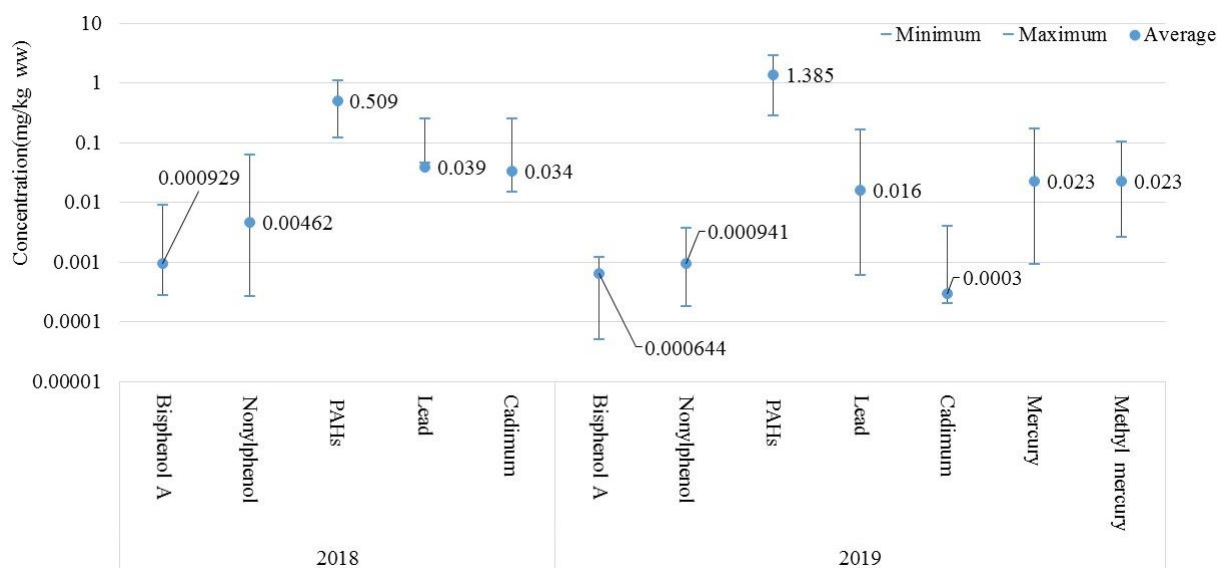


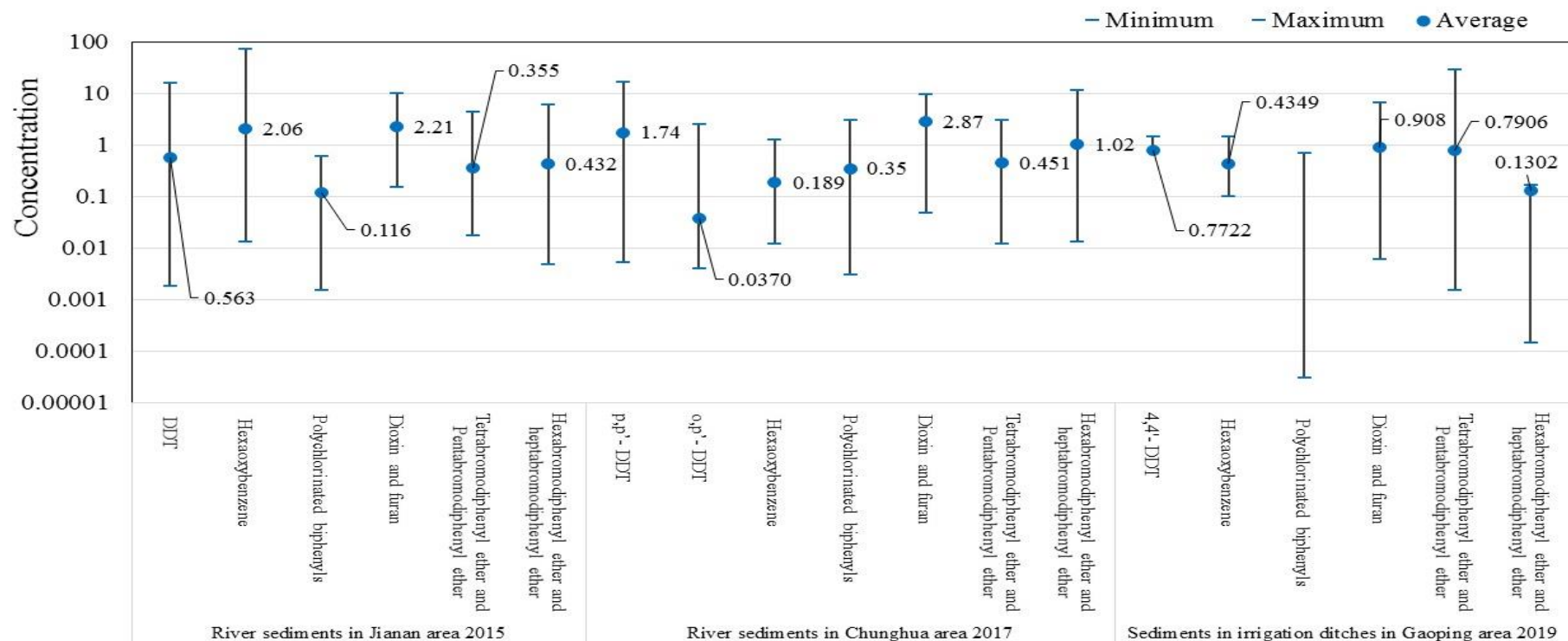
Fig. 17 Distribution of Average Mercury Concentration in River Sediments from 2019 River Investigation



substance	2018			2019		
	concentration range	average	method detection limit	concentration range	average	method detection limit
Bisphenol A	ND~0.0091	0.929×10^{-3}	0.269×10^{-3}	$<0.05 \times 10^{-3} \sim 1.20 \times 10^{-3}$	0.644×10^{-3}	0.162×10^{-3}
nonylphenol	ND~0.0618	4.62×10^{-3}	0.261×10^{-3}	$ND \sim 3.70 \times 10^{-3}$	0.941×10^{-3}	0.182×10^{-3}
PAHs	0.118~1.073	0.509	-	0.285~2.853	1.385	-
lead	ND~<0.25	0.039	0.046	ND~0.166	0.016	0.0006
cadmium	ND~<0.25	0.034	0.015	ND~0.004	0.0003	0.0002
mercury	-	-	-	ND~0.169	0.023	0.0009
Methyl mercury	-	-	-	ND~0.103	0.023	0.0026

Notes : 1. Unit : mg/kg ww, 2. If minimum concentration is ND, the diagram is based on method detection limit (MDL); if the concentration is below quantitative detection limit (QDL), it is based on QDL.

Fig. 18 Environmental distribution investigation of bisphenol A, nonylphenol, polycyclic aromatic hydrocarbon compounds, heavy species (lead, cadmium, mercury, and methyl mercury) in river fish bodies in 2018-2019



year	area	substance	DDT	hexaoxybenzene	polychlorinated biphenyls	dioxin and furan	Tetra bromobiphenyl ether and pentabromodiphenyl ether	hexabromobiphenyls ether and pentabromodiphenyl ether
2015	river sediments in Jianan area	concentration range	ND-15.9	0.0133-71.1	0.00151- 0.599	0.152-10.0	0.0168-4.31	0.00468-5.83
		average	0.563	2.06	0.116	2.21	0.355	0.432
		detection limit	0.00177	-	0.0003-0.004	-	-	-
2017	river sediments in Chunghua area	concentration range	p, p'-DDT : ND- 16.3 ; o, p'-DDTND - 2.48	0.012-1.25	0.003-3.02	0.048~9.64	0.012-3.04	0.013-11.1
		average	p, p'- : 1.74 ; o, p'- : 0.0370	0.189	0.35	2.87	0.451	1.02
		detection limit	p, p'- : 0.0053 ; o, p'- : 0.0039	-	0.0003-0.004	-	-	-
2019	sediments in irrigation ditches in Gaoping area	concentration range	4, 4'-DDT : ND- 1.447	0.0978-1.426	0.00003 -0.696	0.006-6.52	0.00149-29.1	0.000146-0.163
		average	0.7722	0.4349	-	0.908	0.7906	0.1302
		detection limit	(note: if ND (below minimum detection limit, MinDL), use ZERO)	-	-	-	-	-

Notes : 1. Unit : dioxin and furan is ng I-TEQ/kg d.w., dioxins polychlorinated biphenyls is ng WHO-TEQ/kg d.w., other unit is µg/kg d.w. 2. If the concentration is ND, the diagram is based on detection limit. 3.45 river monitoring points in 2015 in Jianan area (including Sandie Creek, Puki Creek, Bashang Creek, Touqian Creek, Baishui Creek, Liuchong Creek, Yanyan Creek and Erren Creek), 30 river monitoring points in 2017 in Changhua area (including river estuary and drainage system for Maoluo Creek, Old Turbid Water Creek, Yangzicuo Creek Drainage and Yuliao Creek), 30 river and ditch monitoring points in 2019 in Kaoping area

Fig. 19 Test Results for River Sediments from Rivers and Irrigation Ditches by the Environmental Analysis Laboratory of the Environmental Protection Administration in 2015, 2017 and 2019

Table 4 Investigation Results for River Sediments from Rivers and Irrigation Ditches by the Soil and Groundwater Remediation Fund Management Board of the Environmental Protection Administration in 2015-2016 and 2018-2019

Year	Tested Substances	Investigation Area and Number of Samples	Test Results
2015	mercury	sediments from rivers, irrigation channels, reservoirs, harbors, estuaries near river shores, 348 water samples of river sediments	<ul style="list-style-type: none"> The test results were 0.004~4.865 mg/kg, among all 20 samples exceeded the river sediment quality index upper limit (0.87 mg/kg), 65 samples exceeded river sediment quality index lower limit (0.23 mg/kg)
2016	Pesticide POPs (including DDT, hexaoxybenzene, etc.) and its derivatives, dioxin and furan, polychlorinated biphenyls and mercury	sediments from irrigation channels, 15 groups	<ul style="list-style-type: none"> Most pesticide POPs from river sediments had the concentration below method detection limit or quantatative limit (method detection limit : DDT0.00106 mg/kg, hexaoxybenzene0.0144 mg/kg), only in 2018 the river sediments near the Yongan Bridge in the Yanyan River estuary and Gongliao Bridge in the Shuangxi estuary was detected trace DDT and its derivatives, at concentration 0.00172 mg/kg and 0.00092 mg/kg respectively, the concentration of all pesticide POPs from river sediments was below river sediment quality index lower limit. The concentration of polychlorinated biphenyls from all river sediments was belowmethod detection limit (0.00304 mg/kg) ° The concentration range of dioxin and furan for all river sediments was 1.49~19.3 ng I-TEQ/kg, average concentration 5.40 ng I-TEQ/kg, three groups of river sediment samples had dioxin and furan concentration over river sediment quality index lower limit (6.82 ng I-TEQ/kg). The concentration of mercury was ND(method detection limit was 0.045 mg/kg)~0.665 mg/kg, among all, three sample groups from six branches of Guangfu Creek had the concentration over river sediment quality index lower limit (0.23 mg/kg), all the rest had the concentration below the method detection limit or the quantitative limit.
2018	9 kinds of perfluorooctane sulfonic acid and its salts and perfluorooctane sulfonate fluoride(including PFOS, PFOA)	river sediments(including Kaya creek, Wuxi, Saltwater creek), 29 groups	PFOs concentration range was ND(method detection limit was 0.67 ng/g)~21.4 ng/g, PFOA concentration range was ND(method detection limit was 0.62 ng/g)~2.36 ng/g, most river sediment samples had the concentration below method detection limit or quantitative limit, only traces of PFOS were detected at the discharge outlet of the Hsinchu Science Park in the Kaya River estuary, and the discharge outlet of the Central Science Park in the Wuxi estuary, the concentrations were.98 ng/g and 1.57ng/g respectively, a number of PFOS and its salts and PFOS were detected in several samples from Saltwater Creek, with the highest detection level of PFOS at 21.4 ng/g.
	Pesticide POPs (including DDT, hexaoxybenzene etc.)and their derivatives	river sediments(including Sungai, Narcissus Creek, Saltwater Creek), reservoir river sediments(Xinshan reservoir), 35 groups	DDT and its derivatives had concentration range ND(method detection limit was 0.00069 mg/kg)~0.00172 mg/kg, hexaoxybenzene samples were all below method detection limit(0.0114 mg/kg), most were below method detection limit or quantitative limit, trace DDT and its derivatives were detected in river sediments samples from Yongan Bridge in Yanyan River estuary and Gongliao Bridge in Sungai River estuary, river sediment samples were detected trace DDT and its derivatives, concentration at 0.00172 mg/kg and 0.00092 mg/kg respectively, in all river sediment samples

Year	Tested Substances	Investigation Area and Number of Samples	Test Results
			pesticide POPs concentration was below river sediment quality index lower limit.
	polychlorinated biphenyls		Polychlorinated biphenyl concentration range was ND(method detection limit was 0.00418mg/kg)~0.0162 mg/kg, most were below method detection limit or quantitative limit, among 25 groups of river sediments, only trace amounts of polychlorinated biphenyls were detected in the river sediment samples of Xidingliao Bridge (formerly Taiping Bridge) in the Yanxi River estuary, and Anshun Bridge and the long channel in the Narcissus estuary, concentration at 0.00458 mg/kg, 0.00927 mg/kg and 0.00483 mg/kg respectively, among 10 groups of reservoir river sediments, the river sediment samples from 5 places were detected trace polychlorinated biphenyls, at concentration 0.00419~0.0162 mg/kg, all river sediment samples had polychlorinated biphenyl concentration below river sediment quality index lower limit(0.09 mg/kg).
	dioxin and furan		<ul style="list-style-type: none"> • In 25 rivers their river sediments dioxin and furan concentration was 0.137~3.710 ng ITEQ/kg, average concentration 0.819 ng I-TEQ/kg, all the river sediment samples had dioxin and furan concentration below river sediment quality index lower limit (6.82 ng ITEQ/kg) • 10 groups of river sediment samples had dioxin and furan concentration 5.83~17.5 ng I-TEQ/kg, average concentration 13.4 ng ITEQ/kg, only one river sediment sample had dioxin and furan concentration below river sediment quality index lower limit, all other reservoir river sediment samples exceeded river sediment quality index lower limit.
	mercury	river sediments from irrigation channels(Saltwater Creek, Shuangxi, Narcissus Creek, Yilan irrigation channel)and reservoir river sediments(Shimen Reservoir, Zengwen Reservoir, Agongdian Reservoir and Xinshan Reservoir), 65 groups	Mercury test result was between ND(method detection limit was 0.049 mg/kg)~13.5 mg/kg, among them, 4 groups of samples from Narcissus Creek and Yilan irrigation channel exceeded the river sediment quality index upper limit project(0.87 mg/kg), 7 groups exceeded river sediment quality index lower limit (0.23 mg/kg).
2019	polychlorinated biphenyls	river sediments, 13 groups	All were below method detection limit or quantitative limit (MDL=0.00442 mg/kg, QDL=0.019 mg/kg).
	dioxin and furan		<ul style="list-style-type: none"> • 0.185~8.700 ng I-TEQ/kg(average concentration was 3.470 ng I-TEQ/kg) • Among them, the Xucugang No. 1 Bridge in Old Street Creek, the New Dajue Creek Bridge between Huanxiang Bridge and Dajue Creek, the concentration of dioxin and furan exceeded the sediment quality index lower limit (6.82 ng I-TEQ/kg).
	Pesticide POPs(including DDT, hexaoxybenzene etc.) and their derivatives		<ul style="list-style-type: none"> • DDT and its derivatives had concentration range ND (method detection limit was 0.00071 mg/kg) ~0.00549 mg/kg, most below method detection limit or quantitative limit, only the Shuibiantou Bridge in Nankan River (0.00227 mg/kg); the new Dajue Creek Bridge in Dajue Creek (0.00549 mg/kg); the Wukong Bridge in Erren River (0.00086 mg/kg) detected trace DDT and its derivatives. • All samples had hexaoxybenzene below method detection limit (0.0126 mg/kg).

Year	Tested Substances		Investigation Area and Number of Samples	Test Results
				<ul style="list-style-type: none"> All river sediment samples had pesticide POPs concentration below river sediment quality index lower limit.
	Heavy metals	lead	river sediments, 56 groups	<ul style="list-style-type: none"> 5.91~610 mg/kg 3 groups of river sediments had lead concentration over the river sediment quality index lower limit, and 1 group of river sediments had lead concentration over river sediment quality index upper limit.
		cadmium		<ul style="list-style-type: none"> ND(method detection limit was 0.19 mg/kg)~2.60 mg/kg 7 groups of river sediment samples had cadmium concentration over the river sediment quality index lower limit
		mercury		<ul style="list-style-type: none"> ND(method detection limit was 0.049 mg/kg)~0.547 mg/kg 7 groups of river sediment samples had cadmium concentration over the river sediment quality index lower limit
	Polycyclic aromatic hydrocarbons (Benzo(a)pyrene)		river sediments, 49 groups	<ul style="list-style-type: none"> ND(method detection limit was 0.0131 mg/kg)~1.055 mg/kg 1 group of river sediment sample had (Benzo (a) pyrene) concentration over the river sediment quality index lower limit.
	Phthalates	DEHP	river sediments, 49 groups	<ul style="list-style-type: none"> ND (method detection limit was 0.198 mg/kg)~6.68 mg/kg 3 groups of river sediment samples had DEHP concentration over river sediment quality index lower limit
		DBP		All below method detection limit(0.201 mg/kg)
		DEP		All below method detection limit(0.189 mg/kg)
		BBP		All below method detection limit(0.190 mg/kg)

(C) Conduct environmental water body investigation.

In 2019, the PFOA and PFOS in the water of Sanye Gong River, Nankan River, Yanyan River, Taliaokeng River were tested, and the concentration ranges were ND (MDL=1.48 ng/L)~118 ng/L, ND(MDL=1.94 ng/L)~3,904 ng/L, respectively. In 2017, 10 mountain lakes and streams were tested and the concentration range of PFOS in the water was ND (method detection limit 0.18 ng/L) - 12.6 ng/L. For details, see Figure 20. (Environmental Analysis Laboratory)

In 2019, groundwater perfluoride investigation for optoelectronic semiconductors and textile-related industries, was conducted and on-site investigations and interviews for 50 optoelectronic semiconductor manufacturers and 4 sewage treatment plants were completed, the sampling of groundwater for 64 sites was conducted; in addition, 16 manufacturers in textile-related industries were selected for sampling and testing raw water and discharged water in the process, and the sampling of groundwater from 29 sites was performed. The test results of PFOS and PFOA in the groundwater for the photoelectric semiconductor industry were ND~4,767 ng/L, 0.72~1,454 ng/L; the test results of PFOS and PFOA in the groundwater for the textile industry were ND~171 ng/L, perfluorooctanoic acid 1.2~362 ng/L. In addition, a baseline investigation of concerned substances in groundwater was carried out, and the results showed that nonylphenol was only detected a few times (ND~0.00128 mg/L), while bisphenol A was not detected. In 2015, investigation was conducted for the specialty chemicals and pharmaceutical biotechnology industries regarding

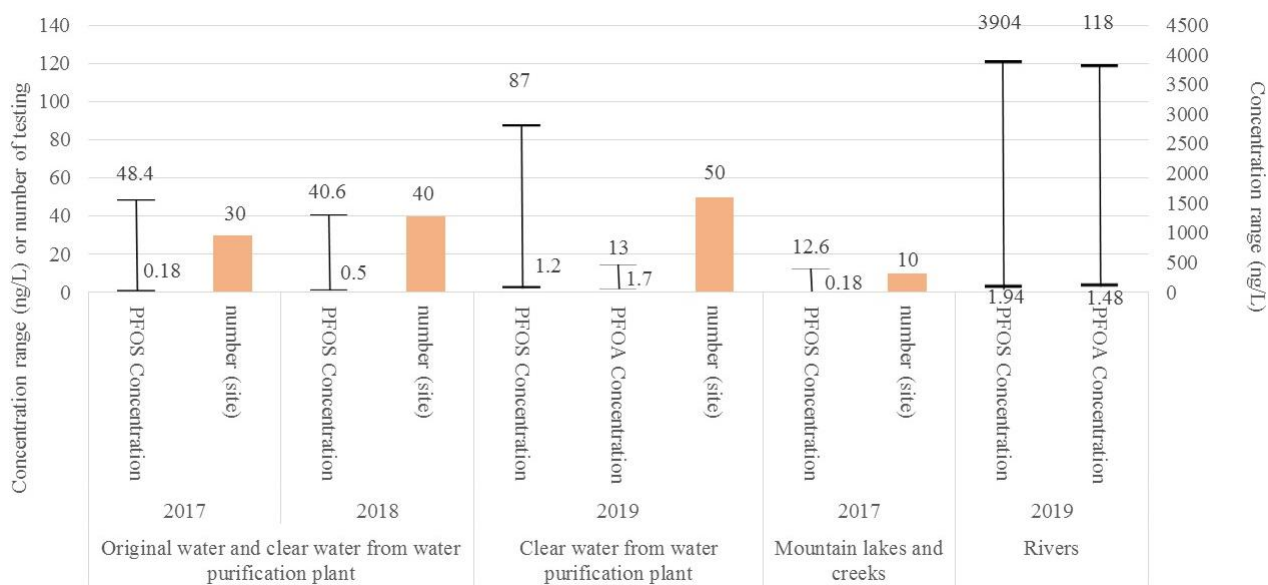
the emerging pollutants, and 29 groundwater samples from 11 manufacturers were collected, and 16 PFOS test results were all ND (method detection limit 1 ng/L). From 2016 to 2017, the groundwater of Changhua and Yunlin rice production areas were investigated for pesticides (including DDT, etc.). The concentration of groundwater DDT was ND (method detection limit: p, p'-DDT was 0.0002 mg/L, o, p'-DDT was 0.0003 mg/L), conforming to the domestic regulatory standards. (Soil and Groundwater Remediation Fund Management Board)

(D) Conduct related tests for the environmental hormones in domestic drinking water.

a. In In 2019, there were 400 times of random sampling of domestic municipal water supply systems, bis(2-ethylhexyl) phthalate (DEHP), dimethyl phthalate (DMP), and diethyl phthalate (DEP), Butyl benzyl phthalate (BBP), dioctyl phthalate (DNOP), nonylphenol and bisphenol A were not detected; in addition, sampling for dioxin and furan in the domestic municipal water supply system was conducted 3 times, the concentration range was undetected ~ 0.006 pg-WHO-TEQ/L, a total of 2,099 samples of lead, the concentration range was undetected ~ 0.0006 mg/L, and 1,306 samples of cadmium, the concentration range was undetected ~ 0.00003 mg/L, and 641 samples of mercury and the concentration range was undetected ~ 0.0001 mg/L. The results all met the drinking water quality standards (Figure 21). In 2017-2019, we conducted sampling of drinking water quality for environmental hormones in domestic municipal water supply systems, and the results are detailed in Figure 21; the test results

for dioxin and furan, lead, cadmium and mercury met the drinking water quality standards(dioxin and furan : 3 pg-WHO-TEQ/L, mercury : 0.002 mg/L, lead : 0.01 mg/L, cadmium : 0.005 mg/L). (Drinking water management administration has been transferred from the Department of Environmental Sanitization and Toxic Substance Management to the Department of Air Quality Protection and Noise Control since June 2019)

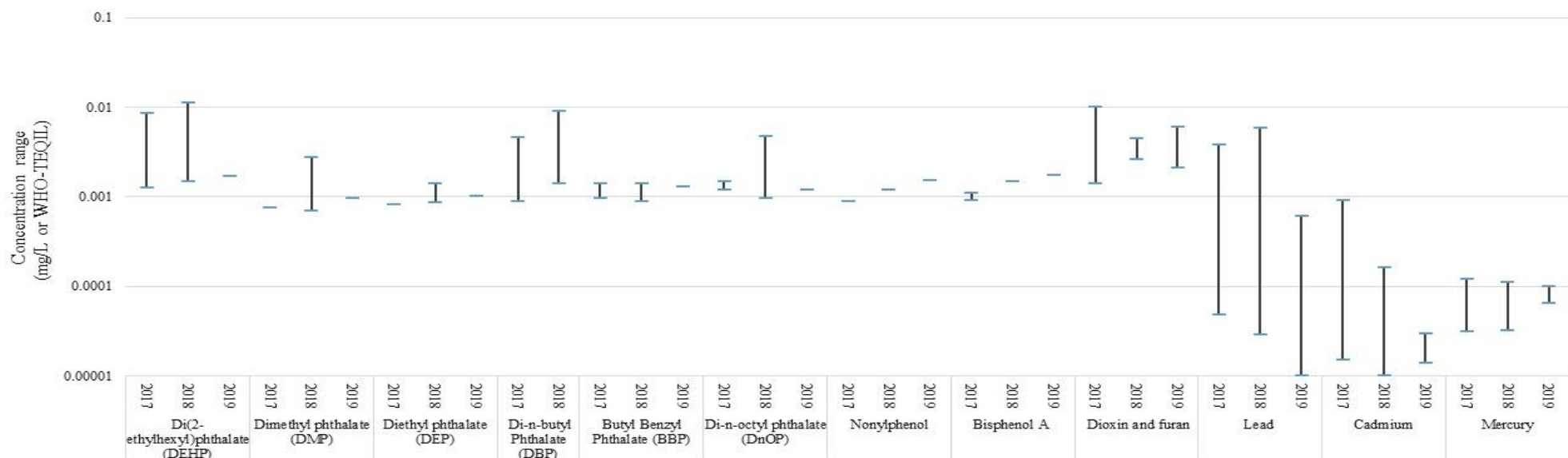
- b. In 2019, the PFOA and PFOS in clean water from 50 sites of water purification plants were tested, and PFOS was detected for one site, concentration at 87 ng/L, the remaining 49 sites were not detected (method detection limit 1.2 ng/L), while PFOA was detected for 3 sites, concentration at 13, 9, 10 ng/L respectively, the remaining 47 sites were not detected (method detection limit 1.7 ng/L). In view of the test results in 2017-2018 by the Environmental Analysis Laboratory of the Environmental Protection Administration, please refer to Figure 20 for the test values of water quality in water purification plants. The results were below the US EPA suggested health standard 70 ng/L. (Department of Environmental Sanitization and Toxic Substance Management, Environmental Analysis Laboratory)



Notes :

1. If concentration range is ND, the diagram is based on detection limit.
2. In 2017, the PFOS method detection limit for water purification plants, mountain lakes and streams was 0.18 ng/L. In 2018, the PFOS method detection limit for water purification was 0.5 ng/L. In 2019, the PFOA and PFOS method detection limits for rivers were 1.94 ng/L and 1.48 ng/L, respectively. In 2019, the PFOS and PFOA detection limit for water purification plants 1.2 ng/L and 1.7 ng/L, respectively.
3. In 2019, the water purification was investigated by the Department of Environmental Sanitization and Toxic Substance Management, while others were by the Environmental Analysis Laboratory.

Fig. 20 Concentrations of PFOS and PFOA in Water from Water Purification Plants, Mountain Lakes and Streams



substance	DEHP	DMP	DEP	DBP	BBP	DNOP	nonylphenol	bisphenol A	dioxin and furan	lead	cadmium	mercury
2017	ND~0.0086 1 (0.00125)	ND (0.00075)	ND (0.00082)	ND~0.00 461 (0.00089)	ND~0.0013 9 (0.00096)	ND~0.0014 6 (0.00119)	ND (0.00088)	ND~0.0011 (0.00092)	0.00140~0.010 (0.00324)	ND~0.0038 (0.000048)	ND~0.0009 (0.000015)	ND~0.00012 (0.000031)
2018	ND~0.0111 (0.00149)	ND~0.002 74 (0.00069)	ND~0.00 139 (0.00085)	ND~0.00 902 (0.00141)	ND~0.0013 9 (0.00089)	ND~0.0047 2 (0.00095)	ND (0.0012)	ND (0.00149)	0.00260~0.00443 (0.00324)	ND~0.0058 (0.000029)	ND~0.0001 6(0.00001)	ND~0.00011 (0.000032)
2019	ND (0.00171)	ND (0.00095)	ND (0.00101)	—	ND (0.00129)	ND (0.00119)	ND (0.00152)	ND (0.00174)	ND~0.006 (0.002087)	ND~0.0006 (0.00001)	ND~0.0000 3(0.000014)	ND~0.0001 (0.000064)

Notes: 1. concentration unit : dioxin and furan were pg WHO-TEQ/L, the rest were mg/L. In the diagram, if the concentration range was ND, the diagram was based on the detection limit. The value in the table was concentration range (detection limit), — : not detected.

2. The number of tests for each substance is as follows :

- (1)2017 : 400 tests for DEHP, DMP, DEP, DBP, BBP, DNOP, nonylphenol and bisphenol A; 5 tests for dioxin and furan; one test for lead(1, 682 municipal water quality tests and 26 simplified municipal water quality tests), 1, 096 cadmium tests(1, 061 municipal water quality tests and 35 simplified municipal water quality tests), 800 mercury tests(774 municipal water quality tests and 26 simplified municipal water quality tests).
- (2)2018 : 400 tests for DEHP, DMP, DEP, DBP, BBP, DNOP, nonylphenol and bisphenol A (362 times from municipal water supply system and 38 times from simplified municipal water supply system), 3 dioxin and furan tests, 2, 022 lead tests(1, 969 municipal water quality tests and 53 simplified municipal water quality tests), 1,268 cadmium tests(1, 216 municipal water quality tests and 52 simplified municipal water quality tests), 682 mercury tests(642 municipal water quality tests and 40 simplified municipal water quality tests).
- (3)2019 : 400 tests for DEHP, DMP, DEP, BBP, DNOP, nonylphenol and bisphenol A, three dioxin and furan tests, 2, 099 lead tests (2, 054 municipal water quality tests and 45 simplified municipal water quality tests), 1,306 cadmium tests (1, 261 municipal water quality tests and 45 simplified municipal water quality tests), 641 mercury tests (608 municipal water quality tests and 33 simplified municipal water quality tests).

Fig. 21 sampling test results for domestic municipal water supply system in 2017-2019

(E) Conduct indoor air quality test.

According to the research project in 2012-2016, the investigation was focused on public place indoor air quality regarding the multi-media distribution and exposure health risk of phthalates (Phthalate esters, PAEs). Among PAEs, Bis (2-ethylhexyl) phthalate (DEHP) had the highest concentration, the next was di-n-octyl phthalate (DNOP). In 2018, we continued the collection of information related international regulations on the phthalates in indoor air. Presently, only Japan and Ontario Province of Canada formulated a suggested control standard for DEHP in air as 0.1 mg/m³ and 0.05 mg/m³. We will continue to collect and update international regulatory information. (Department of Air Quality Protection and Noise Control)

Besides, in 2019, we commissioned National Cheng Kung University to predict the sources of indoor VOCs, suspended particulate and environmental hormones, health risk and suggested values. The test result for DEHP concentration in general indoor air indicated that the DEHP concentration in indoor air in the world was mostly below 1 µg/m³. (Department of Air Quality Protection and Noise Control)

(F) Conduct environmental air quality monitoring.

The Department of Air Quality Protection of the Environmental Protection Administration conducted environmental dioxin monitoring in environmental air. The average concentration among 1~4 quarters in 2019 was 0.021 pg I-TEQ/m³, all far below the only standard in the world regarding “environmental dioxin air quality standard” 0.6 pg WHO₂₀₀₅-TEQ/m³ established by Japan. In

addition, the monitoring results for lead, cadmium and mercury in environmental air in 2019 (May and October) showed the average concentrations were 20.01 ng/m³, 0.879 ng/m³, 2.536 ng/m³, respectively (Figure 22). In 2012-2019, the average concentration of dioxin was 0.021-0.037 pg I-TEQ/m³, far below Japan's "environmental dioxin air quality standard" 0.6 pg WHO₂₀₀₅-TEQ/m³, while air quality monitoring regarding heavy metals (lead, cadmium and mercury) showed the annual average concentration was below WHO air quality standards (lead : 1000 ng/m³, cadmium : 5 ng/m³, mercury : 1000 ng/m³) and our national air quality standards (lead : 1000 ng/m³), the results are in Figure 22. (Department of Air Quality Protection and Noise Control)

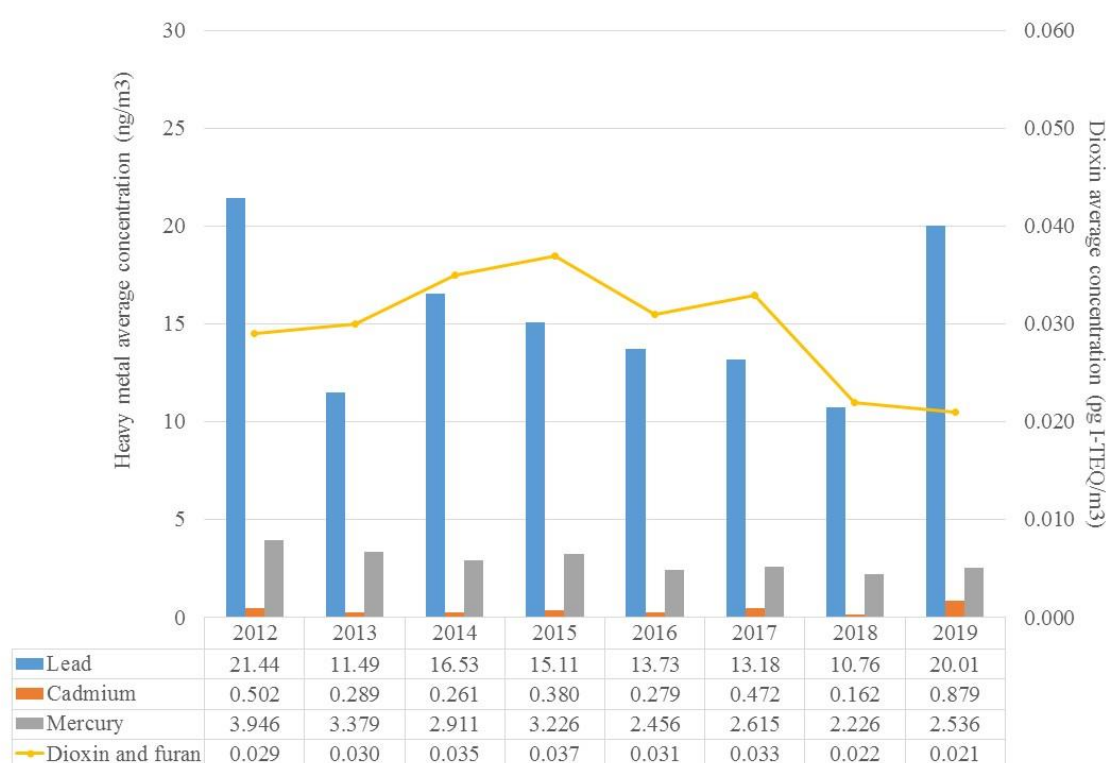


Fig. 22 Average concentrations of dioxin and heavy metals (lead, cadmium, mercury) in environmental air tested by the Department of Air Quality Protection of the Environmental Protection Administration

(G)Handle emission investigation, audits and tests for stationary pollution sources.

a. The Department of Air Quality Protection of the Environmental Protection Administration continued to handle the emission tests for domestic stationary pollution sources of dioxin and furan, and mercury, and build and update the emission inventory every year. The domestic dioxin and furan emission volume indicates that the emission volume in recent years was decreasing, in 2018 the national emission volume was 51.01 g I-TEQ, a decrease by 84% compared to 327.5 g I-TEQ in 2002 (Figure 23). In addition, the mercury emission in the atmosphere in 2018 was about 1.606 tons (Figure 24), with the main source from power generation and cement kilns. (Department of Air Quality Protection and Noise Control)

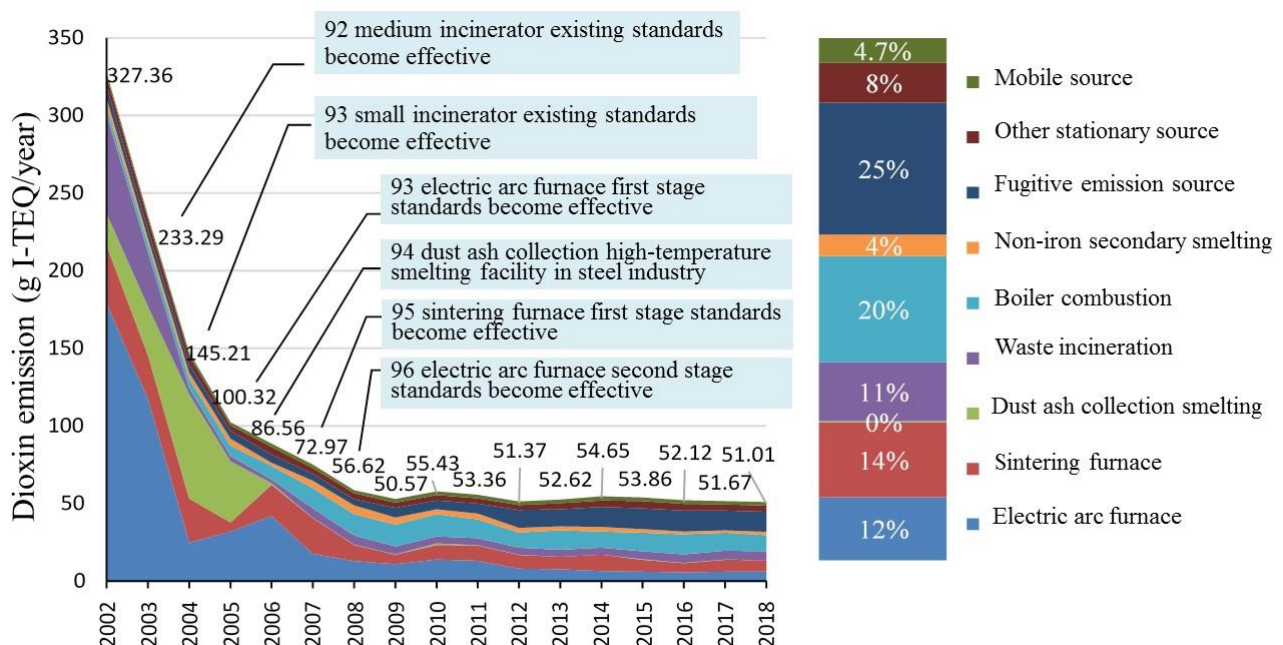


Fig. 23 decreasing trend of dioxin emission in 2002-2018

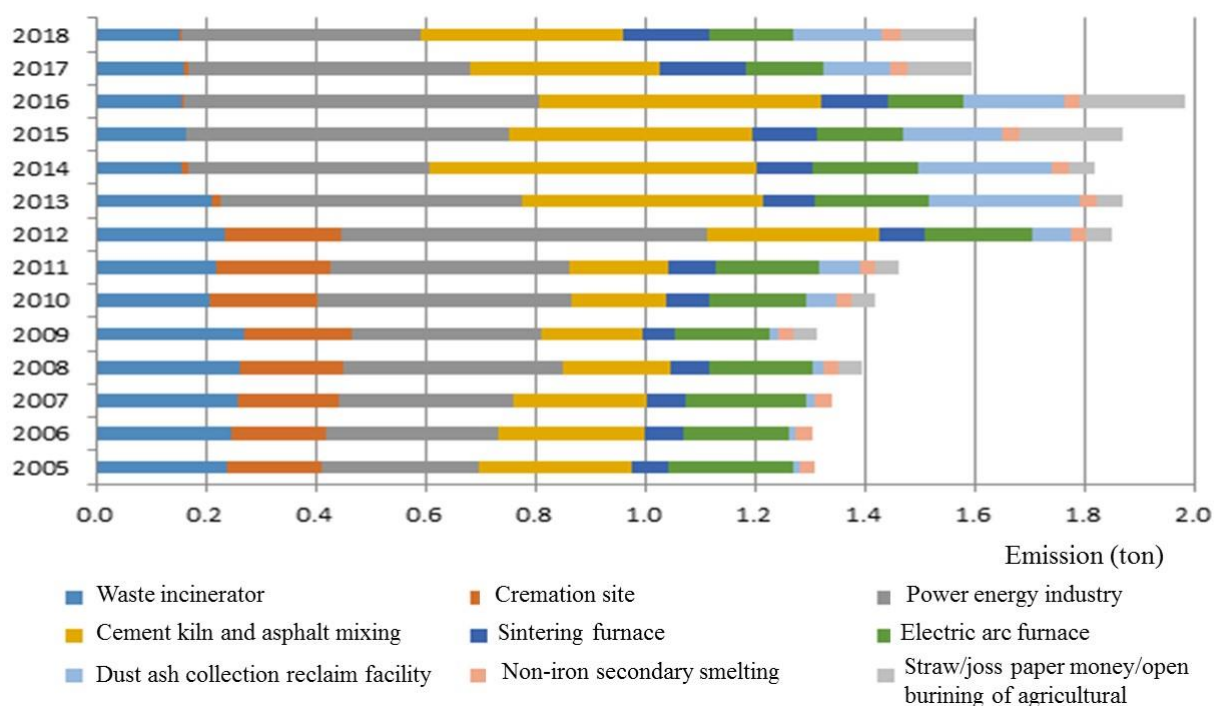
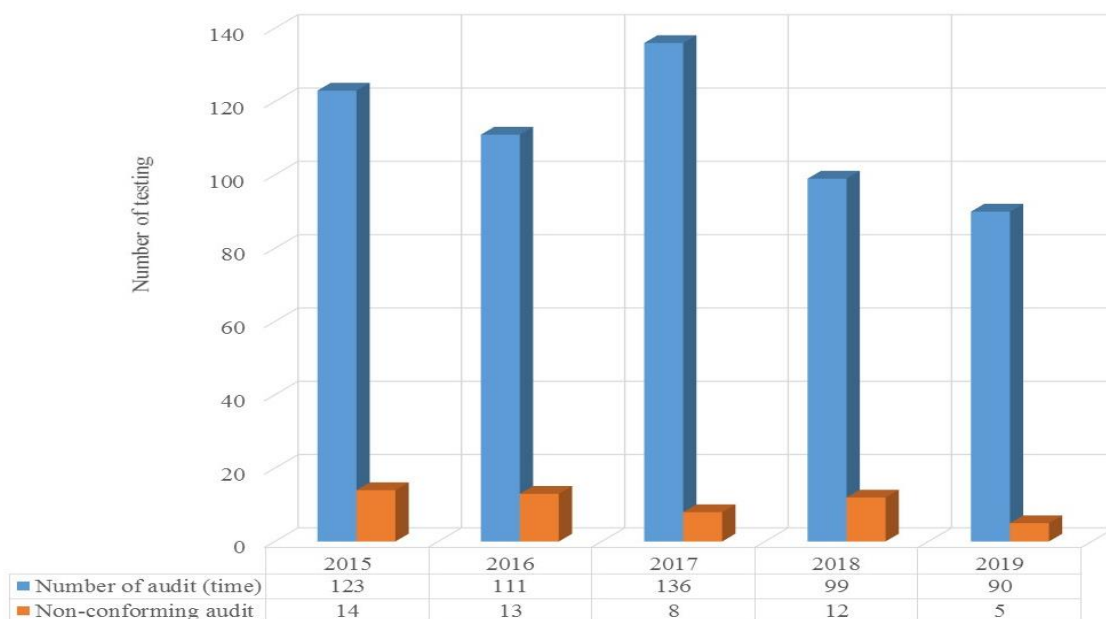


Fig. 24 Trend of heavy mercury emission in 2005-2018

b. The Department of Air Quality Protection of the Environmental Protection Administration also strengthened the audit and control for stationary pollution sources. According to Air Pollution Control Act, those who do not meet the emission standards will be punished and required to improve within a time limit. In 2019, the industry carried out 449 regular dioxin emission pipeline tests and the environmental protection units carried out 90 dioxin emission pipeline tests. A total of 5 tests exceeded the standard. Among them, three times were from the boilers field by wastes, one was from industrial waste incinerator, and one was large scale incinerator. They were all subject to EPA reporting and penalties and required improvement within a time limit. The statistics of test data indicated that in 2015-2019 the environmental protection units conducted 559 emission pipeline dioxin audit tests, and 52 tests failed (Figure 25). They were all subject to EPA reporting and penalties and required improvement

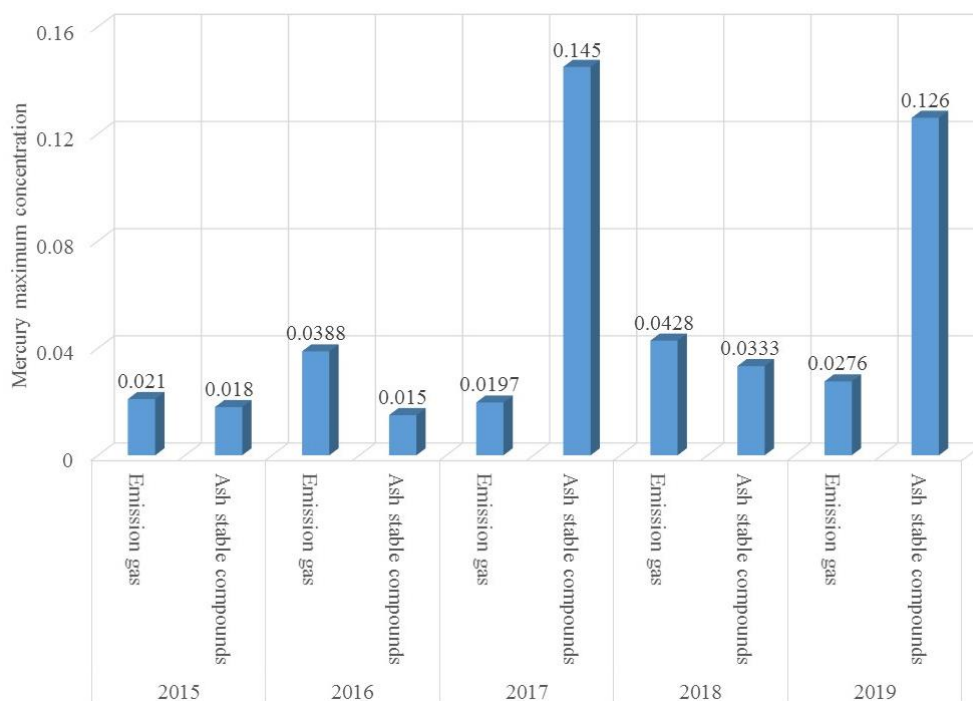
within a time limit. (Department of Air Quality Protection and Noise Control)

- c. The Bureau of Environmental Inspection of the Environmental Protection Administration continued to monitor (test) and control the waste gas emission from incinerators and the heavy metal mercury in incineration ashes. Based on the emission test results from 24 domestic incinerators in 2019, the highest mercury concentration was 0.0276 mg/Nm³, below the specified mercury concentration 0.05 mg/Nm³ in stationary pollution sources of air pollutants. Based on the ash stable compound test results from the 24 domestic incinerators, the highest mercury concentration was 0.126 mg/L, below the specified mercury concentration 0.2 mg/L in the Article 27 of the General Wastes Recycling and Disposal Measures. Based on the test results for the emission and ash stable compounds from 24 domestic incinerators in 2015-2019, the highest mercury concentrations were 0.0197-0.0428 mg/Nm³ and 0.015-0.145 mg/L, respectively, which both met the regulation (Figure 26). (Bureau of Environmental Inspection)



Notes : In 2015, 14 tests failed, including 9 wastes fueled boilers, 1 large incinerator, 1 medical waste incinerator, 2 incineration plants, 1 dichloromethane manufacture process. In 2016, 13 tests failed, including 8 wastes fueled incinerators, 1 small incinerator, 3 incineration plants, 1 secondary copper smelting. In 2017, 8 tests failed, including 6 wastes fueled incinerators, 1 secondary aluminum smelting, and 1 medical waste incinerator. In 2018, 12 tests exceeded the standard, 8 wastes fueled incinerators, 2 incineration plants, 1 medical waste incinerator and 1 secondary copper smelting. In 2019, 5 tests exceeded the standard, 3 wastes fueled boilers, 1 industrial waste incinerator, 1 large incinerator.

Fig. 25 Audits and Tests of Dioxin from Stationary Pollution Sources by the Department of Air Quality Protection of the Environmental Protection Administration in 2015-2019



Notes : The mercury concentration unit for emission gas is mg/Nm^3 . The mercury concentration unit for ash stable compound from incinerator is mg/L .

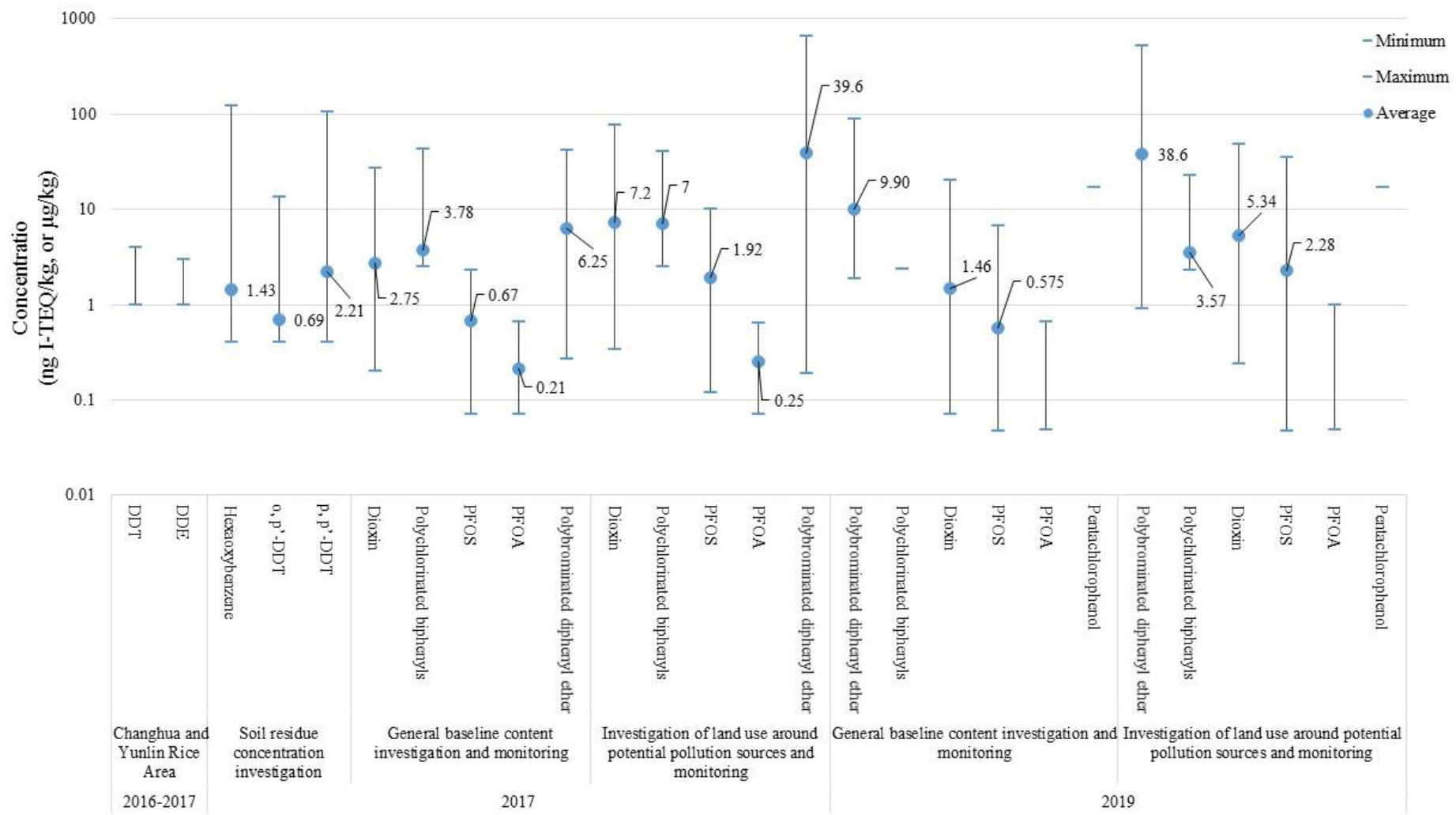
Fig. 26 Test results for emission and ash stable compounds from 24 domestic incinerators

d. In 2019, the Bureau of Environmental Inspection of the Environmental Protection Administration continued to conduct sampling and tests for dioxin from stationary pollution sources. There were 6 tests in total. The test result was 0.005-0.279 ng-TEQ/Nm³, which met the dioxin emission standard from stationary pollution sources 0.5 ng-TEQ/Nm³. In 2018, the sampling of dioxin from the emission pipelines of two large incineration plants was conducted, and the average concentration was 0.008 ng-TEQ/Nm³ and 0.011 ng-TEQ/Nm³, which met the regulatory standards. In addition, 12 samplings and tests for dioxin from medium to small stationary pollution sources, and the result was 0.013 ng-TEQ/Nm³~2.63 ng-TEQ/Nm³, among which 4 tests exceeded the emission control standard 0.5 ng-TEQ/Nm³, and subject to reporting and penalties, and the remaining all met the emission control standard, and the test result of dioxin from 1 large stationary pollution source was 0.017 ng-TEQ/Nm³, which met the emission control standard. (Bureau of Environmental Inspection)

(H) Conduct the test of environmental hormones in soil.

In 2019 the national soil persistent organic pollution investigation was conducted, and the soil baseline content and monitoring for specific areas for polybrominated diphenyl ethers, dioxin, polychlorinated biphenyls, PFOS and PFOA, pentachlorophenol were conducted. The concentrations for dioxin and polychlorinated biphenyls were below soil pollution control standard (dioxin : 1, 000 ng I-TEQ/kg, and polychlorinated biphenyls : 0.09 mg/kg). Based on the investigation of the

environmental hormone's substances in environmental soils in 2016-2017 and 2019, DDT, the concentrations of hexaoxybenzene, dioxin and polychlorinated biphenyls were all below soil control standard (as in Figure 27). (Soil and Groundwater Remediation Fund Management Board)



year	Monitoring substance	Monitoring type	Number of samples	concentration range(average)	method detection limit	Monitoring type	Number of samples	concentration range(average)	method detection limit
2016-2017	DDT	Changhua and Yunlin Rice Area	31 groups	1~4	-				
	DDE			1~3	-				
2017 (Note 2)	hexaoxybenzene	Soil residue concentration investigation	140 groups	ND~123 (1.43)	0.4				
	o, p'-DDT			ND~13.5 (0.69)	0.4				
	p, p'-DDT			ND~104 (2.21)	0.4				
	dioxin	General baseline content investigation and monitoring	25 groups	0.201~26.6 (2.75)	-	Investigation of land use around potential pollution sources and monitoring	35 groups	0.336~75.5 (7.2)	-
	polychlorinated biphenyls		40 groups	ND~43 (3.78)	2.53		60 groups	ND~40 (7)	2.53
	PFOS		26 groups	0.07~2.32 (0.67)	-		24 groups	0.12~10.1 (1.92)	-
	PFOA		26 groups	0.07~0.66 (0.21)	-		24 groups	0.07~0.63 (0.25)	-
	polybrominated diphenyl ether		60 groups	0.268~41.9 (6.25)	-		60 groups	0.189~656 (39.6)	-
2019	polybrominated diphenyl ether	Baseline content monitoring	106	1.87~88.1 (9.90)	-	Investigation of land use around potential pollution sources and monitoring	111 個	0.904~511 (38.6)	-
	polychlorinated biphenyls		62	ND	2.34		29 個	ND~22.7 (3.57)	2.32 and 2.34
	dioxin		106	0.071~20.3 (1.46)	-		67 個	0.239~48.6 (5.34)	-
	PFOS		62	ND~6.64 (0.575)	0.047		24 個	ND~34.9 (2.28)	0.047
	PFOA		62	ND~0.649	0.049		24 個	ND~0.975	0.049
	pentachlorophenol		62 groups	ND	17		40 groups	ND	17

Notes : 1. Unit : dioxin is ng I-TEQ/kg, the rest is µg/kg.

1. In 2017, soil and general baseline content investigations and monitoring of land used around potential pollution sources were conducted for 19 manufacture sites of capacitors of polychlorinated biphenyls, large disposal organizations of capacitors of polychlorinated biphenyls and the storage and use places of capacitors of polychlorinated biphenyls, 3 sites used (PFOA, PFOS) for wafers and in Semiconductor Manufacturing Intensive Science Park, 13 sites that had large decabromodiphenyl ether usage and disposal volume and 19 sites for dioxin

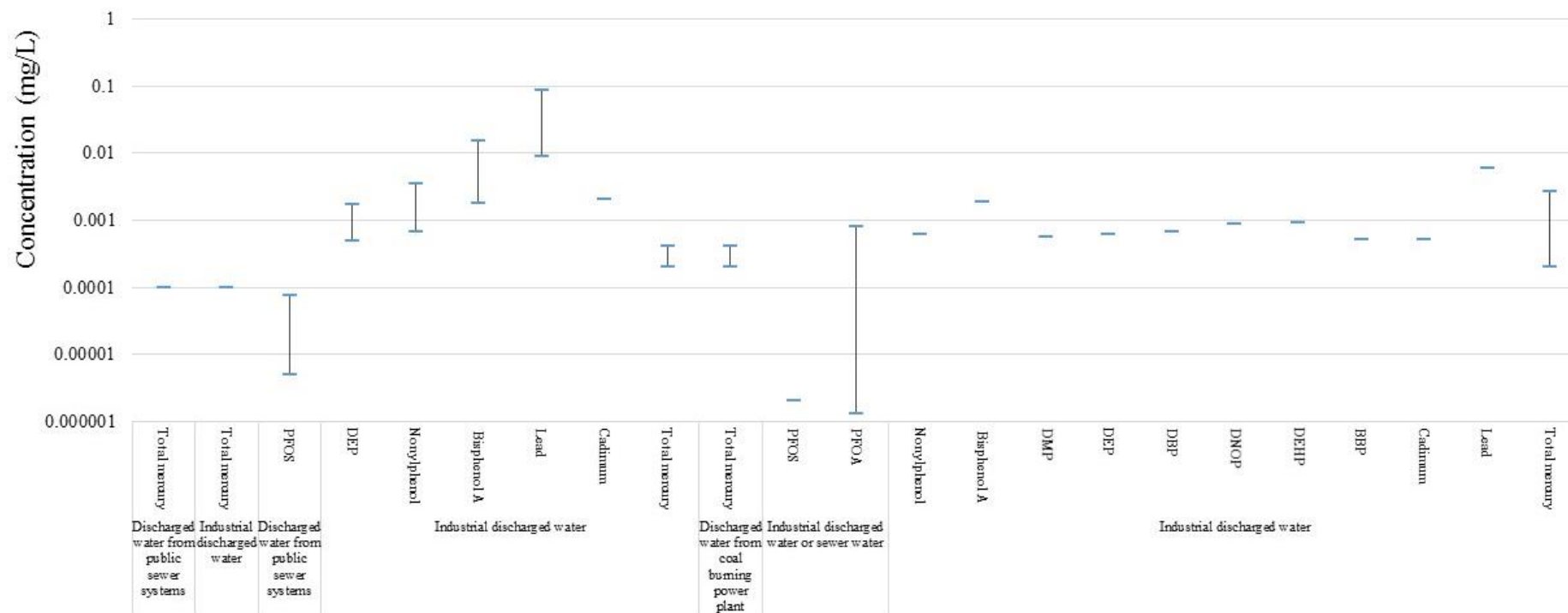
Fig.27 Environmental Soil Investigation and Monitoring Results in 2016-2017 and 2019

(I) Conduct industrial discharged water concentration investigation.

a. 29 times of total mercury water quality investigation were conducted with focus on 7 coal-fired power plants and 1 petrochemical company in 2019. Among the industrial discharged water tests (17 tests), only one test detected the concentration 0.0027 mg/L, below the control standard (0.005 mg/L), all other 16 times below the method detection limit (0.0002 mg/L); for the investigation of dioxin and furan in the industrial discharged water (10 tests) all met the discharged water control standard (10 pg-I-TEQ/L); water quality investigation was conducted for operation containing PFOS and PFOA raw materials (printing and dyeing industry, textile industry and chemical industry, etc.), the PFOS for industrial discharged water or controlled water were all below the method detection limit (2.05 ng/L), while the PFOA concentration range was ND (method detection limit was 1.30 ng/L)-795 ng/L ; the tests of concentration of nonylphenol, DMP, DEP, DBP, DNOP, DEHP, BBP, lead, cadimium, and bisphenol A were carried out twice for industrial discharged water, and the results were all lower than the method detection limit. The test results of industrial discharged water in 2015-2019 are shown in Table 5 and Figure 28. (Department of Water Quality Protection)

Table 5 Test results of dioxin and furan from the industrial discharged water by the
Department of Water Quality of the Environmental Protection Administration
Protection in 2018-2019

Year	Industry Type	Number of Tests	Concentration range of tests
2018	Industrial wastewater containing dioxin pollution potential from paper industry, aluminum alloy manufacturing and zinc recycling manufacturing	20	In the summary of dioxin fingerprint spectra from domestic waste and sewage water, the industrial waste and sewage water from waste incinerators, caprolactam manufacturing, epichlorohydrin manufacturing, acetylene manufacturing, aluminum alloy manufacturing, zinc recycling manufacturing, and final waste disposal sites mainly contains octachlorinated dibenzo-p-dioxin (OCDD) and octachlorinated dibenzofuran (OCDF) as the main species. Only the industrial wastewater from pulp manufacturing process and certain chlorate manufacturing such as sodium hypochlorite and liquid chlorine has 2, 3, 7, 8-tetrachlorofuran (2, 3, 7, 8-TeCDF) as the main species. (method detection limit is 0.1780 pg-I-TEQ/L)
2019	Industrial discharged water	10	All comply with the control limit of the discharged water standard (10 pg-I-TEQ/L)



year	Industry Type	substance	Number of Tests	concentration range(mg/L)	method detection limit(mg/L)
2015	Power plant, discharged water from the designated sewer system in the science technology industrial park.	Total mercury	5	ND-0.0001	0.0001
2016	Industrial discharged water (metal surface treatment industry)	Total mercury	4	ND-0.0001	0.0001
2017	Discharge water from the designated sewer systems in hospitals, medical institutions, industrial parks or science technology parks and public sewer systems	PFOS	8 water samples	ND-0.000074	0.000005
2018	Industrial discharged water (Petrochemical Industry, Metal Industry, Chemical Industry, Paper Industry, Petrochemical Specialized Zone, designated sewer systems, industrial park designated sewer systems)	DEP	10	ND-0.00170	0.00048
		nonylphenol		ND-0.00353	0.00068
		bisphenol A		ND-0.0154	0.00182
		lead		ND-0.086	0.009
		cadimium		ND	0.002
	industrial discharged water (Wafer manufacturing and semiconductor manufacturing, optoelectronic and material component manufacturing, printed circuit board manufacturing, metal surface treatment industry, metal industry, chemical industry, petrochemical industry, paper industry, soil and rock processing industry, designated sewer systems in science park , designated sewer systems in industrial area)	Total mercury	29	ND-0.0004	0.0002
	Discharged water from 8 coal power plants	Total mercury	8	ND-0.0004	0.0002

year	Industry Type	substance	Number of Tests	concentration range(mg/L)	method detection limit(mg/L)
2019	Discharged water or regulated water from possible industries operating with perfluorooctanoic acid (Printing and dyeing industry, textile industry and chemical industry etc.)	PFOS	10	ND	0.00000205
		perfluorooctanoic acid		ND-0.000795	0.00000130
	industrial discharged water (metal industry and sewer systems in designated science parks)	nonylphenol	2	ND	0.00062
		bisphenol A		ND	0.00187
		DMP		ND	0.00057
		DEP		ND	0.0006
		DBP		ND	0.00066
		DNOP		ND	0.00089
		DEHP		ND	0.00091
		BBP		ND	0.00052
		cadimum		ND	0.0005
		lead		ND	0.006
	Industrial discharged water from 7 coal power plants and 1 petrochemical company	Total mercury	29	ND-0.0027	0.0002

Fig. 28 Test results of industrial discharged water by the Department of Water Quality Protection of the Environmental Protection Administration in 2015-2019

- b. In 2019 the industrial discharged water near Sanye Palace Creek, Nankan Creek, Salt Water Creek, and Taliaokeng Creek was tested for perfluorooctanoic acid concentration, ND (MDL=1.48 ng/L)~1,427 ng/L, and PFOS concentration, ND(MDL=1.94 ng/L)~ 1,267,840 ng/L. (Environmental Analysis Laboratory)
- c. In 2019 sampling of process water and discharged water from 50 optoelectronic semiconductor companies and 16 textile related companies was completed. The test results of PFOS and perfluorooctanoic acid in the industrial waste water/ discharged water from optoelectronic semiconductor industry were ND~398 ng/L, ND~194.8 ng/L. The test results of PFOS and perfluorooctanoic acid in the industrial waste water/ discharged water from textile industry were ND~18.7 ng/L, 2.9~701 ng/L (method detection limit : PFOS and PFOA were both 1 ng/L). (Soil and Groundwater Remediation Fund Management Board)

B. Ministry of Economic Affairs

- (A) Plan to include textile products and stationary products in the national standards and testing feasibility of environmental hormones substances.

In 2019 CNS 15290 “Textile products safety regulations (general requirements)” was revised to add PFOS content specification. (Bureau of Standards, Metrology, and Inspection)

- (B) Based on the annual market sampling and test program, conduct tests of environmental hormones substance in market products. (Bureau of Standards, Metrology, and Inspection)

In 2019 based on market sampling and test program, the environmental hormones substance tests of 216 market products

were conducted as follows:

- a. 60 purchased market products, include : 10 “wooden brick toys”, 20 “clay toys”, 10 “baby walkers” and 20 “game mats”. The tests include the contents of 8 kinds of phthalate plasticizers (DEP, DMP, DEHP, DBP, BBP, DINP, DIDP, and DNOP)” and “heavy metals (cadimum, lead, mercury)”.
- b. 46 purchased market products, include : 11 “travel luggage”, 15 “incense products” and 20 “paper money products”. The tests include the contents of heavy metals, like cadimum, lead and mercury.
- c. In 2019, the purchased market textile products (including socks, swimsuits, apparels, and sweaters) and the tests include 46 samples of organic tin content and 44 samples of NPEO and NP contents.
- d. According to CNS 14729 “Test method of pentachlorophenol preservatives in woods”, the test includes the pentachlorophenol preservative content of 20 kinds of wood products in market, such as composite wood flooring, laminate veneer, ordinary plywood, medium density fiberboard, and decorative laminate veneer.

In 2015-2019, about 1,542 market products were tested, and the results are shown in Table 6.

**Table 6 Sampling of market products by the Bureau of Standards, Metrology, and
Inspection of the Ministry of Economic Affairs in 2015-2019**

Year	Number of sampling	Types	Tests	Passing rate
2015	199	A sampling and testing plan for market products covers plastic doll toys, inflatable toys, gun-shaped toys (water gun toys), portable lanterns, baby walkers, plastic children shoes, children rain boots, soft plastic table mats, summer mats, interlocking foam mats, adult diapers, and elder's cotton apparels.	8 plasticizers (DEP, DMP, DEHP, DBP, BBP, DINP, DIDP, DNOP), free formaldehyde etc.	78%
	12	A sampling and testing plan for market products covers tops and pants of infants and kids clothing etc.	Nonylphenol polyoxyethylene ether (NPEO) and nonylphenol (NP)	100%
2016	239	Ball toys, plastic doll toys, bubble water toys, travel luggage, children raincoats, toy scooters, soft plastic table mats, baby wraps, infant clothing, towels, scarves, silk quilts, winter student uniforms	Phthalate plasticizer contents (DEP, DMP, DEHP, DBP, BBP, DINP, DIDP, DNOP), PAHs (PAHs), nonylphenol (NP) and nonylphenol polyoxyethylene ether (NPEO)	94%
2017	240	Soft plastic table mats, toys for children under 3 years old, children school bags, bubble water toys, plastic doll toys, children highchairs	phthalates plasticizers (DEP, DMP, DEHP, DBP, BBP, DINP, DIDP, DNOP) and heavy metals(cadimium, lead, mercury)	89%
		Functional tight-fitting sweatpants	Organic tin	100%
		Baby clothing containing plastic coatings or accessories	phthalates plasticizers (DEP, DMP, DEHP, DBP, BBP, DINP, DIDP, DNOP)	100%
		Children's bedside guardrail	Migratable elements (cadimium, lead, mercury)	100%
		Water-based cement paint (latex paint)	Contents of soluble hazardous heavy metals (lead, cadimium and mercury)	100%
		gold and silver joss paper	heavy metals (lead, cadimium)	100%
	50	According to sampling and testing plan for textile products in market, test socks and apparels etc.	organic tin	100%
	8		nonylphenol polyoxyethylene ether (NPEO) and nonylphenol(NP)	100%
	280	Work with border tests by Customs Administration, MOF on imported incense products and gold and silver joss paper	Heavy metals (lead, cadimium)	100%
	20	Wood products from market include composite boards, composite wood flooring, laminates, wood core board, plywoods for concrete formwork, special plywoods and ordinary plywoods	According to CNS 14729 "Test method of pentachlorophenol preservatives in woods", test pentachlorophenol preservatives.	100%
	26	Market car perfume	phthalates(DBP, BBP, DEHP, DMEP, DIPP, DnPP, DNOP, DIBP)	100%
2018	19	Children's underpants	nonylphenol(NP) and nonylphenol polyethoxy alcohol (NPEO)	100%

Year	Number of sampling	Types	Tests	Passing rate
	30	Pillowcases and sports socks	organic tin (tributyltin, triphenyltin)	100%
	90	Children's shoes, plastic doll toys, erasers, children rain boots and dress-up toys	phthalates plasticizers(DEP, DMP, DEHP, DBP, BBP, DINP, DIDP, DNOP) and heavy metals(cadimium , lead , mercury)	91%
	31	pencils and crayons	heavy metals(cadimium , lead , mercury)	100%
	20	Wood products such as laminate flooring	According to CNS 14729 “Test method of pentachlorophenol preservatives in woods”, test pentachlorophenol preservatives	100%
	45	According to the sampling and testing plan for textile products in market, purchase socks and apparels etc.	organic tin	100%
	5		nonylphenol(NP), nonylphenol polyethoxy alcohol (NPEO)	100%
	6	Computer cases, hair dryers, power extension cords, 2 brands for each (study on testing decabromodiphenyl ether in electronic and electric products in market)	According to CNS 15050 “Electrical and electronic products – test method for six control substances (lead, mercury, cadimium, hexavalent chromium, polybrominated biphenyls, polybrominated diphenyl ether)”, test decabromodiphenyl ether content	100%
	6	Work with border tests by Customs Administration, MOF on imported incense products and gold and silver joss paper	heavy metals(lead , cadimium)	100%
2019	60	Wooden brick toys, clay toys, baby walkers, game mats	phthalates plasticizers(DEP, DMP, DEHP, DBP, BBP, DINP, DIDP, DNOP) and heavy metals(cadimium , lead , mercury)	100%
	46	travel luggage, incense products, joss paper money	heavy metals(cadimium , lead , mercury)	100%
	46	Sampling of textile products from market (including socks, swimsuits, clothes, weathers)	organic tin	100%
	44		NPEO and NP	100%
	20	Wood panels such as composite wood flooring	According to CNS 14729 “Test method of pentachlorophenol preservatives in woods”, test pentachlorophenol preservatives	100%

C. Ministry of Health and Welfare

(A)Continue irregular audits on product labeling for medical equipment of polyvinyl chloride (PVC) materials with high exposure risk of plasticizers.

In 2015 according to the test report on “medical equipment

containing plasticizers” published in Consumer Magazine No. 415 in November, 2015, label inspection and sampling and testing were conducted on the plasticizer contents of 18 PVC or polyethylene (PE) medical equipment products from the market. It was found only 5 products met the regulation on the exposure risk of Bis(2-ethylhexyl) phthalate (DEHP) in the Ministry Foods No. 1001603415 Notice publicized on May 23, 2011 by the previous Ministry of Health of the Executive Yuan. The suppliers should follow the regulation on the notice to show the related texts or symbols on packaging labels on the smallest package and add warning language in the Chinese insert. Later, re-audit was conducted on the 5 products and in 2016 the re-audit result was notified to the local health bureau for the drug supplier. 2 of the 5 products conformed to the relevant labeling specification of the Pharmaceutical Administration Law, and 3 products did not fully comply with the requirements of the announcement and were handed over to the local health bureau for violation of Article 75 of the Pharmaceutical Administration Law.

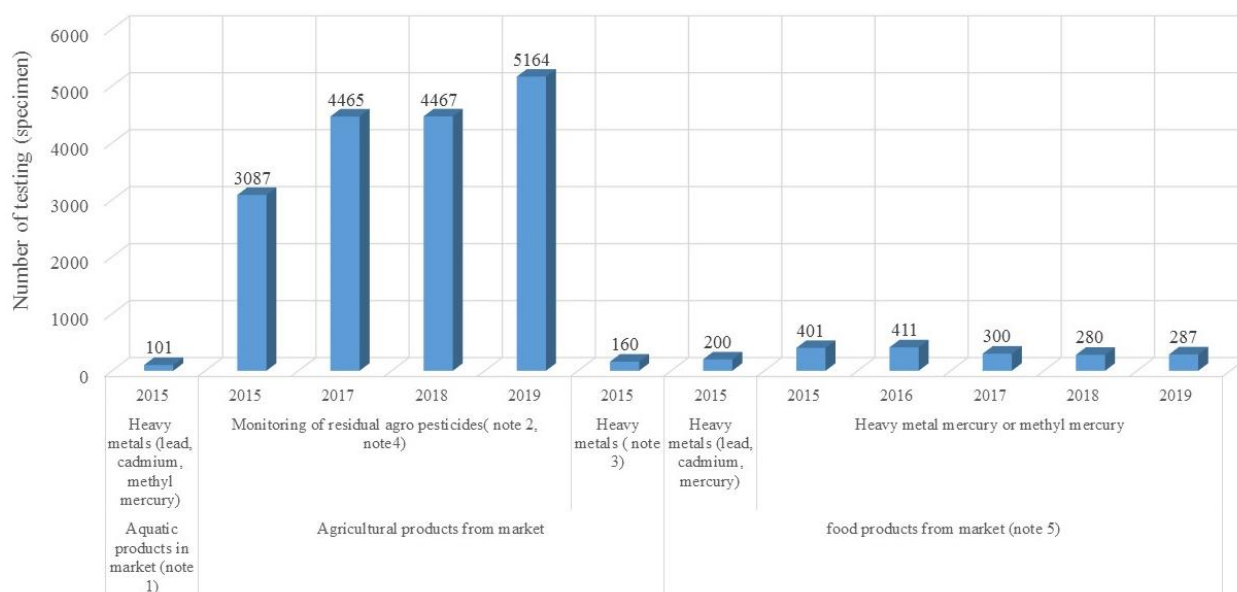
In 2017, the local health bureaus went to hospitals, pharmacies, medical equipment companies and manufacturers in their jurisdictions to conduct sampling and testing of commercial products, including 29 samples like infusion sets, hemodialysis tubes, blood bags, gastrointestinal nutrition catheters, etc. 10 samples were found DEHP. 9 samples met the regulation of warning language by Ministry Foods No. 1001603415 Notice publicized on May 23, 2011 by the previous Ministry of Health of the Executive Yuan. Only 1 sample did not comply with the

regulation on labeling and was subject to regulatory penalty by the local health bureau. (Food and Drug Administration)

(B) Conduct sampling and analysis on food products in market.

- a. In 2018-2019, conduct risk management analysis for the phthalates plasticizers in processed foods and fresh food products in market, establish the background value for the phthalates plasticizers in the processed foods and fresh food products in market, and complete background value investigation for 10 categories and 914 food products. (Food and Drug Administration)
- b. In 2019, focus on agricultural products in market (5, 164 products) and conduct organochlorine pesticide investigation (including DDT and hexaoxybenzene). The results were all ND, for organochlorine pesticides. In addition, in 2019, continue monitoring of contents of heavy metals in domestic products in market. Sampling was conducted for 102 rice products, 153 aquatic products and 32 algae food products. Except 2 aquatic products were found “methyl mercury” content exceeding the “Health Standards for Contaminants and Toxins in Foods”, and already subject to regulatory action, all others complied with the regulation. In 2015-2019, the contents of organochlorine pesticides or heavy metals in aquatic products, agricultural products and food products in market were tested. The results are in Figure 29. (Food and Drug Administration)
- c. In 2019, the contents of dioxin, furan and dioxin type polychlorinated biphenyls in 97 food products in market of Yilan and outlying islands were tested and found the total weight

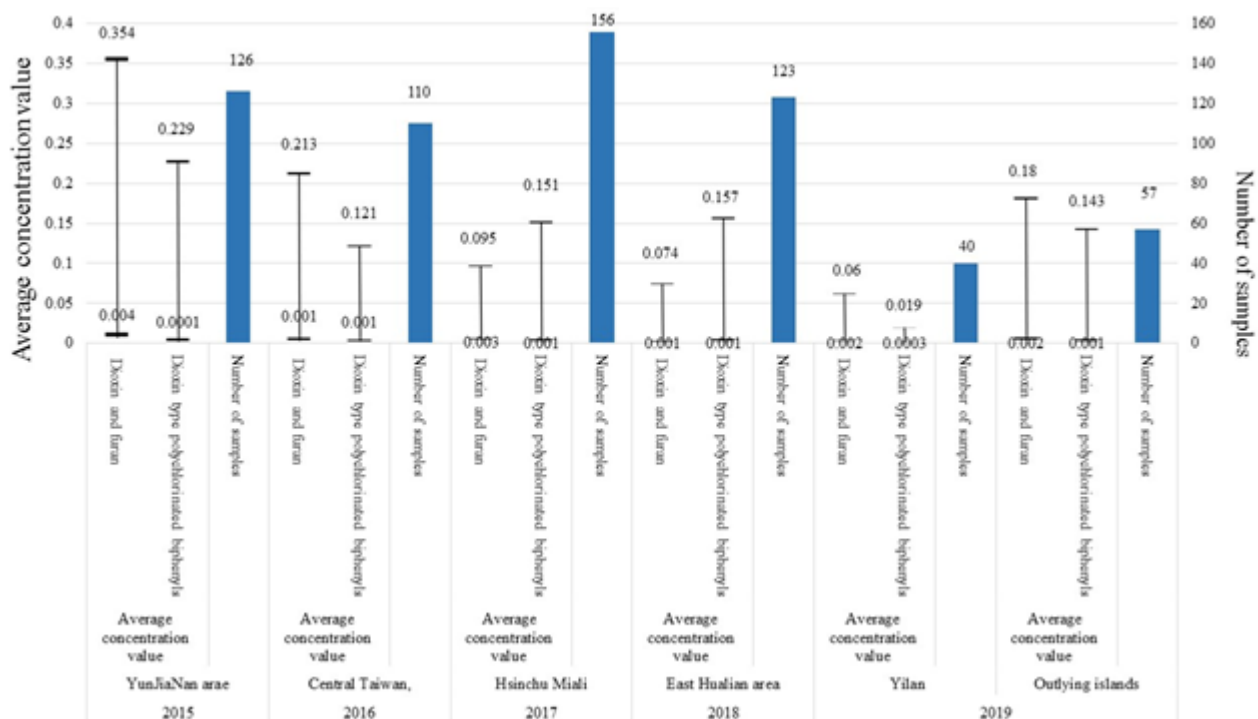
average concentration was between 0.002-0.18 pg WHO₀₅-TEQ_{PCDD/F}/g wet weight and 0.0003-0.143 pg WHO₀₅-TEQ_{PCB}/g wet weight, for all kinds of foods. In 2015-2019 with focus on domestic areas (Hsinchu Miali, central Taiwan, Yunlin Jiayi Tainan, east Hualian area, Yilan and outlying islands) the contents of dioxin, furan and dioxin type polychlorinated biphenyls in foods (including cereals, oils and fats, aquatic animals, dairy products, eggs, fruits and vegetables etc.) were tested, as references for health risk assessment and policy making for our country. The results are shown in Figure 30. Except in 2017 one egg had the dioxin concentration over 5.23 pg WHO₀₅-TEQ_{PCDD/F}/g fat, exceeding our national standard, and immediate initiation of environmental food safety notification and responsive measure process by “Ministry of Health and Welfare of the Council of Agriculture” and “Environmental Protection Administration”, all other samples complied with “Regulations on handling foods containing dioxin and polychlorinated biphenyls”. (Food and Drug Administration)



Notes :

1. In 2015 the aquatic products in market included 83 fish samples, 8 crustaceans samples, 1 shellfish sample and 1 celphalopods etc., among which 1 flat crab had cadimium content 0.7 ppm, over the health standard (0.5 ppm), and was already subject to regulatory action by the Act Governing Food Safety and Sanitation.
2. In 2015, with focus on 3, 087 agricultural products (1, 407 vegetable products, 537 fruit products, 1143 other samples (including teas), residual pesticide monitoring was conducted, and among all 349 cases did not comply with the regulation, and all were subject to the regulatory action by the Act Governing Food Safety and Sanitation.
3. In 2015 the contents of heavy metals in vegetables and fruits in market were tested and all complied with the regulation.
4. In 2017-2019, the contents of organochlorine pesticides (including DDT and hexaoxybenzene) for agricultural products in market were tested and all found ND.
5. Heavy metals (lead, cadimium, mercury) : in 2015 food products in market included 200 rice products, heavy metals mercury or methyl mercury : in 2015 food products in market included 300 rice products and 101 aquatic products, in 2016 food products in market included 260 rice products and 151 aquatic products, in 2017 food products in market include 100 rice products, 150 aquatic products and 50 algae food products, in 2018 food products in market include 50 rice products, 180 aquatic products and 50 algae food products, in 2019 food products in market include 102 rice products, 153 aquatic products and 32 algae food products. Except in 2019, 2 aquatic products had methyl mercury content not compliant the regulation and were subject to regulatory action, all others complied with the regulation.

Fig. 29 Testing of Aquatic Products, Agricultural Products and Foods in Market by the Food and Drug Administration of the Ministry of Health and Welfare in 2015-2019



Note : the unit of average concentration for dioxin and furan is pg WHO₂₀₀₅-TEQ_{PCDD/F}/g fresh weight, the unit of average concentration for dioxin type polychlorinated biphenyls is pg WHO₂₀₀₅-TEQ_{PCB}/g fresh weight

Fig. 30 Test results of the contents of dioxin, furan, and dioxin type polychlorinated biphenyls in foods of each domestic area in 2015-2019

D. The Council of Agriculture of the Executive Yuan

(A) Study the feasibility to include environmental hormones substances in animal drug specifications and conduct testing.

According to authorities and responsibilities, test animal drugs and find no environmental hormones substances. (Bureau of Animal and Health Plant Health Inspection and Quarantine)

(B) Continue sampling and testing for agricultural, fishery and animal products.

a. According to authorities and responsibilities, test animal drugs and find no environmental hormones substances. (Bureau of Animal and Plant Health Inspection and Quarantine)

b. In 2019, the test of nonylphenol and bisphenol A in pork products was conducted and the test of dioxin in dairy products before shipping out of plant was conducted, and all complied with the

standard. (Department of Animal Industry)

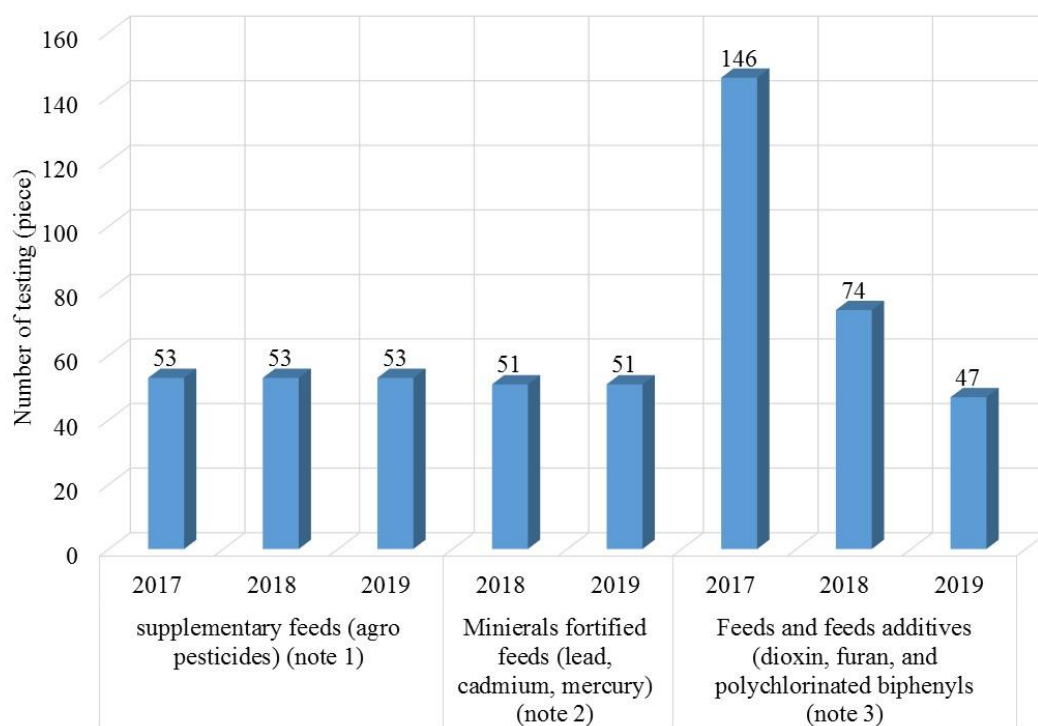
- c. In 2019, 53 samples of livestock feeds were tested for the residual pesticides, and all met the standard of residual pesticides in livestock feeds. Monitoring of the contents of mercury, lead and cadmium in mineral fortified livestock feeds was conducted, to include 51 random samples. The test results met “the standards of heavy metals in mineral fortified livestock feeds heavy metals” (mercury below 0.5 ppm, lead below 50 ppm, and cadmium below 10 ppm). Besides, 47 samples of livestock feeds were under monitoring for additives, and all samples were tested to be below the national control limit for dioxin, furan, and polychlorinated biphenyls in livestock feeds. (Department of Animal Industry, Agricultural Chemicals and Toxic Substances Research Institute)
- d. In 2019, “Improve aquatic product quality and safety - monitoring of aquatic products at production site and before market” plan was implemented, to test dioxin and polychlorinated biphenyls for 54 samples, and mercury for 2,310 samples (including farmed aquatic products, fished aquatic products along the offshore and deep seas and cultivated oysters in the west), and the test results all met the food hygiene standards. (Fisheries Agency, Agricultural Chemicals and Toxic Substances Research Institute)
- e. In 2019, with focus on the farmland of high pollution potential, sampling and monitoring of above ground food crops (rice, fruits and vegetables etc.) was conducted, and the tests of heavy metals (cadmium, mercury and lead) were conducted for 550 samples,

and the test results found that 10 samples of food crops (rice) had cadmium content over the control limits of heavy metals by the Act Governing Food Safety and Sanitation. The nonconforming food crops from the field had been destroyed and did not go to the market, and by regulations notification was sent to environmental protection agencies to expand the testing on farmland soils, water or air, to investigate and cut the pollution sources, and prevent reoccurrence or pollution expansion. (Agriculture and Food Agency, Agricultural Chemicals and Toxic Substances Research Institute)

- f. According to the data of nonconforming plant discharge pipeline (chimney) and other plants of high pollution potential from environmental protection agencies regarding dioxin monitoring, sampling of nearby farmland crops was conducted for 11 samples of crops in 2019, and the contents of dioxin /furan and polychlorinated biphenyls were tested, and 2 samples exceeded the EU action control value for dioxin in vegetables and fruits (0.3 pg WHO₂₀₀₅-TEQ/g d.w.), and they were one sample of corn and one sample of leaf sweat potatoes, and they were all destroyed. (Agriculture and Food Agency)
- g. To comply with the EU sanitary certification requirement for imported honey products for human consumption, the residual polychlorinated biphenyls (PCBs) in honey products from bee farms were tested, and in 2019, no residue was found for 33 random samples (detection limit : 0.001 pg WHO₂₀₀₅-TEQ/g d.w.). (Agriculture and Food Agency)
- h. In 2019, 14,587 samples of agricultural products were under

monitoring for the residual pesticides related to environmental hormones substances, and 18 samples failed the test (6 samples of Carbaryl, 2 samples of Atrazine, 10 samples of Methomyl). The nonconforming products were notified to the local governments to prohibit their sales and subject to the regulatory actions by the pesticides management law. (Agriculture and Food Agency)

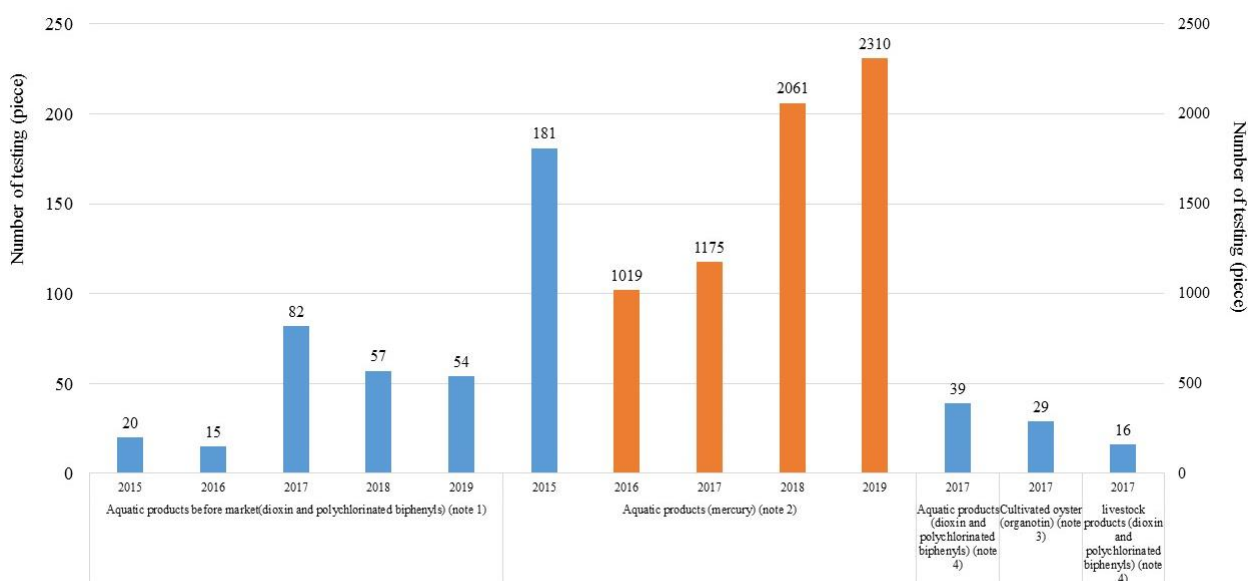
- i. In 2015-2019, the tests of environmental hormones of nonylphenol and bisphenol A in pork products were conducted, and the test of dioxin in dairy products was conducted, and they all met the standard. The result of monitoring aquatic products, animal products, agricultural products and livestock feeds by the Council of Agriculture in 2015-2019 is shown in Figure 31, Figure 32, and Figure 33. (Department of Animal Industry, Fisheries Agency, Agriculture and Food Agency, Agricultural Chemicals and Toxic Substances Research Institute)



Notes :

1. In 2017-2019, together with the random testing of residual pesticides in livestock feeds, the tested environmental hormones include Carbaryl, DDT and Malathion, and they all met the standard of residual pesticides in livestock feeds.
2. In 2018-2019, the monitoring of the contents of mercury, lead and cadmium in minerals fortified livestock feeds was conducted, and all the results met “the standard of heavy metals in fortified livestock feeds” (mercury below 0.5 ppm, lead below 50 ppm, and cadmium below 10 ppm).
3. In 2017, 146 samples of livestock feeds and livestock feeds additives included 3 samples of fish livestock feeds, and the remaining samples of egg chicken livestock feeds and additives like minerals, oyster shell powders, vinasse and oils and fats. In 2017-2019, the dioxin, furan and polychlorinated biphenyls for all samples were tested and found to be lower than the EU control limit in livestock feeds.

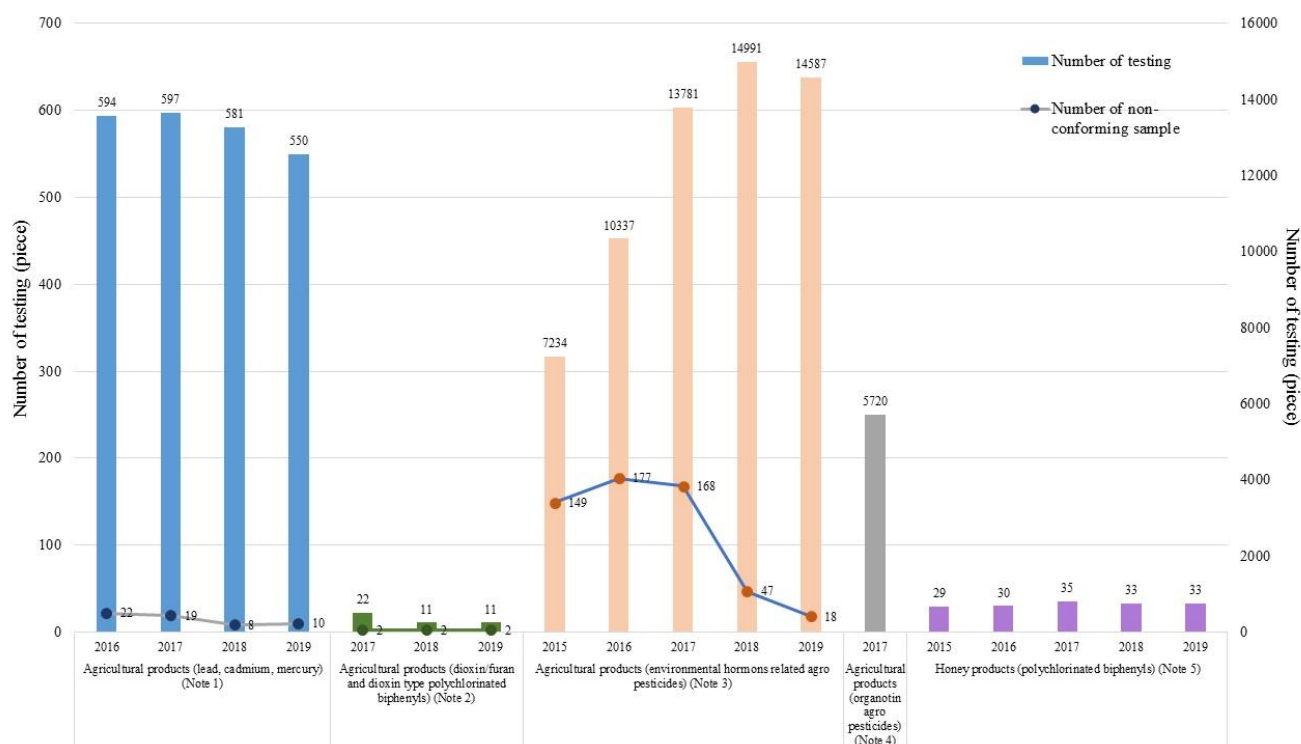
Fig. 31 testing of livestock feeds and livestock feeds additives in 2017-2019



Notes :

1. In 2015-2019, the “Improve aquatic product quality and safety - monitoring of aquatic products at production site and before market” plan was implemented, and all the results met food hygiene standards.
2. In 2015-2019, mercury was tested for random samples of aquatic products, including monitoring for farmed aquatic products, fished aquatic products along the offshore and deep seas and cultivated oysters in the west, among which the nonconforming products included 2 samples (Swordfish, black tuna) in 2016, 1 sample (shark) in 2017, and 3 samples (Swordfish, Golden Barracuda and Striped Bonito) in 2018, and the notification was sent to the local governments to enforce monitoring and management of the nonconforming fish products, and require the fish market vendors to strengthen food safety management, and require the suppliers to prevent nonconforming products from entering market. In addition, the industry was required to hold product liability and conduct self-management by notifying local health authorities or providing samples for testing when any concern arises to fishery products, and when necessary, the transaction can be suspended according to the provisions of Article 7 of the Measures for the Administration of Agricultural Products Wholesale Markets.
3. In 2017, the test of organic tin (including monobutyltin, dibutyltin, tributyltin and tetrabutyltin) in the farmed oysters of western coastal waters (Hsinchu, Changhua, Yunlin, Chiayi, and Tainan) was conducted.
4. In 2017, the contents of dioxin, furan and polychlorinated biphenyls in 39 samples of aquatic products (including 35 samples of hairy crabs, the remaining 4 samples of farmed fish and shrimp) and 16 samples of livestock products (including 13 samples of eggs, 3 samples of chicken offal) were tested, and except that 1 sample of hairy crab and 2 samples of eggs had dioxin and polychlorinated biphenyls above the total toxic equivalent limit, the dioxin, furan and polychlorinated biphenyls of all other samples were found below the control limit of our country or the EU action control limit.

Fig. 32 Testing of Aquatic Products and Animal Products in 2015-2019



Notes :

1. In 2016-2019, with focus on farmland areas of high pollution potential, sampling and monitoring of above ground food crops (rice and vegetables and fruits etc.) was conducted and the test of heavy metals (cadmium, mercury, lead) was conducted, for 22 samples in 2016 (12 samples of cereals, 1 sample of garlic, 6 samples of leaf vegetables, 2 samples of taro, 1 sample of eggplant), 19 samples in 2017 (6 samples of lettuce, 4 samples of rice, 3 samples of peanuts, 1 sample of mustard greens, 1 sample of taro, 1 sample of taro stem, 2 samples of cabbage, 1 sample of bulbous cabbage), 8 samples in 2018 (rice) and 10 samples in 2019 (rice), and the content of cadmium or lead in these food crops was found to exceed the standard of heavy metals by the Act Governing Food Safety and Sanitation. The nonconforming food products were destroyed and did not go to the market, and the notification was sent to the local environmental protection agencies to expand testing on farmland soil, water and air, investigate and cut the pollution sources, and prevent reoccurrence or pollution expansion.
2. In 2017-2019, according to the data of nonconforming plant discharge pipeline (chimney) and other plants of high pollution potential from environmental protection agencies regarding dioxin monitoring, sampling of nearby farmland crops was conducted to test the contents of dioxin /furan and polychlorinated biphenyls, and the results found that 2 samples (Leek and Amaranth, one for each) in 2017, 2 samples (Leek and lettuce, one for each) in 2018, and 2 samples (corn and leaf sweat potato, one for each) in 2019, were found to have the vegetable and fruit dioxin over the EU action control limit (0.3 pg WHO₂₀₀₅-TEQ/g d.w.), and the nonconforming products were subject to the regulatory action and control by the local governments.
3. In 2015-2019, monitoring of the residual pesticides related to environmental hormones substances in agricultural products was conducted, and the nonconforming products were notified to the local governments to prohibit the farmers from selling, and subject to the regulatory action by pesticide management law.
4. In 2017, the tested crops included rice, vegetables and fruits, and the test of organochlorine pesticides (including DDT, hexaoxybenzene) found ND for organochlorine residual pesticides (quantitative limit : 0.01 mg/kg), and they met the food safety and hygiene regulations.
5. To comply with the EU sanitary certification requirement for imported honey products for human consumption, Council of Agriculture implemented the program regarding monitoring of the residues in honey products, and all the results found no residue (detection limit : 0.001 pg WHO₂₀₀₅-TEQ/g d.w.).

Fig. 33 Testing of Agricultural Products in 2015-2019

E. Ministry of the Interior

(A)Conduct audit of environmental hormones substances on green building materials label.

- a. It has been informed to the certification institutes of green building materials label when they conduct audit on green building materials label that the priority is to confirm environmental hormones substances such as heavy metals (total mercury, total cadmium, total lead, total arsenic, hexavalent chromium, total copper, total silver) and phthalates (plasticizers) etc. In 2015-2019, 1, 157 cases of green building materials label certification were conducted, and all the tests of heavy metals met the standard. In 2015-2019, 24 products of polyvinyl chloride (PVC) were subject to the test of phthalates (plasticizers) and found to meet the standard. The numbers of tests by year are shown in Figure 34. (Architecture and Building Research Institute)
- b. Supervise closely the certification institutes of green building materials label in conducting sampling of heavy metals (total mercury, total cadmium, total lead, total arsenic, hexavalent chromium, and total copper, total silver) and phthalates (plasticizers). In 2015-2019, 86 samples were tested for heavy metals and phthalates (plasticizers), and all the results met the standard. The numbers of tests by year are shown in Figure 34. (Architecture and Building Research Institute)

F. Ministry of Finance

(A) Continue sampling and testing of lead content in wines and liquors.

In 2019, all 2,209 random samples of wines and liquors met the regulation by Article 3 of “Alcohol Health Standard” that lead content per liter should be below 0.3 mg. In 2015-2019 there were 10,369 random samples of wines and liquors. In 2017 and 2018,

there was one sample in each year that the lead content exceeded the standard 0.3 mg per liter by Article 3 of Alcohol Health Standard, and the products were destroyed under the supervision of the local governments, while all other samples met the standard. The numbers of tests by year are shown in Figure 35. (National Treasury Administration)

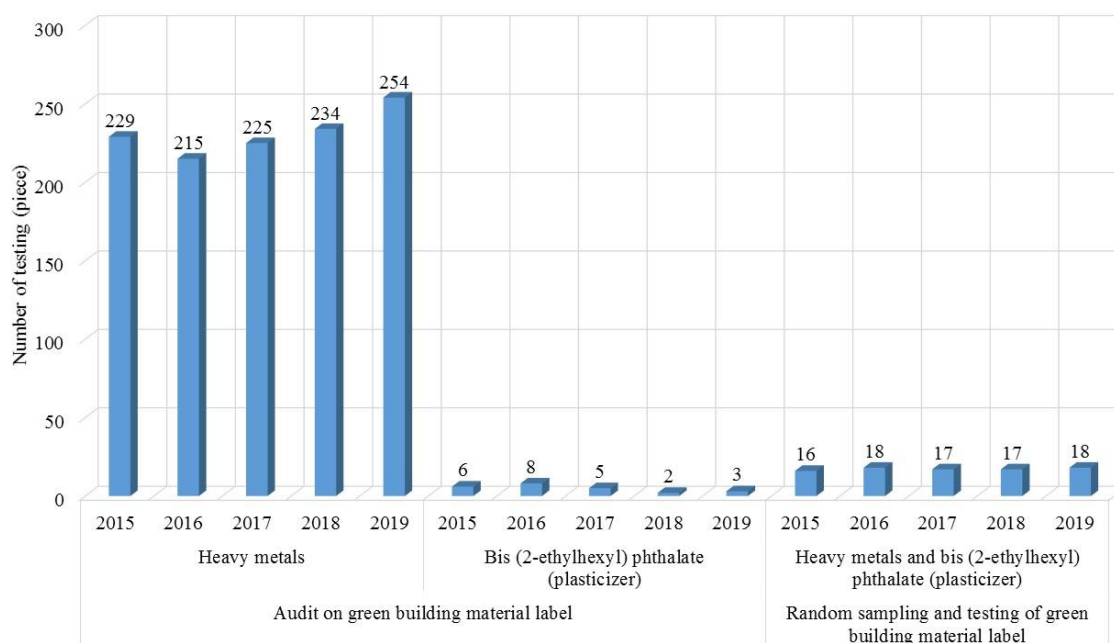


Fig. 34 Auditing and Sampling of Green Building Materials Label in 2015-2019

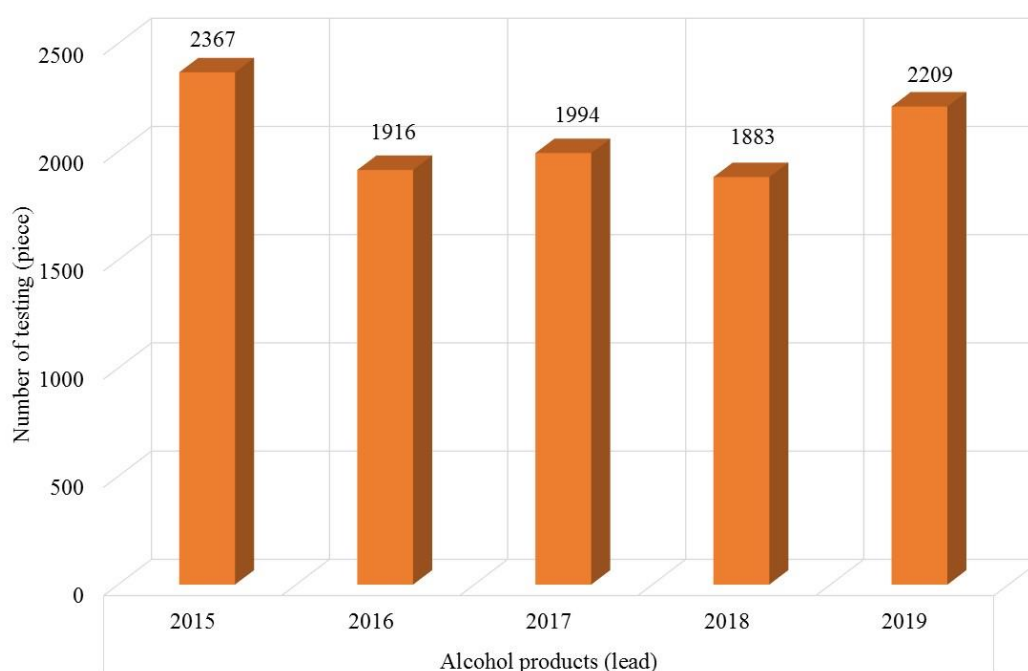


Fig. 35 Sampling of Wines and Liquors for Lead Content in 2015-2019

(IV) Strengthen risk communication and advocacy

A. The Environmental Protection Administration of the Executive Yuan

(A) By authorities and responsibilities, strengthen advocacy and public awareness of environmental hormones substances, timely and proper communication and advocacy with media and the public, to reduce public concerns.

Continue to update and maintain the information on the websites of “persistent organic pollutant”, “Minamata Convention on Mercury” and “environmental hormones”, including continuing collection of domestic and international news reports, convention updates, and updated foreign list of environmental hormones substances, and grasp the current status of domestic management and update the information on the website in real time, so that the public can instantly grasp the domestic and foreign management trends and status through the website. In addition, set up Chem Life (Facebook) page and publish the book “Chemical Substances in Life”, to promote public awareness of environmental hormones with life-oriented topics. Besides, publish the brochure “Investigation results of environmental distribution of toxic chemical substances” (2009-2019), on the website of investigation of environmental distribution of chemical substances for the public review. In 2019, the government held three environmental hormone seminars, two events of seeded teacher training and two college elite camps to advocate the correct knowledge about environmental hormones to the public. (Toxic and Chemical Substances Bureau)

(B) Timely publicize the news and information regarding the specifications of environment friendly labeled products in the

website of green life information by the Environmental Protection Administration, for the public review and download.

In 2015-2019, 62 pieces of news were released regarding the environment friendly labeled products of added and revised specifications. (Committees for Legal Affairs, Petitions and Appeals, Public Nuisance Arbitration)

B. Ministry of Economic Affairs

(A) Timely release the random product test results regarding environmental hormones substances.

Release the news of the test result for products like wooden brick toys, clay toys, baby walkers, and travel luggage and game mats etc., and publicize it on the website of Ministry of Economic Affairs Bureau of Standards, Metrology and Inspection. (Bureau of Standards, Metrology, and Inspection)

(B) Advocate environmental hormones substances.

a. Link the “environmental hormones” information website through the “Industry Green Technology Information” website, distribute the related information, and exceeded 10,000 views. (Industrial Development Bureau)

b. In 2015, 4 advocacy seminars were held to call on the manufacturers to implement product quality safety regarding the safety limit regulation of plasticizers, heavy metals and PAHs for travel luggage and spring and rocking equipment in children playground. In 2016-2019, through environmental regulations and technical seminars, industrial boiler improvement and regulatory trend seminar, green technology promotion seminar, 2,749 copies of advocacy materials for environmental hormones

were released. (Industrial Development Bureau)

(C) Study the pollution prevention assistance and alternative measures regarding environmental hormones substances and provide technical assistance to the industry under restrictions.

a. The environment friendly plasticizer (1, 2-cyclohexane dimethyl ester; DINCH) technology developed by Material and Chemical Research Laboratories, ITRI, was utilized, through “Key chemical materials chain gap project (pilot plant project)”, to assist UPC in R&D and trial production. The produced environment friendly plasticizers do not contain phthalates and can replace traditional environmental hormones – phthalate plasticizers. In addition to wide applications in PVA, PVB and PVC as plasticizers, they can also be used in adhesives, dispersants, coatings, inks, food packaging, medical products and children toys etc., to effectively increase the global competitiveness of our petrochemical industry. Currently UPC has started a pilot plant of 30,000 tons in Linhai Industrial Zone and started commercial production in the end of 2019. (Industrial Development Bureau)

b. The environment friendly fluorine-free water repellent that was independently developed by the Textile Research Institute does not contain any perfluorocarbon octyl (PFOS/PFOA) compounds. It is currently promoted to the textile industry for applications in the process of finishing fabrics. It is expected to replace the use of fluorine-containing water repellents. At present, we continue to assist Zhenxiang Industry, which has invested in producing textile additives and derivative applications; in addition, to meet

the needs of the industry, we have customized fluorine-free water repellent for Chongxin Company (product code: WR28), and accelerated the replacement by expanding the use of fluorine-free products. With increasing replacement, we will continue to work towards the goal of zero fluorocarbons (PFCs) in the industrial manufacturing process. (Industrial Development Bureau)

- c. Promote domestic companies to develop high value-added LED lighting products to replace mercury-containing lighting products, and assist companies in integrating cross-field resources, towards the integration of LED smart lighting systems, the development of non-mercury UV LED sterilization and purification applications, and explore domestic and foreign markets. (Industrial Development Bureau)

C. Ministry of Health and Welfare

(A) By authorities and responsibilities, strengthen advocacy and public awareness of environmental hormones substances, timely and proper communication and advocacy with media and the public, to reduce public concerns.

- a. To advocate the plastic food packaging container information to the public and the industry and increase the capability of risk communication of the frontline auditors, in 2015-2017, the Ministry of Health and Welfare held 15 advocacy events (7 events of public education advocacy, 5 events of industrial forum, 2 events of seminars, and 1 public advocacy event of "LINE Sticker Creative Competition"), and 18 events of GHP auditor training regarding plastic food containers, food container and packaging. Besides, we also produced topics like "tight control,

free of pesticide” and “dioxin knowledge” and dummies guide to fish intake for pregnant women and children, and published them on magazines and news media, to advocate food safety. Besides, the Ministry of Health and Welfare Food and Drug Administration built “plastic food container advocacy” website, to provide the updated information about domestic and international food wares, food containers or packaging and advocacy materials, to help the public establish the correct concept of using plastic food containers, and to ensure the public food hygiene and safety. (Food and Drug Administration)

- b. Besides, to build correct food safety concept, on the website of Food and Drug Administration we put the risk explanation of common endocrine disrupting substances for public review and download. Throughout the years, various media such as TV, newspapers and advertisements, magazines, outdoor LED walls, radios, Internet, free resources from the Executive Yuan (airport lighting boxes, radio broadcasts) and other media, and regional food safety advocacy activities, food safety science camps, poster contests and other activities, and food-related exhibitions, we conduct food safety advocacy and education to consumers in different focused groups. (Food and Drug Administration)
- c. In "Eat Healthy (Folic Acid, Iodine, and Iron)" in the 2017 edition of "Pregnancy Health" brochure, we remind women who are preparing to become pregnant should adjust their bodies to a healthy state. In addition, infants, and young children, pregnant or breastfeeding women may be more sensitive to the harm of some heavy metals (such as methyl mercury, etc.). Therefore, it is

recommended to reduce the intake of large fish with high concentrations of heavy metals. However, a variety of other small fishes can still be taken in an appropriate amount to achieve the supplementary effect of fish nutrients and reduce risks. The local government health bureaus (institutes) and medical institutions within their jurisdictions releases this brochure for pregnant women's reference. In June 2017, the brochure was placed in the website of "Health 999" of the "Health Promotion Administration" for public review and download. Besides, in 2017-2018, the National Health Research Institute was commissioned to conduct the "Investigation of Lead and Mercury Concentrations in the Blood of Preschool Children". The blood of 1,000 children has been sampled and analyzed for lead and mercury, and the advocacy of diet and hygiene was given to the parents of children. (Health Promotion Administration)

- d. Continue to care for the health of the patients with oil disease (from the polychlorinated biphenyls contaminated rice bran oil incident in 1988), conduct regular visits, and provide necessary hygiene education, health information and consultation services. As of December 2019, 1,884 patients were listed and provided with regular individual visits and consultation service. In 2017-2018, 2 events of education training for healthcare workers of oil disease patient were held (from local health bureaus, institutes and health centers, medical institutes for total 161 attendees), through professional education training to improve the caring capability of health professionals for polychlorinated biphenyls intoxication. In Taichung and Chunghua, 17 events of

health promotion activities were held for patients of oil disease (total 267 attendees), providing the attendees with free transportation, health examination and health promotion seminars (such as promoting health knowledge in sleep, nutrition and hygiene education, chronic disease prevention and care, Chinese medicine for healthy life, medicated diet and nutrition supplement for middle-aged and elderly). The brochures of "healthcare guide for the patients of oil disease" of 2018 edition were released, to provide the patients and the healthcare workers with healthcare reference. (Health Promotion Administration)

- e. In 2019, National Cheng Kung University was entrusted to conduct the "Environmental Health Impact Research on Sensitive Ethnic Groups" project. It has provided 100 women of pregnancy age with dietary health awareness services and continue to conduct the dietary health education and awareness services in 2020. (Health Promotion Administration)

(B) Conduct health risk assessment for diet exposure.

In 2019, through the national dietary intake database, the food intake and body weight in all age groups from northern Taiwan (Taoyuan, Hsinchu, Yilan) and southern Taiwan (Jiayi, Tainan, Kaohsiung, Pingtung, Penghu) was obtained, and with the toxic equivalent concentration data for dioxin compounds in various foods from Yilan and outlying islands in 2019, the average daily dose (ADD) of all age groups in Yilan and outlying islands was estimated, and then the average daily dose was used to estimate the life-time average daily dose (LADD), and they were 0.108 and 0.344 pg WHO-TEQ_{PCDD/F+PCB}/kg BW/day, respectively (LADD

were 0.759 and 2.406 pg WHO-TEQ_{PCDD/F+PCB}/kg BW/week, respectively), which met the tolerable daily intake (TDI) by WHO, 1~4 pg WHO-TEQ_{PCDD/F+PCB}/kg BW/day, and the tolerable weekly intake (TWI) suggested value by European Food Safety Authority (EFSA), 2 pg WHO-TEQ_{PCDD/F+PCB}/kg BW/week. (Food and Drug Administration)

In summary of the exposure risk estimation of polychlorinated dioxin/furan and dioxin type polychlorinated biphenyls from food intake by people in all areas between 2013 and 2019 by the Ministry of Health and Welfare, the estimated LADD range was 0.108~0.433 pg WHO-TEQ_{PCDD/F+PCB}/kg BW/day (Figure 36), which met the WHO TDI, 1-4 pg WHO-TEQ_{PCDD/F+PCB}/kg BW/day, and proved the significant achievement of our source control of polychlorinated dioxin /furan and dioxin type polychlorinated biphenyls. (Food and Drug Administration)

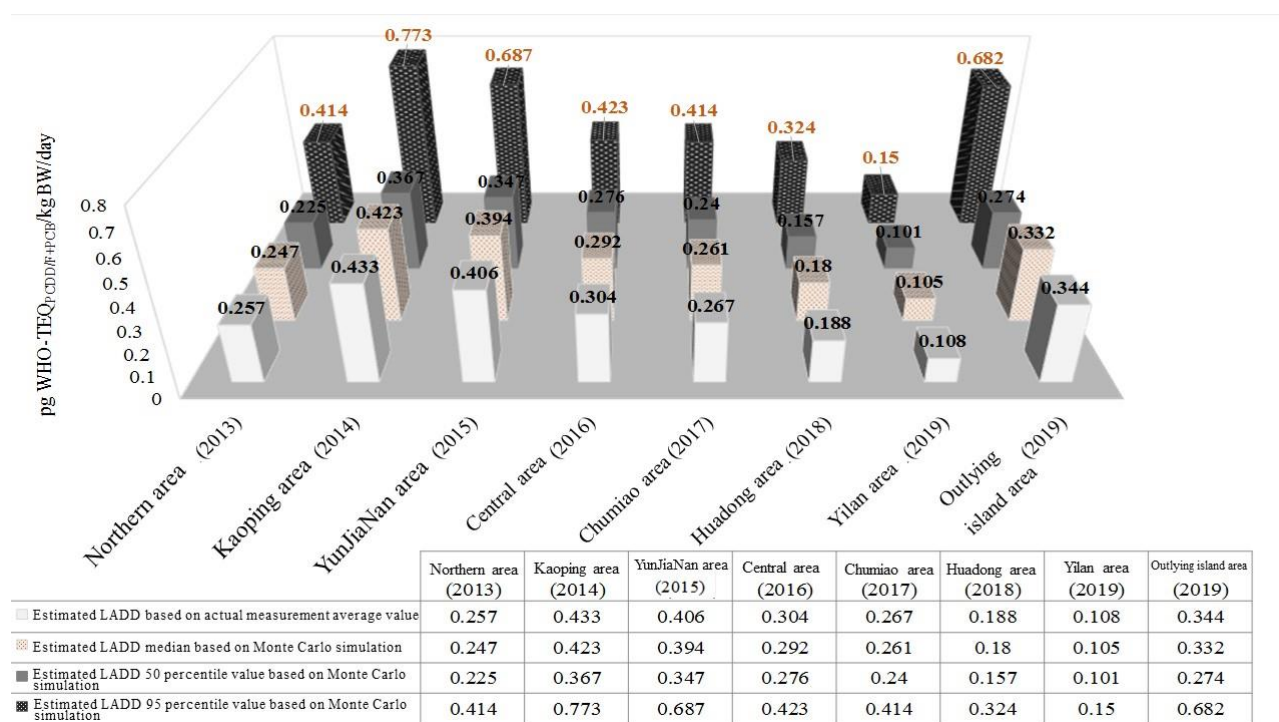


Fig. 36 Summary of estimated exposure to dioxin /furan and dioxin type polychlorinated biphenyls from food intake of people in all areas in 2013-2019

D. the Council of Agriculture of the Executive Yuan

(A) By authorities and responsibilities, strengthen advocacy and public awareness of environmental hormones substances, timely and proper communication and advocacy with media and the public, to reduce public concerns.

- a. In 2016-2019, 200 events of education advocacy on crop pest control and safe and reasonable use of pesticides were held by the trial and improvement fields and local governments. (Bureau of Animal and Health Plant Health Inspection and Quarantine)
- b. In 2016-2019, local governments sent people and held 926 events of advocacy education for the gathering of livestock breeders and animal drug companies, in total of 31,841 attendees. The key points of advocacy included selecting legal animal drugs and correct safe use of animal drugs; prohibition of using human drugs and pharmaceutical intermediates and unapproved unregistered animal drugs. (Bureau of Animal and Health Plant Health Inspection and Quarantine)
- c. Hold education training and advocacy seminars about aquatic products. (Fisheries Agency)

In 2015-2019, 10 events for 592 attendees of education training courses on “improve aquatic product quality and safety” program and aquatic product production and marketing were held; 9 events for 349 attendees of education training for the education training of fish farmers of exported fishery products to EU ; on fish farm sites, 84 events of “aquatic animal disease control and correct drug use” seminars for about 6, 994 attendees were held, and there were on-site aquatic veterinarians, to offer treatment of

aquatic diseases and correct drug use knowledge. Besides, through magazines advocacy of legal and correct use of animal drugs for aquaculture industry was conducted, and “to maintain the safety of farmed aquatic products - please use animal drugs correctly in accordance with the prescription of the veterinarian” has been advertised for 50 times.

d. Advocate straw treatment concept to farmers to reduce open burning. (Agriculture and Food Agency)

(a) To reduce the dioxin pollution problem due to open burning, the Council of Agriculture continued to advocate straw treatment concept to farmers, through news release, digital bulletin board, and other channels such as farmer gathering, and encourage farmers to pick up rice straw, chop it and bury it in the field, and promote the application of organic fertilizer containing straw decomposing bacteria.

(b) Agricultural agencies (offices) at all levels continued to advocate and provide various assisting measures. The straw is mainly processed by cutting and burying in soil, and the rest is recycled and reused as raw materials such as bedding, mulch material, cultivation medium, and compost.

E. Ministry of the Interior

(A) By authorities and responsibilities, strengthen advocacy and public awareness of environmental hormones substances, timely and proper communication and advocacy with media and the public, to reduce public concerns.

a. Strengthen green building promotion program, subsidize local governments in conducting audits and inspection of green

building license, and update inspection and assessment, and advocate the program. In 2016-2019, there were 160 events of green building advocacy and education seminars. (Construction and Planning Agency)

- b. Strengthen the advocacy of green building materials label and continue to update the website of green building materials label and introduce the requirements of green building materials label regarding environmental hormones substances. In addition, in 2015-2019, 12 events of “green building materials label system seminar” were held for total 1,657 attendees. (Architecture and Building Research Institute)

F. Ministry of Education

- (A) Strengthen and advocate the knowledge of environmental hormones and environmental education.

In the seminars and environmental education activities, strengthen and advocate the knowledge of environmental hormones, and the promotion events of the overall concepts of environmental hormones sources, common types, and hazardous nature are as follows: (Information and Technology Education Department)

- a. In 2018, 4 events of “2018 Green Chemistry Summer Camp” were held (over 300 attendees), and 4 events of “2018 Prevention and treatment of invasive species of animals, plants and insects on campus and black mosquitoes seminar” were held (over 400 attendees), and “College environmental safety and hygiene management joint conference” was held (about 200 attendees), which advocated the overall concepts of environmental hormones sources, exposure and effects, and the precautions of using the

environmental pesticide for red imported fire ants.

- b. In 2019, 6 events of “School chemical substance management and reporting system operating seminar” were held (about 680 attendees), and 4 events of “2019 Prevention and treatment of invasive species of animals, plants and insects on campus and black mosquitoes seminar” were held (over 400 attendees) and “College environmental safety and hygiene management joint conference” was held (about 200 attendees), which advocated the types, sources, exposure paths and human hazards of environmental hormones and plasticizers and the precautions of using the environmental pesticide for red imported fire ants.

VII. Conclusions

The management of environmental hormones in our country is through the competent authorities. Inter-ministerial promotion team are formed for sampling, monitoring and advocacy of goods, supplies, products, foods, and environment background. With the project implementation, strengthening management regulations of environmental hormones can be achieved to reduce exposure of environmental hormones substances, and lower the exposure risk of public diet, and ensure public healthy living environment. In the future, the promotion team will continue to strengthen coordinated control and monitoring, to effectively protect public and consumer health and safety, and build healthy and sustainable living environment.

Appendix 1

“Environmental Hormones Management Plan (the Second Term)” Table of 2019 Implementation Results

“Environmental Hormones Management Plan (the Second Term)”

Table of 2019 Implementation Results

Implementation Method	Tasks	Implementation Results (to be filled)	Executive (Unit)
1. Form inter-ministerial promotion team	EPA of the Executive Yuan 1. Form the promotion team for the “environmental hormones management plan” (Second Term), and EPA of the Executive Yuan as the convening agency.	In the implementation period of the “Environmental Hormones Management Plan (the Second Term)” (2016-2021) continued to hold inter-ministerial promotion team meeting, which discussed and verified the implementation results of the environmental hormones management plan by ministries, work schedules and the implementation results regarding the environmental hormones substances by years.	Toxic and Chemical Substances Bureau
	2. Confirm the division of work of control of environmental hormones.	In view of increasing international attention on the environmental hormones, our country continues to promote the management plan and safeguard the public health. In 2015, the Environmental Protection Administration convened the relevant ministries to jointly establish the “Environmental Hormones Management Plan (the Second Term)”, which is to summary the yearly implementation results from the previous year and updated work schedules by ministries, as further promotion work basis.	Toxic and Chemical Substances Bureau
2. Strengthen management system, and implement and revise the related regulations	EPA of the Executive Yuan 1. Collect related global control information to environmental hormones substances and propose control	Continue to collect and update the management status of EU, US and Japan and the environmental hormones list, as references for assessment and inclusion into our domestic concerned environmental hormones list.	Toxic and Chemical Substances Bureau

Implementation Method	Tasks	Implementation Results (to be filled)	Executive (Unit)
	analysis and suggestions.		
	2. According to the principle of screening and identification of toxic chemical substances by EPA of the Executive Yuan, study the feasibility of inclusion of the environmental hormone's substances into the publicized controlled toxic chemical substances	On December 20, 2019, completed the revised operating principles for screening and identifying toxic and concerned chemical substances.	Toxic and Chemical Substances Bureau
	3. With focus on the publicized environmental hormones substances that are listed as controlled toxic chemical substances, review their regulations such as prohibition and restriction, and control concentration.	1. On March 5, 2019, decabromodiphenyl ether was revised as a Category I and Category II toxic chemical substance in response to international trends, and the controlled concentration was revised to 1%, and the mass operation criteria was 50 kg. The prohibited operations and possible uses were also added. (Toxic and Chemical Substances Bureau) 2. It was publicized on July 5, 2019 that the management of mercury toxic chemicals was revised in the Appendix Table 2 "Prohibited Operations" of the "Toxic Chemical Substances and Their Operation Management", and added that mercury is prohibited to be used in the manufacture of batteries, switches and relays, fluorescent lamps, high-pressure mercury	Toxic and Chemical Substances Bureau Toxic and Chemical Substances Bureau

Implementation Method	Tasks	Implementation Results (to be filled)	Executive (Unit)
		lamps and non-electronic measurement instruments, with the exclusions of the regulations in the convention, effective January 1, 2021, In addition, in conjunction with the amendments to Table 2, Table 3 “Permitted Uses” was slightly revised accordingly. In addition, mercury-containing products for the manufacture of calibration instruments or reference standards were added.	
		3. In 2019, the government completed the data collection and compilation of the latest control information of the Stockholm Convention, studied and proposed the revised uses of PFOS, and revised the Chinese and English names of tetrabromodiphenyl ether, and added the CAS registration numbers of tetrabromodiphenyl ether and pentabromo diphenyl ether to comply with the Convention.	Toxic and Chemical Substances Bureau
	4. According to the regulations of prohibition and restriction on environmental hormones substances by each competent authority, revise the specifications of environment friendly labeled products on a rolling basis.	The addition (revision) of specifications of environment friendly labeled products already listed environmental hormones substances as assessment items. In 2019, the labels and specifications for 12 environment-friendly products were added (revised), including two-stage water-saving toilets, original toner cartridges, monitors, computer servers, notebook computers, desktop PCs, ink cartridges, recycled toner cartridges, printers, image output devices, small cars, motorcycles, among which the definitions of polybrominated	Committees for Legal Affairs, Petitions and Appeals, Public Nuisance Arbitration

Implementation Method	Tasks	Implementation Results (to be filled)	Executive (Unit)
		biphenyls and polybrominated diphenyl ethers were added for printers and image output devices. The control values and the product items have not been changed. The remaining items do not include the revision for environmental hormones substances.	
	5.Study feasibility of inclusion of environmental hormones substances into control standards.	<p>1.Emission control measures for dioxin and furan</p> <p>(1)To strengthen dioxin emission control, release the "Dioxin Control and Emission Standards for Waste Incinerators", and the "Dioxin Control and Emission Standards for Small and Medium-sized Waste Incinerators" , and the "Dioxin Control and Emission Standards for Electric Arc Furnace in Steelmaking Industry", and the "Dioxin Control and Emission Standards for Sintering Plants in Iron and Steel industry", and the "Dioxin Control and Emission Standards for High-Temperature Smelting Facilities in Iron and Steel Industry", and the "Dioxin Emission Standards for Stationary Sources of Pollution" to put all fixed sources of pollution of dioxin and furan emission under control.</p> <p>(2)The control measures for dioxin and furan mainly focus on strengthening the inspection and tests of pollution sources and implementing regulatory</p>	Department of Air Quality Protection and Noise Control

Implementation Method	Tasks	Implementation Results (to be filled)	Executive (Unit)
		<p>control, in accordance with the domestic emissions inventory and ambient air monitoring, to understand domestic emissions and air quality status and trends, as a reference for reviewing future control direction.</p> <p>2. In 2019, we completed domestic status investigation, foreign standard data collection, and industry interview, and based on control technology and emission status, planned for the revision draft of the air pollutant emission standards for cement industry with the industrial inputs.</p> <p>3. We have included dioxin and furan in drinking water quality control standard and conducted water quality sampling and testing every year. In addition, based on the “collection list” in the screening operation process for including DMP, BBP, DNOP, nonylphenol and bisphenol A into drinking water quality control standard, we included DEP in “preliminary collection list”, and DBP in “observation list”, and DEHP in “candidate list”, and continued domestic water quality testing and assessment.</p> <p>4. In 2019, we publicized new pollution sites under control of lead, cadmium, mercury, 2, 1, 0 case, and dismissed control for 4, 5, 2 cases, and sites without dioxin and polychlorinated biphenyls and their dismissal notice.</p> <p>5. To strengthen control the discharged waste water containing dioxin, on April 29,</p>	<p>Department of Air Quality Protection and Noise Control</p> <p>Department of Environmental Sanitization and Toxic Substance Management</p> <p>Soil and Groundwater Remediation Fund Management Board</p> <p>Department of Water Quality Protection</p>

Implementation Method	Tasks	Implementation Results (to be filled)	Executive (Unit)
		<p>2019, we revised “discharged water standard”, revising the applicable conditions for waste incineration facilities, not limited to the waste treatment to generate and discharge waste water to waste water treatment facilities. Besides, considering industry classification by Water Pollution Control Law and definition of new steam suppliers, and the wet treatment for waste gas from the steam generation process by the industry, we established the dioxin standard to the applicable items that the generated waste water contains dioxin.</p> <p>6. In compliance with the Minamata Convention on Mercury, a seminar on the drafted restrictions on imported mercury-containing products was held on September 23, 2019. On February 3, 2020, the drafted “restriction on imported mercury-containing products” has been publicized and it was stipulated that from January 1, 2021, it is prohibited to import mercury-containing switches and relays, high-pressure mercury lamps for general lighting, and non-electronic measurement instruments (barometers, hygrometers, pressure gauges, thermometers and sphygmomanometers, etc.) to strengthen domestic mercury management.</p>	Department of Waste Management
	6. Add and revise environmental test standard methods, increase environmental test technical capability and ensure national testing data quality	1. Revise sampling method of dioxin and furan in water (NIEA W790.51B) (November 20, 2019 EPA Testing No. 1080006959 Publication), which is applicable to the sampling and testing of dioxin and furan in drinking water, drinking water source, surface water, groundwater and discharged water.	Environmental Analysis Laboratory

Implementation Method	Tasks	Implementation Results (to be filled)	Executive (Unit)
		<p>2. In May 21, 2019, we revised and publicized the detection method of metals and trace elements by water-inductively coupled plasma atomic emission spectrometry (NIEA W311.54C), with revised contents including : applicable range, interference, reagents, sampling and storage, and procedures and quality control etc., to strengthen data quality.</p> <p>3. On May 23, 2019, we revised and publicized the detection method of metals and trace elements by water-inductively coupled plasma mass spectrometry (NIEA W313.54B), with revised contents including: applicable range, interference, reagents, sampling and storage, and procedures and quality.</p>	<p>Environmental Analysis Laboratory</p> <p>Environmental Analysis Laboratory</p>
	<p>Ministry of Economic Affairs</p> <p>Continue to collect the test standards and regulatory information for environmental hormones substances from the advanced countries such as EU, US and Japan, and review addition and revision of related CNS national standards regarding environmental hormones substances on a rolling basis and assess, plan and publicize the inclusion into test items.</p>	<p>1. Review and revise CNS National Standards regarding environmental hormones substances on a rolling basis.</p> <p>(1) Revise CNS 691 “Fluorescent tube (for general lighting)” and add the regulation on mercury content.</p> <p>(2) Revise CNS 15047 “incense products” and CNS 15095 “gold and silver joss paper” and add the regulation of mercury content and revise the limits of lead and cadmium.</p> <p>(3) Establish CNS 16095 “child care products — public diaper changing table”, and include the regulation of lead content.</p> <p>(4) Establish CNS 16116</p>	<p>Bureau of Standards, Metrology, and Inspection</p>

Implementation Method	Tasks	Implementation Results (to be filled)	Executive (Unit)
		<p>“Children’s beds and children bed mats”, to include the content specification of lead, cadimium, and mercury.</p> <p>(5) Revise CNS 15290 “Textile safety regulations (general requirements)” and add PFOS content regulation.</p> <p>(6) Plan “automatic data processing system monitor”, head-mounted display for automatic data processing system, monitors, head-mounted display, revised “Television” product inspection standards, new CNS 15598-1 standard to include the mercury content limit for cold cathode fluorescent tubes and electrodeless fluorescent tubes for electronic display, which will be publicized along with revision of the inspection standards in the end of 2020.</p> <p>2. Assess, plan and publicize the national standards to include environmental hormones substances into the required testing items.</p> <p>(1) In 2019, publicize the revised the electrical and electronic products that require testing such as wireless charger and electronic toilet seat, and add in section 5 of CNS 15663 the required label for products to contain the restricted substances (lead, mercury, cadimium, hexavalent chromium, polybrominated biphenyls and polybrominated diphenyl</p>	Bureau of Standards, Metrology and Inspection

Implementation Method	Tasks	Implementation Results (to be filled)	Executive (Unit)
	<p>Ministry of Health and Welfare</p> <p>1. Continue to review “pesticide residue tolerance standards” for foods and publicize the banned or restricted pesticides by agricultural administration agencies, delete and revise the regulation on tolerance standards.</p> <p>2. According to international trend, continue to review the hygiene standards for all kinds of foods, food wares, and food containers or packaging.</p> <p>3. Continue to collect and analyze domestic and foreign health risk management information regarding environmental hormones</p>	<p>ether).</p> <p>(2) In 2019, preannounce the establishment of the “required test regulations on children beds and foldable children beds”, and the test includes specific element migration (including lead, cadimium, mercury).</p> <p>On November 6, 2019, “pesticide residue tolerance standard for animal products” was revised and added “Methomyl” to the standard of residual tolerance of bee pollen (0.1 ppm).</p> <p>On August 15, 2019, Health Standards for Contaminants and Toxins in Foods was publicized, along with 7 standards for general foods health standards, and 12 egg products health standards were revoked, with the same parts deleted.</p> <p>In 2019, one article “Evidences of influences of environmental plasticizers on health” was collected, to review the exposure pathways, metabolic pathways, and health effects of different phthalate esters (PAEs).</p>	<p>Food and Drug Administration</p> <p>Food and Drug Administration</p> <p>Health Promotion Administration</p>

Implementation Method	Tasks	Implementation Results (to be filled)	Executive (Unit)
	<p>substances.</p> <p>the Executive Yuan Council of Agriculture</p> <p>1.Pesticide part : Based on domestic watch list of environmental hormones, screen the pesticide products and commission experts and scholars to conduct safety assessment of pesticides with respect to environmental and ecological risks, and review the control measures.</p> <p>2.Animal drugs part : based on suspected list of environmental hormones</p>	<p>1.Continue to implement control measures over the newly registered suspected pesticides containing environmental hormones, including tests of toxicological and environmental impact.</p> <p>2.Hold expert review meetings on a random basis (pesticide advisory meeting), conduct environmental and ecological safety assessment. Only those without concerns after assessment can be registered and put in market.</p> <p>3.With focus on domestic use of glyphosate and international risk assessment results, the re-assessment was conducted, and on May 15 and October 14, 2019, two-stage assessment report was completed and released on the website of “Pesticide information service net/ open information”, for the public reference. According to the assessment results, the current approved range and use method do not cause exposure risk to human health and environmental safety, but the pesticides are used in a large quantity, we will continue to watch for the domestic exposure risk.</p> <p>NA</p>	<p>Bureau of Animal and Health Plant Health Inspection and Quarantine</p> <p>Bureau of Animal and Health Plant Health Inspection and Quarantine</p> <p>Bureau of Animal and Health Plant Health Inspection and Quarantine</p> <p>Bureau of Animal and Health Plant Health Inspection and</p>

Implementation Method	Tasks	Implementation Results (to be filled)	Executive (Unit)
	<p>substances from US, Jaan and EU, screen the animal drugs containing approved ingredients, and collect domestic and foreign scientific reports, and study and evaluate the safety of using the drugs.</p> <p>3.Livestock feeds part : review and revise the prohibited substances in livestock feeds and livestock feeds additives, and registration and management regulations.</p> <p>Ministry of the Interior</p> <p>Continue to review the regulation of usage of green building materials, to expand the application of green building materials.</p> <p>Ministry of Finance</p> <p>Jointly revise the related health regulations and standards for wines and liquors with Ministry of Health and Welfare</p>	<p>1.“Criteria of identification of residual pesticides in livestock feeds” was reviewed and found no need of revision.</p> <p>2.Continue to collect the international information regarding environmental hormones substances, and if necessary, revise the current items, and if necessary, revise the registration management regulatory of prohibited ingredients in livestock feeds and livestock feeds additives.</p> <p>On August 19, 2019, the revised Article 321 of building design and construction of “Building technical specifications” was publicized, to increase the percentage of green building materials (from 45% to 60%), and implemented on January 1, 2021.</p> <p>In 2019, the health-related regulations and standards for wines and liquors were not revised.</p>	<p>Quarantine</p> <p>Department of Animal Industry</p> <p>Department of Animal Industry</p> <p>Construction and Planning Agency</p> <p>National Treasury Administration</p>

Implementation Method	Tasks	Implementation Results (to be filled)	Executive (Unit)
	<p>2. Conduct the environmental distribution investigation for river sediments and fish body in key domestic rivers.</p>	<p>fountain, 9 drinking water dispensers, 2 storage type electric water heaters, 2 biodegradable plastic products, 3 medicine infusion containers, 13 non-kiln-fired resource building materials, 4 plastic pipe products, 6 electric motorcycles, 4 mattresses, 5 transformers for power distribution, 1 low voltage bus ; the inspection items include heavy metals such as lead, cadmium, hexavalent chromium in formaldehyde products, formaldehyde for textiles, phthalates (DEHP, DNOP, BBP, DINP, DIDP, DEP, DMP, DBP), azo dyes for color toners, plastic products and plastic parts in products, and the heavy metals such as lead, hexavalent chromium in coatings and formaldehyde in cleaning products ...etc. The test result found the lead content in one plastic original carbon cartridge did not meet the control limit in product specification, and the environment friendly label of product was revoked.</p> <p>1. The sampling and analysis of the river sediments and fish body from 15 rivers, Nankan Creek, Touqian Creek, Kaya Creek, Zhonggang Creek, Houlong Creek, Da'an Creek, Wuxi, Beigang Creek, Puzi Creek, Yanyan Creek, Erren Creek, Dianbao Creek, Donggang Creek, Lanyang Creek and Xincheng Creek was completed. The tests included hexachlorobutadiene (HCB), short-chain chlorinated paraffin (SCCPs), nonylphenol</p>	<p>Toxic and Chemical Substances Bureau</p>

Implementation Method	Tasks	Implementation Results (to be filled)	Executive (Unit)
		<p>(NP) and bisphenol A (BPA), phthalates (DEHP, DNOP, BBP, DINP, DIDP, DEP, DMP, DBP, DIBP), polybrominated diphenyl ether (PBDEs) and hexabromobiphenyls (HBBs), PAHs, heavy metals (lead, cadmium) and methyl mercury in 7 categories and 92 substances, and obtained 15, 180 pieces of testing data. The result found a decreasing trend for many chemical substances, indicating control measure helping reduce environmental concentration.</p> <p>2. In 2019, from 30 monitoring sites in Kaohuiung and Pingdong area, the concentrations of DDT, hexaoxybenzene, dioxin and furan, dioxin type polychlorinated biphenyls, tetrabromodiphenyl ether and pentabromodiphenyl ether, hexabromodiphenyl ether and heptabromodiphenyl ether of the river sediments in irrigation ditches were tested, and it was found that the distribution range of dioxin and the total toxic equivalent in the river sediment was 0.006 -6.52 (average 0.908) ng I-TEQ/kg d.w., and the distribution range of total toxic equivalent of dioxin type polychlorinated biphenyls was 0.00003 - 0.696 ng WHO-TEQ/kg d.w., while other concentration range was 0.000146-29.1 µg/kg d.w.</p> <p>3. In 2019, the investigation of concentrations of pesticides in the river sediments, like POPs (including DDT,</p>	<p>Environmental Analysis Laboratory</p> <p>Soil and Groundwater Remediation Fund</p>

Implementation Method	Tasks	Implementation Results (to be filled)	Executive (Unit)
		hexaoxybenzene etc.) and its derivatives, dioxin and furan, polychlorinated biphenyls, heavy metals (lead, cadmium, mercury), polycyclic aromatic hydrocarbons (Benzene(a) Pyrene) and phthalates (including DEHP, DBP, DEP, BBP) was conducted and it was found that only few samples had concentration exceeding river sediments quality index lower limit or upper limit, and all others met the specification.	Management Board
	3. Conduct environmental water body investigation.	<p>1. The concentration ranges for perfluorooctanoic acid and PFOS in Sanye Palace Creek, Nankan Creek, Salt Water Creek, Taliaokeng Creek were ND (MDL=1.48 ng/L)~118 ng/L and ND(MDL=1.94 ng/L)~3,904 ng/L, respectively.</p> <p>2. In 2019, the investigation of perfluoride in groundwater of optoelectronic semiconductor and textile industries was conducted, and on-site investigation and interview for 50 optoelectronic semiconductor companies and 4 waste water treatment sites were conducted, with 64 samples of groundwater ; besides sampling and investigation of process water and discharged water from 16 textile companies was conducted with 29 samples of groundwater. The test result of PFOS and perfluorooctanoic acid in groundwater of optoelectronic semiconductor industry was ND~4, 767 ng/L,</p>	<p>Environmental Analysis Laboratory</p> <p>Soil and Groundwater Remediation Fund Management Board</p>

Implementation Method	Tasks	Implementation Results (to be filled)	Executive (Unit)
		0.72~1, 454 ng/L; the test result of PFOS and perfluorooctanoic acid of the textile industry was ND~171 ng/L, perfluorooctanoic acid 1.2~362 ng/L. In addition, the baseline investigation for concerned substances in groundwater was conducted, and the result showed that nonylphenol was found for only one sample (ND~0.00128mg/L), while bisphenol A was not found.	
	4. Conduct related tests of environmental hormones in domestic drinking water.	<p>1. In 2019, 400 random samples from domestic municipal water supply system were taken for bis(2-ethylhexyl) phthalate (DEHP), dimethyl phthalate (DMP), diethyl phthalate (DEP), butyl benzyl phthalate (BBP), dioctyl phthalate (DNOP), nonylphenol and bisphenol A, and all were ND, besides, 3 random samples of dioxin and furan from domestic municipal water supply system, concentration range was ND~0.006 pg-WHO-TEQ/L, and 2,099 samples of lead, concentration range was ND~0.0006 mg/L, 1,306 samples of cadmium, concentration range was ND~0.00003 mg/L, 641 samples of mercury, concentration range was ND~0.0001 mg/L, and all the results met drinking water quality standard.</p> <p>2. In 2019, clear water samples from 50 locations of water purification plant were tested for PFOA and PFOS, and PFOS was found in 1 location, with</p>	<p>Department of Environmental Sanitization and Toxic Substance Management</p> <p>Department of Environmental Sanitization and Toxic Substance</p>

Implementation Method	Tasks	Implementation Results (to be filled)	Executive (Unit)
		<p>concentration at 87 ng/L, while other 49 locations were ND (method detection limit 1.2 ng/L), and PFOA was found in 3 locations, with concentration at 13, 9, 10 ng/L, respectively, while other 47 locations were ND (method detection limit 1.7 ng/L).</p> <p>3. NA</p>	<p>Management</p> <p>Environmental Analysis Laboratory</p>
	5. Conduct indoor air quality test.	In 2019 Chenggong University was commissioned to conduct investigation of sources of indoor VOC, suspending particles and environmental hormones and prediction of health risk and suggested values, and the test of DEHP concentration in indoor air found present DEHP concentration in most world indoor air (including domestic indoor environment) is lower than 1 µg/m ³ .	Department of Air Quality Protection and Noise Control
	6. Conduct monitoring of environmental air quality.	For the monitoring result for dioxin in environmental air, in the 1~4 seasons of 2019, the season-average concentration was 0.021 pg I-TEQ/m ³ , all far below currently only world standard from Japan “environmental dioxin air quality standard value” 0.6 pg WHO ₂₀₀₅ -TEQ/m ³ . Besides, the result of monitoring lead, cadmium, mercury in environmental air, in 2019 (May and October), showed the average concentration at 20.01 ng/m ³ , 0.879 ng/m ³ , and 2.536 ng/m ³ , respectively.	Department of Air Quality Protection and Noise Control
	7. Handle emission investigation,	1. The domestic statistics of domestic emission of dioxin	Department of Air Quality

Implementation Method	Tasks	Implementation Results (to be filled)	Executive (Unit)
	audits and tests for stationary pollution sources °	<p>and furan showed in recent years the emission was decreasing, and in 2018 the domestic emission was 51.01 g I-TEQ, lower than that in 2002, 327.5 g I-TEQ by 84%.</p> <p>2. Continue to conduct tests of mercury in emission from stationary pollution sources and build emission inventory, monitor, and control mercury emission. In 2018, mercury in atmospheric emission was about 1.606 tons, with the main emission source being power generation and cement kiln.</p> <p>3. According to Air Pollution Control Act, those who do not meet the emission standards will be punished and required to improve within a time limit. The 2019 statistics showed the industry conducted 449 times of regular emission pipeline dioxin test, the environmental protection agencies conducted 90 times of emission pipeline dioxin audit, and there were 5 times of nonconforming, among them there were 3 times from boilers using waste as fuel, 1 time from incinerator of industrial waste, 1 time from large incinerator, which were all notified of penalty and mandatory improvement within time limit by environmental protection agencies.</p> <p>4. Continue to conduct sampling and testing of stationary pollution source dioxin, for total 6 times, and the test result showed 0.005-0.279 ng-TEQ/Nm³, meeting the emission standard of stationary</p>	<p>Protection and Noise Control</p> <p>Department of Air Quality Protection and Noise Control</p> <p>Department of Air Quality Protection and Noise Control</p> <p>Bureau of Environmental Inspection</p>

Implementation Method	Tasks	Implementation Results (to be filled)	Executive (Unit)
		<p>pollution source dioxin 0.5 ng-TEQ/Nm³.</p> <p>5. In 2019 the test results of emission from 24 incineration plants found the maximum mercury concentration was 0.0276 mg/Nm³, lower than the specified mercury concentration 0.05 mg/Nm³, in stationary pollution source air pollution emission standard. The test result of ash stable compounds from 24 domestic incineration plants showed that the maximum mercury concentration was 0.126 mg/L, lower than the specified mercury concentration, 0.2 mg/L, in Article 27 of the General Waste Recycling and Disposal.</p>	Bureau of Environmental Inspection
	8. Conduct tests of environmental hormones in soils.	In 2019, the investigation of domestic soil pollution from persistent organic substances was conducted, with focus on polybrominated diphenyl ether (including tetrabromo to octabromo compounds and decabromodiphenyl ether), dioxin, polychlorinated biphenyls, soil baseline contents of PFOS and PFOA and monitoring of special areas, and found the concentrations of dioxin and polychlorinated biphenyls were below (dioxin : 1, 000 ng I-TEQ/kg, polychlorinated biphenyls : 0.09 mg/kg).	Soil and Groundwater Remediation Fund Management Board
	9. Conduct investigation of industrial discharged water concentration.	1. In 2019, 29 times of total mercury analysis for water from 7 coal-fired power plants and 1 petrochemical company, and among them, only 1 test of industrial discharged water (of	Department of Water Quality Protection

Implementation Method	Tasks	Implementation Results (to be filled)	Executive (Unit)
		<p>all 17 tests) found the concentration 0.0027 mg/L, below the control limit (0.005 mg/L), and all others were below the method detection limit (0.0002 mg/L).</p> <p>2.The investigation result of dioxin and furan in industrial discharged water (10 times) all met the discharged water control limit (10 pg-I-TEQ/L).</p> <p>3.With focus on the possible industries operating with raw materials containing PFOS and perfluorooctanoic acid (printing and finishing, textile and chemical etc.), water quality investigation was conducted, and PFOS in industrial discharged water or controlled water was found below the method detection limit (2.05 ng/L), and PFOA concentration range was ND (method detection limit, 1.30 ng/L)-795 ng/L.</p> <p>4.With two times of sampling industrial discharged water the concentration investigation of nonylphenol, DMP, DEP, DBP, DNOP, DEHP, BBP, lead, cadmium, bisphenol A was conducted and found all results below the method detection limit.</p> <p>5.In 2019, the sampling investigation of process water and discharged water for 50 optoelectronic semiconductor companies and 16 textile companies was conducted. The test results of PFOS and perfluorooctanoic acid in the optoelectronic semiconductor wastewater/discharged water were ND~398 ng/L, ND~194.8</p>	<p>Department of Water Quality Protection</p> <p>Department of Water Quality Protection</p> <p>Department of Water Quality Protection</p> <p>Soil and Groundwater Remediation Fund Management Board</p>

Implementation Method	Tasks	Implementation Results (to be filled)	Executive (Unit)
		<p>ng/L, and the test results of PFOS and perfluorooctanoic acid in textile wastewater/discharged water were ND~18.7 ng/L, 2.9~701 ng/L (method detection limit : both PFOS and PFOA were 1 ng/L).</p> <p>6.In the industrial discharged water near Sanye Palace Creek, Nankan Creek, Salt Water Creek, Taliaokeng Creek, the perfluorooctanoic acid concentration was ND (MDL=1.48 ng/L)~1,427 ng/L, and the PFOS concentration was ND(MDL=1.94 ng/L)~1,267,840 ng/L.</p>	Environmental Analysis Laboratory
	<p>Ministry of Economic Affairs</p> <p>1. Study to include textile products and stationery in the national standards regarding environmental hormones substances, and the feasibility of conducting test.</p>	<p>In 2019, CNS 15290 “Textile Products Safety Regulations (General Requirements)” was revised, to add PFOS content regulation.</p>	Bureau of Standards, Metrology, and Inspection
	<p>2. According to the established annual market sampling and testing plan, assess the testing of market purchased products containing environmental hormones substances.</p>	<p>1.The contents of 8 phthalates plasticizers (DEP, DMP, DEHP, DBP, BBP, DINP, DIDP, DNOP)” and heavy metals (cadimium, lead, mercury) from 60 market purchased products, including 10 wooden brick products, 20 clay toy products, 10 baby walker products and 20 game mat products were analyzed.</p> <p>2.The contents of heavy metals, including cadimium, lead, and</p>	<p>Bureau of Standards, Metrology, and Inspection</p> <p>Bureau of Standards,</p>

Implementation Method	Tasks	Implementation Results (to be filled)	Executive (Unit)
		mercury, from 46 market purchased products, including 11 “travel luggage”, 15 “incense products” and 20 “joss paper money” products, were analyzed.	Metrology, and Inspection
		3. In 2019, the analysis was conducted on 46 random samples of market purchased textile products (including socks, swimsuits, apparels, and sweaters) for organic tin content and on 44 products for NPEO and NP contents.	Bureau of Standards, Metrology, and Inspection
		4. According to CNS 14729 “Test method of pentachlorophenol preservatives in woods”, the contents of pentachlorophenol type preservatives were analyzed for 20 products such as composite wood floor, single layer laminate, common laminate, medium density fiberboard, and decorative composites.	Bureau of Standards, Metrology, and Inspection
	Ministry of Health and Welfare		
	1. Continue audit on labeling of polyvinyl chloride (PVC) medical device products of high exposure risk of plasticizers on a random basis.	In 2019, conduct no audit on PVC medical device products.	Food and Drug Administration
	2. Conduct sampling and analysis of market products.	1. In 2019, risk management analysis for phthalates plasticizers in market fresh food was conducted, and the background data for phthalates plasticizers in market fresh foods was conducted, and the background data investigation was completed for 10	Food and Drug Administration

Implementation Method	Tasks	Implementation Results (to be filled)	Executive (Unit)
		categories and 300 food products. 2.In 2019, the investigation of organochlorine pesticides (including DDT and hexaoxybenzene) in market farm products (5,164 products) was conducted and found all ND. 3.In 2019, the contents of dioxin, furan and dioxin type polychlorinated biphenyls in 97 market food products from Yilan and outlying islands area were analyzed, and the total weight-average concentration was 0.002-0.18 pg WHO ₀₅ -TEQ _{PCDD/F} /g wet weight, 0.0003-0.143 pg WHO ₀₅ -TEQ _{PCB} /g wet weight. 4.In 2019, monitoring of heavy metals in domestic food products continued, with sampling of 102 rice products, 153 aquatic products and 32 algae food products, and except 2 aquatic products had “methyl mercury” content above ”Health Standards for Contaminants and Toxins in Foods” and were subject to regulatory action, all other products met the regulation.	Food and Drug Administration Food and Drug Administration Food and Drug Administration
	the Council of Agriculture of the Executive Yuan 1. Study the inclusion of environmental hormones substances into animal drugs regulations and study testing feasibility.	By authorities and responsibilities, test animal drugs, without testing environmental hormones substances.	Bureau of Animal and Health Plant Health Inspection and Quarantine

Implementation Method	Tasks	Implementation Results (to be filled)	Executive (Unit)
	2. Continue sampling and analysis of agricultural, fishery and livestock products.	<p>1.By authorities and responsibilities, test animal drugs, without testing environmental hormones substances.</p> <p>2.Nonylphenol and bisphenol A in pork products was analyzed, and dioxin in dairy products was analyzed before shipment to market, and all met the standards.</p> <p>3.53 random samples of livestock feeds were tested for residual pesticides, and all met the identification standard of residual pesticides in livestock feeds.</p> <p>4.The contents of mercury, lead and cadmium in mineral fortified livestock feeds were under monitoring and all 51 random samples met “the content standards of heavy metals in the fortified livestock feeds” (mercury below 0.5 ppm, lead below 50 ppm, and cadmium below 10 ppm).</p> <p>5.The monitoring of 47 additives in livestock feeds and livestock feeds was conducted, and the test results for all samples were below the domestic control limits for dioxin, furan and polychlorinated biphenyls in livestock feeds.</p> <p>6.In 2019 “Improve aquatic product quality and safety - monitoring of aquatic products at production site and before market” program was implemented, and the contents of dioxin and polychlorinated biphenyls in 54 products were</p>	<p>Bureau of Animal and Health Plant Health Inspection and Quarantine Department of Animal Industry</p> <p>Department of Animal Industry</p> <p>Department of Animal Industry</p> <p>Department of Animal Industry, Agricultural Chemicals and Toxic Substances Research Institute</p> <p>Fisheries Agency, Agricultural Chemicals and Toxic Substances Research Institute</p>

Implementation Method	Tasks	Implementation Results (to be filled)	Executive (Unit)
		<p>tested, mercury was tested for 2, 310 products (including aquatic products, fishery aquatic products from the offshore and deep seas and oyster farming in the west), and all the test results met the health standards.</p> <p>7. In 2019, with focus on farmland areas of high pollution potential, sampling and monitoring of ground food crops (rice and vegetables and fruits) was conducted to test heavy metals, like cadmium mercury and lead, in 550 samples, and the test results found 10 samples of food crops (rice) had cadmium above the heavy metal standard by the Act Governing Food Safety and Sanitation. The nonconforming products of field crops were destroyed and did not go to the market. Notification was given to environmental protection agencies to expand testing of farmland soil, air, and water, and investigate and cut pollution sources, and prevent reoccurrence or cause extended pollution.</p> <p>8. According to EPA monitoring in many years regarding dioxin from the emission pipelines (chimney) of nonconforming plants and other plants of high pollution potential, the sampling was focused on ground crops. In 2019, the contents of dioxin /furan and polychlorinated biphenyls in 11 random samples of crops were tested, and the results found 2 samples exceeding dioxin EU action control limit</p>	<p>Agriculture and Food Agency, Agricultural Chemicals and Toxic Substances Research Institute</p> <p>Agriculture and Food Agency</p>

Implementation Method	Tasks	Implementation Results (to be filled)	Executive (Unit)
		<p>for vegetables and fruits (0.3 pg WHO₂₀₀₅-TEQ/g d.w.), and the samples of crops were corn and leaf sweat potato, one for each, and the nonconforming products were destroyed.</p> <p>9.To comply with the requirement of health certification for human consumed honey products imported to EU, the residual polychlorinated biphenyls (PCBs) of honey products from bee farms were tested, and in 2019, all 33 random samples were found no residue (detection limit : 0.001 pg WHO₂₀₀₅-TEQ/g d.w.).</p> <p>10.In 2019, 14,587 samples of agricultural products were monitored for the residual pesticides related to environmental hormones substances, and among all 18 samples (6 samples of Carbaryl, 2 samples of Atrazine, 10 samples of Methomyl) failed the test. The nonconforming cases were notified by local governments to the farmers to prohibit their sales and subject to regulatory action of pesticide management regulation.</p>	<p>Agriculture and Food Agency</p> <p>Agriculture and Food Agency</p>
	<p>Ministry of the Interior</p> <p>Conduct audits on green building materials label regarding environmental hormones substances.</p>	<p>1. Green building materials label certification institutes were required to first verify the heavy metals (total mercury, total cadmium, total lead, total arsenic, total hexavalent chromium, total copper, total silver) and phthalates (plasticizers) as environmental hormones substances when conducting audits on green</p>	<p>Architecture and Building Research Institute</p>

Implementation Method	Tasks	Implementation Results (to be filled)	Executive (Unit)
	<p>Ministry of Finance</p> <p>Continue sampling and testing of lead content in wines and liquors.</p>	<p>building materials label. From January 1, 2019 to December 31, 2019, 254 audits of green building materials label were conducted, and the result of heavy metals met the standard, and 3 PVC products were required to test phthalates (plasticizers) by regulation, and the result also met the standard.</p> <p>2.The supervision on quarterly sampling and testing of heavy metals (total mercury, total cadmium, total lead, total arsenic, hexavalent chromium, total copper, total silver) and phthalates (plasticizers) by green building materials label certification institutes was strengthened, and in 2019, 18 samples of heavy metals and phthalates (plasticizers) were completed and the result met the standard,</p> <p>In 2019, 2,209 random samples of wines and liquors were tested, and all met the regulation by Article 3 of the “Alcohol Health Standard”, lead per liter below 0.3 mg.</p>	<p>Architecture and Building Research Institute</p> <p>National Treasury Administration</p>
<p>4. Strengthen risk communication and advocacy</p>	<p>EPA of the Executive Yuan</p> <p>1. By authorities and responsibilities, strengthen advocacy, strengthen the public awareness of environmental hormones substances, and timely and properly</p>	<p>1.Continue to update and maintain the websites of “Persistent Organic Pollutants”, “Minamata Convention on Mercury”, and “Environmental Hormones”, including collection of domestic and foreign reports, updated convention management status and updated foreign list of environmental hormones substances, and at</p>	<p>Toxic and Chemical Substances Bureau</p>

Implementation Method	Tasks	Implementation Results (to be filled)	Executive (Unit)
	communicate with the media and the public and reduce the public concerns.	<p>the same time grasp domestic management status and timely update website information, for the public to keep up with the domestic and foreign management trend and status through websites.</p> <p>2. Build Chem Life on Facebook, with life subjects, to promote the public awareness of environmental hormones.</p> <p>3. Produce the brochure of “Investigation results of environmental distribution of toxic chemical substance” (2009-2019) and publicize it on the website of environmental distribution of chemical substances for the public review.</p> <p>4. In 2019, the government held three environmental hormone seminars, two events of seeded teacher training and two college elite camps to advocate the correct knowledge about environmental hormones to the public.</p>	<p>Toxic and Chemical Substances Bureau</p> <p>Toxic and Chemical Substances Bureau</p> <p>Toxic and Chemical Substances Bureau</p>
	2. Timely release the news of the specifications of environment friendly labeled products on EPA green life information website, for the public review and download.	In 2019, 2 messages were released regarding revised product specifications.	Committees for Legal Affairs, Petitions and Appeals, Public Nuisance Arbitration
	Ministry of Economic Affairs		
	1. Timely publicize the random sampling and	The news release regarding the test results for market purchased wooden brick toys, clay toys,	Bureau of Standards, Metrology, and

Implementation Method	Tasks	Implementation Results (to be filled)	Executive (Unit)
	testing results of environmental hormones substances in products.	baby walkers, travel luggage and game mats was publicized on the website of Bureau of Standards, Metrology, and Inspection of the Ministry of Economic Affairs.	Inspection
	2. Advocate environmental hormones substances.	1.Through the website of “Industrial Green Technology Information” to link to the website of “Environmental Hormones Information”, distribute related information to more than 10, 000 viewers. 2.Through the materials of environmental regulation and technology seminars, advocate environmental hormones in total 373 copies.	Industrial Development Bureau Industrial Development Bureau
	3. Study the pollution prevention assistance and alternative measures regarding environmental hormones substances and provide technical assistance to the industry under restrictions.	1.Use the non-environmental hormones environment-friendly plasticizer (1, 2-cyclohexane dimethyl; DINCH) technology developed by Material and Chemical Research Laboratories, ITRI and through the "Key Chemical Material Chain Gap Project (Pilot Plant Project)" to assist UPC Group to start trial production R&D and mass production. The produced environment friendly plasticizers do not contain phthalates and can replace traditional environmental hormones – phthalate plasticizers. In addition to wide applications in PVA, PVB and PVC as plasticizers, they can also be used in adhesives, dispersants, coatings, inks, food packaging, medical products and children toys etc., to effectively increase the global competitiveness of our petrochemical industry.	Industrial Development Bureau

Implementation Method	Tasks	Implementation Results (to be filled)	Executive (Unit)
		<p>Currently UPC has started a pilot plant of 30,000 tons in Linhai Industrial Zone and started commercial production in the end of 2019.</p> <p>2.The environment friendly fluorine-free water repellent that was independently developed by the Textile Research Institute does not contain any perfluorocarbon octyl (PFOS/PFOA) compounds. It is currently promoted to the textile industry for applications in the process of finishing fabrics. It is expected to replace the use of fluorine-containing water repellents. At present, we continue to assist Zhenxiang Industry, which has invested in producing textile additives and derivative applications; in addition, to meet the needs of the industry, we have customized fluorine-free water repellent for Chongxin Company (product code: WR28), and accelerated the replacement by expanding the use of fluorine-free products With increasing replacement, we will continue to work towards the goal of zero fluorocarbons (PFCs) in the industrial manufacturing process.</p>	Industrial Development Bureau
	<p>Ministry of Health and Welfare</p> <p>1. By authorities and responsibilities, strengthen advocacy, strengthen public awareness of</p>	<p>1.On the website of the Food and Drug Administration, build the risk communication of common endocrine disruptive substances for review and download.</p> <p>2.In 2019, Chenggong University</p>	<p>Food and Drug Administration</p> <p>Health</p>

Implementation Method	Tasks	Implementation Results (to be filled)	Executive (Unit)
	<p>environmental hormones substances, and timely and properly communicate the advocacy with the media and the public, to reduce the public concerns.</p> <p>2. Conduct health risk assessment for domestic diet exposure.</p>	<p>was commissioned to carry out “the Study of Environmental Health Impact on Sensitive Ethnic Groups” project, and provided 100 pregnant women with diet and health advocacy services, and in 2020 continued the previous diet and health advocacy services.</p> <p>Through the national dietary intake database, the food intake and body weight in all age groups from northern Taiwan (Taoyuan, Hsinchu, Yilan) and southern Taiwan (Jiayi, Tainan, Kaohsiung, Pingtung, Penghu) was obtained, and with the toxic equivalent concentration data for dioxin compounds in various foods from Yilan and outlying islands in 2019, the average daily dose (ADD) of all age groups in Yilan and outlying islands was estimated, and then the average daily dose was used to estimate the life-time average daily dose (LADD), and they were 0.108 and 0.344 pg WHO-TEQ_{PCDD/F+PCB}/kg BW/day, respectively (LADD were 0.759 and 2.406 pg WHO-TEQ_{PCDD/F+PCB}/kg BW/week, respectively), which met the tolerable daily intake (TDI) by WHO, 1 ~ 4 pg WHO-TEQ_{PCDD/F+PCB}/kg BW/day, and the tolerable weekly intake (TWI) suggested value by European Food Safety Authority (EFSA), 2 pg WHO-TEQ_{PCDD/F+PCB}/kg BW/week.</p>	<p>Promotion Administration</p> <p>Food and Drug Administration</p>
	Council of Agriculture of the		

Implementation Method	Tasks	Implementation Results (to be filled)	Executive (Unit)
	<p>Executive Yuan</p> <p>By authorities and responsibilities, strengthen advocacy and public awareness of environmental hormones substances, timely and proper communication and advocacy with media and the public, to reduce public concerns.</p>	<p>1.Municipal and county (city) governments sent people to 172 conferences by animal husbandry industry with animal drug companies to promote advocacy and education. There were 7,441 attendees. The key points of advocacy included purchase of legal animal drugs and correct use of animal drugs, prohibition of human drugs, pharmaceutical intermediates and unapproved animal drugs.</p> <p>2.In 2019, 200 events of education advocacy on crop pest control and safe and reasonable use of pesticides were held by the trial and improvement fields and local governments .</p> <p>3.Carry out related seminars of aquatic product education training and advocacy.</p> <p>(1)2 events of promotion education and training courses for sales and marketing of aquatic products were held for 81 attendees ; 3 events of education training seminars of fishery and aquatic products exported to EU were held for 91 attendees.</p> <p>(2)Through magazines, advocacy of legal and correct use of animal drugs for aquaculture industry was conducted, and “to maintain the safety of farmed aquatic products - please use animal drugs correctly in accordance with the prescription of the veterinarian” has been advertised for 10 times.</p>	<p>Bureau of Animal and Health Plant Health Inspection and Quarantine</p> <p>Bureau of Animal and Health Plant Health Inspection and Quarantine Fisheries Agency</p>

Implementation Method	Tasks	Implementation Results (to be filled)	Executive (Unit)
		<p>(3)On fish farm sites, 16 events of “aquatic animal disease control and correct drug use” seminars for about 1,626 attendees were held, and there were on-site aquatic veterinarians, to offer treatment of aquatic diseases and correct drug use knowledge.</p> <p>4.Advocate straw treatment concept to farmers to reduce open burning.</p> <p>(1)To reduce the dioxin pollution problem due to open burning, the Council of Agriculture continued to advocate straw treatment concept to farmers, through news release, digital bulletin board, and other channels such as farmer gathering, and encourage farmers to pick up rice straw, chop it and bury it in the field, and promote the application of organic fertilizer containing straw decomposing bacteria.</p> <p>(2)Agricultural agencies (offices) at all levels continued to advocate and provide various assisting measures. The straw is mainly processed by cutting and burying in soil, and the rest is recycled and reused as raw materials such as bedding, mulch material, cultivation medium, and compost.</p>	Agriculture and Food Agency
	<p>Ministry of the Interior</p> <p>By authorities and responsibilities, strengthen advocacy</p>	1.With 2019 Strengthen Green Building Promotion Program, subsidize local governments in	Construction and Planning Agency

Implementation Method	Tasks	Implementation Results (to be filled)	Executive (Unit)
	<p>and public awareness of environmental hormones substances, timely and proper communication and advocacy with media and the public, to reduce public concerns.</p> <p>Ministry of Education</p> <p>Strengthen and widely spread environmental hormones knowledge advocacy and environmental education.</p>	<p>conducting audits and inspection of green building license, and update inspection and assessment, and advocate the program. In 2019, 40 events of green building advocacy and education seminars were held.</p> <p>2.Strengthen advocacy of green building materials label and continue to update the website of green building materials label and introduce the related requirements of environmental hormones substances for green building materials label. Besides, on June 12, 2019 (Taipei), June 20 (Taichung) and June 28 (Tainan), respectively, 3 “green building materials label system” seminars were held for 366 attendees.</p> <p>In 2019, there were 6 sessions of "School Chemical Substance Management and Report System Operation" (approximately 680 attendees), 4 seminars on "2019 Campus Invasive Species and Plant Diseases and Pests and Black Mosquito Prevention and Control" (over 400 attendees) and "Joint Meeting of College Supervisors on Environment, Safety and Hygiene" (approximately 200 attendees), to promote the types, sources, exposure routes of environmental hormones and plasticizers, the hazards to humans, and the environmental precautions for using RIFA.</p>	<p>Architecture and Building Research Institute</p> <p>Information and Technology Education Department</p>

Appendix 2

Implementation Results regarding Environmental Hormones Substances by Various Ministries in the Past

Implementation Results regarding Environmental Hormones Substances by Various Ministries in the Past

item	chemical substances	related ministry	execution unit	Implementation Results		
				regulatory addition and revision	Environmental monitoring, products and foods sampling	others
1	Nonylphenol and Nonylphenol polyethoxy alcohol	the Environmental Protection Administration	Department of Environmental Sanitization and Toxic Substance Management	Publicize the newly added nonylphenol, nonylphenol polyethoxy alcohol as Class 1 Toxic Chemical Substances, and newly add the prohibition of use in manufacturing household cleaners, and specify their legal uses (2007) Newly add that the use of nonylphenol, nonylphenol polyethoxy alcohol, bisphenol A as plasticizers, is exempt from the regulations by Toxic and Concerned Chemical Substances Control Act, if there is no environmental hazard through curing and under normal use condition (2009). Revise the controlled concentration of nonylphenol, nonylphenol polyethoxy alcohol (2015).	Sampling of market products of household cleaners (2010-2016) Investigation of river environmental distribution (2013-2016) Testing of drinking water (2012-2019)	

item	chemical substances	related ministry	execution unit	Implementation Results		
				regulatory addition and revision	Environmental monitoring, products and foods sampling	others
			Toxic and Chemical Substances Bureau	Since December 28, 2016, the administrative affairs of toxic chemical substances have been transferred to Toxic and Chemical Substances Bureau.	Sampling of market products of household cleaners (2017-2018) Investigation of river environmental distribution (2017-2019)	Update and maintain the website of “Environmental hormones information”, and update and maintain “Chem Life” page on Facebook (2017-2019), and produce booklets of “Chemical Substances in Life” (2018)
			Department of Supervision, Evaluation and Dispute Resolution	Newly add the specification of environment friendly label (2012, 2018)	Sampling and testing of environment friendly products (2012, 2018)	
			Department of Water Quality Protection		Testing of discharged water from petrochemical industry, basic metal industry, chemical industry, paper industry, industrial zone, or scientific industrial zone (2018) Original wastewater and discharged water from metal industry (coking process) and science industrial park (2019)	
			Soil and Groundwater Remediation Fund Management Board		Investigation of groundwater from optoelectronic and textile related industries (2019)	

item	chemical substances	related ministry	execution unit	Implementation Results		
				regulatory addition and revision	Environmental monitoring, products and foods sampling	others
		Ministry of Health and Welfare	Food and Drug Administration	Revise the hygienic standards of detergents for foods (2007-2017) Publicize the prohibited substances in cosmetic products (2019)	Monitoring of detergents for foods (2010) Monitoring of foods (2013-2015)	Complete foods investigation and risk assessment (2016)
			Health Promotion Administration			Collect and compile domestic and foreign data regarding environmental distribution of bisphenol A and nonylphenol (2015)
		Ministry of Economic Affairs	Bureau of Standards, Metrology, and Inspection	Revise or publicize national standards of foods and detergents for foods, synthetic laundry detergents, and textile products (2008-2009, 2013, 2018) Publicize that “children clothes” are required to be tested (2013)	Testing of market samples of laundry detergent powder (liquid), kitchen and toilet cleaners, children clothes and textile products (2011-2012, 2014-2016, 2018-2019)	
		Council of Agriculture	Department of Animal Industry		Testing of pork products (2011-2019)	

item	chemical substances	related ministry	execution unit	Implementation Results		
				regulatory addition and revision	Environmental monitoring, products and foods sampling	others
2	Phthalates	the Environmental Protection Administration	Department of Environmental Sanitization and Toxic Substance Management	<p>Revise and publicize bis(2-ethylhexyl) phthalate, dimethyl phthalate and dibutyl phthalate as class 1 and class 2 toxic chemical substances; newly publicize butyl benzyl phthalate as class 1 and class 2 toxic chemical substances ; newly add and publicize diisononyl phthalate, diisodecyl phthalate and diethyl phthalate as class 1 toxic chemical substances ; newly add and publicize 18 kinds of phthalates (control number 068, serial number from 07 to 24) as class 4 toxic chemical substances (2011)</p> <p>Modify and newly add the prohibition of use of bis(2-ethylhexyl) phthalate, dioctyl phthalate, dibutyl phthalate and butyl benzyl phthalate in manufacturing under 14 children toys and children products (2011), and in 2013 delete, modify and publicize diisobutyl phthalate as class 1 and class 2 toxic chemical substances (2013)</p>	<p>Sampling of children toys (2011-2012)</p> <p>Investigation of river environmental distribution (2010, 2013-2016)</p> <p>Testing of drinking water (2012-2019)</p>	<p>According to common products in daily life, divide authorities and responsibilities, strengthen interministerial coordination and communication (2011)</p> <p>Establish Chinese toxicological data abstracts (2012)</p>

item	chemical substances	related ministry	execution unit	Implementation Results		
				regulatory addition and revision	Environmental monitoring, products and foods sampling	others
			Toxic and Chemical Substances Bureau	Since December 28, the administrative affairs of toxic chemical substances have been transferred to Toxic and Chemical Substances Bureau, which manages the operation of publicized toxic chemical substances plasticizers. Di (2-ethylhexyl) phthalate, diisononyl phthalate, diisodecyl phthalate and diisobutyl phthalate are subject to reporting of emission and their planning, investigation, and market usage.	Investigation of river environmental distribution (2017-2019)	Upgrade and maintenance "Chem Life" page on Facebook (2017-2019) and release the booklets of "Chemical substances in daily life" (2018)
			Department of Air Quality Protection	Include the applicability assessment of indoor air quality standards (2017-2018)	Indoor air phthalate exposure assessment (2012-2017) Testing of DEHP in indoor air (2019)	
			Department of Supervision, Evaluation and Dispute Resolution	Newly add specifications of environment friendly label (2011-2013, 2015-2018)	Random sampling of environment friendly products (2012-2019)	

item	chemical substances	related ministry	execution unit	Implementation Results		
				regulatory addition and revision	Environmental monitoring, products and foods sampling	others
			Department of Water Quality Protection	Revise standards for discharged water (1987-2017) Revise and publicize “Types and limits of hazardous substances prohibited from being discharged into groundwater bodies”(2018)	Testing of discharged water from petrochemical industry, basic metal industry, chemical industry, paper industry, industrial zone, or scientific industrial zone (2018) Testing of original wastewater and discharged water from basic metal industry (coking process) and science industrial park (2019)	
			Soil and Groundwater Remediation Fund Management Board	Establish and publicize “Classification, management and use restriction for river sediments quality index” (2012)	Testing of river sediments in environmental bodies (2014, 2016-2019)	

item	chemical substances	related ministry	execution unit	Implementation Results		
				regulatory addition and revision	Environmental monitoring, products and foods sampling	others
		Ministry of Health and Welfare	Food and Drug Administration	Publicize “Guide for the industry to reduce plasticizers in foods” (2011) Revise and publicize “Health standards for food wares, food containers and packaging” (2010, 2012) Publicize the tolerable daily intake (TDI) reference values for 5 phthalates plasticizers (DEHP, DBP, DINP, BBP, DIDP) (2011) Publicize the related labeling regulations for polyvinyl chloride (PVC) medical devices with exposure risk of bis(2-ethylhexyl) phthalate (DEHP) (2011) Public the prohibited substances in cosmetic products (2019)	Leaching tests and monitoring of food wares (2010-2011) Foods monitoring (2011-2012) Random sampling of medical devices such as infusion set, hemodialysis tube, blood bag, gastrointestinal nutrition catheter (2015-2017) Investigation of background value of DEHP in foods (2018-2019)	
			Health Promotion Administration			Complete collection of one article on “Evidences of influences of environmental plasticizers on health” (2019)

item	chemical substances	related ministry	execution unit	Implementation Results		
				regulatory addition and revision	Environmental monitoring, products and foods sampling	others
		Ministry of Economic Affairs	Bureau of Standards, Metrology, and Inspection	Revise or establish and publicize the testing methods for shoes, stationaries, plastic products, and CNS national specifications for children products, tiles, bicyclesand pacifier clips (2011-2012, 2014-2015, 2018) Revise or publicize that products such as "Children's bicycles", "erasers", "toys", "children highchairs", "children raincoats", "travel luggage", "children bedside guardrails", and "baby walkers" are subject to testing ; publicize that products such as children playground spring rocking equipment, ladder components, slide components and floor mats are subject to voluntary product testing (2011, 2013-2018).	Market purchased sampling and testing of toys, shoes, stationaries, children products, children clothes, and car perfumes (2010-2019)	
		Ministry of the Interior	Architecture and Building Research Institute	Revise “Green Building Materials Interpretation and Evaluation Manual” (2012)	Green building materials label evaluation and audit (2010-2019)	
		Ministry of Finance	National Treasury Administration	Revise “Health standards for wine containers” (2013)		
3	Lead	the Environmental Protection Administration	Toxic and Chemical Substances Bureau	Since December 28, the administrative affairs of toxic chemical substances have been transferred to Toxic and Chemical Substances Bureau.	Investigation of river environmental distribution (2018-2019)	

item	chemical substances	related ministry	execution unit	Implementation Results		
				regulatory addition and revision	Environmental monitoring, products and foods sampling	others
			Department of Environmental Sanitization and Toxic Substance Management		Testing of drinking water(2007-2019)	
			Department of Supervision, Evaluation and Dispute Resolution	Newly add specification of environment friendly label (2011-2018)	Random sampling of environment friendly products (2012-2019)	
			Department of Air Quality Protection		Monitoring of environmental air (2009-2019)	
			Department of Water Quality Protection		Testing of discharged water from petrochemical industry, basic metal industry, chemical industry, paper industry, industrial zone, or scientific industrial zone (2018) Testing of original wastewater and discharged water from metal basic industry (coking process) and science industrial park (2019)	

item	chemical substances	related ministry	execution unit	Implementation Results		
				regulatory addition and revision	Environmental monitoring, products and foods sampling	others
			Soil and Groundwater Remediation Fund Management Board	Revise and publicize “Soil pollution control standards” (2011) Establish and publicize “Classification, management and use restriction for river sediments quality index” (2012) Revise and publicize “Groundwater pollution control standards” (2013)	Testing of river sediments in environmental water bodies (2009-2014, 2016-2019) As of December 31, 2019, 322 sites of lead polluted soil and groundwater were publicized, and 270 sites were improved to be removed from the list of controlled sites.	
			Environmental Analysis Laboratory	Revise and publicize “Method for detecting heavy metals in soil-microwave-assisted aqua regia digestion method” (NIEA S301.61B) (2018) Revise and publicize “Method for detecting heavy metals in soil-aqua regia digestion method” (NIEA S321.65B) (2018) Revise and publicize “Detection method of metals and trace elements in water-inductively coupled plasma atomic emission spectrometry” (W311.54C) (2019) Revise and publicize “Detection method of metals and trace elements in water-inductively coupled plasma mass spectrometry” (W313.54B) (2019)		

item	chemical substances	related ministry	execution unit	Implementation Results		
				regulatory addition and revision	Environmental monitoring, products and foods sampling	others
		Ministry of Health and Welfare	Food and Drug Administration	Establish and publicize “Health standards for natural food colorants” (2011) Establish “Health Standards for Contaminants and Toxins in Foods (2018) Publicize the table of prohibited substances in cosmetic products (2019)	Monitoring of market aquatic products (2010, 2012, 2014-2015) Monitoring of foods (2011-2015) Monitoring of agricultural products (2013-2015)	
			Health Promotion Administration			Commission Chenggong University to carry out the Study of Environmental Health Impact on Sensitive Ethnic Groups, and provide 100 pregnant women with diet and health advocacy services (2019)

item	chemical substances	related ministry	execution unit	Implementation Results		
				regulatory addition and revision	Environmental monitoring, products and foods sampling	others
		Ministry of Economic Affairs	Bureau of Standards, Metrology, and Inspection	<p>Revise, establish and publicize the testing methods for stationaries and plastic products, and CNS national standards for infant and children products, tiles, correction liquids, pacifier clips and incense products (2011-2012, 2014-2015, 2017-2019)</p> <p>Revise or publicize the regulations on required tests for children bicycles, erasers, toys, children high chairs, children raincoats, travel luggage" "children bedside guardrails, mixed paints, and baby walkers; publicize voluntary testing for children playground spring rocking equipment, ladder components, slide components and paving mats (2011, 2013-2018)</p> <p>Publicize that “automatic data processors” and “wireless keyboards” are subject to product testing and required to show the restricted substances on labeling (2015-2019)</p> <p>Preannounce and establish “the required testing regulation for infant beds and folding infant beds” (2019)</p>	Market sampling and testing of toys, children shoes, children products, incense products joss paper money, environment friendly bags, children bedside guardrails, waterbased cement coating, and textile products (2010-2019)	

item	chemical substances	related ministry	execution unit	Implementation Results		
				regulatory addition and revision	Environmental monitoring, products and foods sampling	others
		Council of Agriculture	Agriculture and Food Agency		Monitoring of heavy metals pollution in crops (2011-2019)	
			Department of Animal Industry		Monitoring of mineral fortified livestock feeds (2018-2019)	
		Ministry of the Interior	Architecture and Building Research Institute		Evaluation and auditing of green building materials label (2010-2019)	
		Ministry of Finance	National Treasury Administration	Jointly revise and publicize with the Ministry of Health and Welfare "Alcohol Health Standard" (2013, 2016)	Random sampling of lead in wines and liquors (2010-2019)	
4	Cadimium	the Environmental Protection Administration	Toxic and Chemical Substances Bureau	Since December 28, the administrative affairs of toxic chemical substances have been transferred to Toxic and Chemical Substances Bureau.	Investigation of river environmental distribution (2018-2019)	
			Department of Environmental Sanitization and Toxic Substance Management		Testing of drinking water(2007-2019)	
			Department of Supervision, Evaluation and Dispute Resolution	Newly add specifications of environment friendly label (2011-2018)	Random sampling of environment friendly products (2012-2018)	
			Department of Air Quality Protection		Monitoring of environmental air (2009-2019)	

item	chemical substances	related ministry	execution unit	Implementation Results		
				regulatory addition and revision	Environmental monitoring, products and foods sampling	others
			Department of Waste Management	Restrict the manufacture, import and sale of dry batteries(2015)	Random testing of market batteries (2016-2019)	
			Department of Water Quality Protection		Testing of discharged water from petrochemical industry, basic metal industry, chemical industry, paper industry, industrial zone, or scientific industrial zone (2018) Testing of original wastewater and discharged water from basic metal industry (coking process) and science industrial park (2019)	
			Soil and Groundwater Remediation Fund Management Board	Revise and publicize “Soil pollution control standards” (2011) Establish and publicize “Classification, management and use restriction for river sediments quality index” (2012) Revise and publicize “Groundwater pollution control standards” (2013)	Testing of river sediments in environmental water bodies (2009-2014, 2016-2019) As of December 31, 2019, 617 sites of cadmium polluted soil and groundwater were publicized, and 495 sites were improved to be removed from the list of controlled sites.	

item	chemical substances	related ministry	execution unit	Implementation Results		
				regulatory addition and revision	Environmental monitoring, products and foods sampling	others
			Environmental Analysis Laboratory	<p>Revise and publicize” Method for detecting heavy metals in soil-microwave-assisted aqua regia digestion method” (NIEA S301.61B) (2018)</p> <p>Revise and publicize” Method for detecting heavy metals in soil-aqua regia digestion method” (NIEA S321.65B) (2018)</p> <p>Revise and publicize “Detection method of metals and trace elements in water-inductively coupled plasma atomic emission spectrometry (W311.54C)” (2019)</p> <p>Revise and publicize “Detection method of metals and trace elements in water-inductively coupled plasma mass spectrometry (W313.54B)” (2019)</p>		
		Ministry of Health and Welfare	Food and Drug Administration	<p>Establish “Health Standards for Contaminants and Toxins in Foods” (2018)</p> <p>Publicize the table of prohibited substances in cosmetic products (2019)</p>	<p>Monitoring of market aquatic products (2010, 2012, 2014-2015)</p> <p>Monitoring of foods(2011-2015)</p> <p>Agriculture product monitoring(2013-2015)</p>	

item	chemical substances	related ministry	execution unit	Implementation Results		
				regulatory addition and revision	Environmental monitoring, products and foods sampling	others
		Ministry of Economic Affairs	Bureau of Standards, Metrology, and Inspection	<p>Revise, establish and publicize the CNS national standards for stationaries, plastic products, infant and children products, tiles, correction liquid, pacifier clips, incense products (2011-2012, 2014-2015, 2017-2019)</p> <p>Revise or publicize the regulations of required testing for “children bicycles”, “erasers”, “toys”, “children high chairs”, “children raincoats”, “travel luggage”, “children beside guardrails” “mixed paints”, “baby walkers” and publicize that “children raincoats”, “travel luggage”, “children beside guardrails” “mixed paints”, “baby walkers” ; publicize “children playground spring and rocking equipment”, “ladder components”, and “slide components and game mats” are subject voluntary product testing (2011, 2013-2018)</p> <p>Publicize that 277 products of “automatic data processors” and “wireless keyboards” are subject to product testing and required to show the restricted substances on labeling (2015-2019)</p> <p>Preannounce the related required testing of children beds and folding children beds 2019)</p>	Market purchased sampling and testing of toys, children shoes, children products, incense products joss paper money, environment friendly bags, children bedside guardrails, waterbased cement coatings and textile products (2010-2019)	

item	chemical substances	related ministry	execution unit	Implementation Results		
				regulatory addition and revision	Environmental monitoring, products and foods sampling	others
		Council of Agriculture	Agriculture and Food Agency		Monitoring of heavy metals pollution in crops (2011-2019)	
			Department of Animal Industry		Monitoring of mineral fortified livestock feeds (2018-2019)	
		Ministry of the Interior	Architecture and Building Research Institute		Evaluation and auditing of green building materials label (2010-2019)	
5	Mercury	the Environmental Protection Administration	Department of Environmental Sanitization and Toxic Substance Management	Add that mercury is prohibited in industrial catalysts; delete the use of mercury in industrial catalysts (2009)	Investigation of river environmental distribution (2010) Testing of drinking water(2007-2019)	

item	chemical substances	related ministry	execution unit	Implementation Results		
				regulatory addition and revision	Environmental monitoring, products and foods sampling	others
			Toxic and Chemical Substances Bureau	Since December 28, 2016, the administrative affairs of toxic chemical substances have been transferred to Toxic and Chemical Substances Bureau. The management of mercury toxic chemicals was revised and publicized, and in the Appendix Table 2 "Prohibited Operations" of the "Toxic Chemical Substances and Their Operation Management", prohibited operations were added, excluding the exemptions under the convention. In addition, in conjunction with the amendment to Table 2, Table 3 "Permitted Uses" was slightly revised accordingly. In addition, mercury-containing products for the manufacture of calibration instruments or reference standards were added. (2019)	Investigation of river environmental distribution (2018-2019)	Update and maintain the website of "Minamata Convention on Mercury" (2017-2019) Update and maintain the page of "Chem Life" on Facebook (2017-2019) and produce the booklets of "Chemical substances in daily life" (2018)
			Department of Air Quality Protection	Revise "Air pollutant emission standards for electric facilities", and newly add "mercury emission control limit" (2014.12.1)	Monitoring of environmental air (2009-2019) Testing of emission from stationary pollution sources and establishment of emission inventory (2005-2018) Testing of emission gases from Rotary Kiln in Cement Plant (2019)	

item	chemical substances	related ministry	execution unit	Implementation Results		
				regulatory addition and revision	Environmental monitoring, products and foods sampling	others
			Bureau of Environmental Inspection		Testing of emission gases and fly ashes from incineration plants (2016-2019)	
			Department of Supervision, Evaluation and Dispute Resolution	Newly add specifications of environment friendly label (2011-2018)	Random sampling of environment friendly products (2012-2018)	
			Department of Waste Management	Restrict the manufacture, import and sale of dry batteries (2006, 2007, 2008, 2015) Restrict mercury body temperature thermometer from import and sales (2008)	Random testing of market batteries (2005-2019) Auditing of the import and sales of mercury body temperature thermometer (2017-2019)	

item	chemical substances	related ministry	execution unit	Implementation Results		
				regulatory addition and revision	Environmental monitoring, products and foods sampling	others
			Department of Water Quality Protection	<p>Revise the standards for discharged water (2017)</p> <p>Revise “Water pollution prevention and control measures and inspection and reporting management measures” (2017)</p> <p>Revise “Marine environmental classification and marine environmental quality standards” (In February 2018, it was decided that the administrative affairs of marine water quality would be transferred to the Ocean Affairs Council of the Ocean Conservation Administration, starting April 28, 2018)</p> <p>Revise “Water quality standards for water injected into groundwater and types and limits of hazardous substances” and change its name to “Types and limits of hazardous substances prohibited from being injected into groundwater bodies”, To comply with “Water pollution control act”, wastewater (sewage) is completely prohibited from discharging into groundwater bodies, so the water quality regulations and the applicable substances are deleted. (2018)</p>	<p>Testing of discharged water from power plants, petrochemical industry, basic metal industry, chemical industry, paper industry, industrial zone, or scientific industrial zone (2018)</p> <p>Testing of original wastewater and discharged water from power plants and petrochemical industry (2019)</p>	

item	chemical substances	related ministry	execution unit	Implementation Results		
				regulatory addition and revision	Environmental monitoring, products and foods sampling	others
			Soil and Groundwater Remediation Fund Management Board	Revise and publicize “Soil pollution prevention act” (2011) Establish and publicize “Classification, management, and use restriction for river sediments quality index” (2012) Revise and publicize “Groundwater pollution control standards” (2013)	Testing of river sediments in environmental water bodies (2009-2019) Testing of methyl mercury in river sediments from environmental water bodies (2015) As of December 31, 2019, 31 sites of mercury polluted soil and groundwater were publicized, and 16 sites were improved to be removed from the list of controlled sites.	

item	chemical substances	related ministry	execution unit	Implementation Results		
				regulatory addition and revision	Environmental monitoring, products and foods sampling	others
			Environmental Analysis Laboratory	Revise and publicize “Method for detecting heavy metals in soil-microwave-assisted aqua regia digestion method” (NIEA S301.61B) (2018) Revise and publicize “Method for detecting heavy metals in soil-aqua regia digestion method” (NIEA S321.65B) (2018) Revise and publicize “Detection method of metals and trace elements in water-inductively coupled plasma atomic emission spectrometry (W311.54C)” (2019) Revise and publicize “Detection method of metals and trace elements in water-inductively coupled plasma mass spectrometry (W313.54B)” (2019)		
		Ministry of Health and Welfare	Food and Drug Administration	Establish “Health Standards for Contaminants and Toxins in Foods” (2018) Publicize the table of prohibited substances in cosmetic products (2019)	Monitoring of market aquatic products (2010, 2012, 2014-2015, 2018) Monitoring of foods (2011-2015, 2017-2019)	
			Health Promotion Administration			Edit reference materials for health education of mercury pollution (2014)

item	chemical substances	related ministry	execution unit	Implementation Results		
				regulatory addition and revision	Environmental monitoring, products and foods sampling	others
		Ministry of Economic Affairs	Bureau of Standards, Metrology, and Inspection	<p>Revise, establish and publicize the testing methods for stationaries and plastic products, and the CNS national standards for infant and children products, tiles, correction liquid, fluorescent tubes, pacifier clips and incense products (2011-2012, 2014-2015, 2017-2019)</p> <p>Revise or publicize the regulations of required testing for “children bicycles”, “erasers”, “toys”, “children high chairs”, “children raincoats”, “travel luggage”, “children beside guardrails” “mixed paints”, “baby walkers” ; and publicize that “children playground spring and rocking equipment”, “ladder components” and “slide components and game mats” are subject to voluntary product testing (2011, 2013-2018)</p> <p>Publicize that 277 products of “automatic data processors” and “wireless keyboards” are subject to product testing and required to show the restricted substances on labeling (2015-2019)</p> <p>Preannounce the establishment of the related regulations of required testing of infant and children beds and children folding beds.</p>	Market purchased sampling and testing of toys, children shoes, children products, children beside guardrails, waterbased cement coatings (2010-2019)	

item	chemical substances	related ministry	execution unit	Implementation Results		
				regulatory addition and revision	Environmental monitoring, products and foods sampling	others
		Council of Agriculture	Agriculture and Food Agency		Monitoring of heavy metals pollution in crops (2011-2019)	
			Fisheries Agency		Monitoring of aquatic products before market (2011-2019)	
			Department of Animal Industry		Monitoring of mineral fortified livestock feeds (2018-2019)	
		Ministry of the Interior	Architecture and Building Research Institute		Evaluation and auditing of green building materials label (2010-2019)	
6	Polybrominated diphenyl ether	the Environmental Protection Administration	Department of Environmental Sanitization and Toxic Substance Management	Revise the prohibited matters of polybrominated diphenyl ether type substances (control number 091, serial number from 02 to 08), add “Those flame retardants prohibited in electronic products since January 1, 2016, but with obtained registration or approval document for the use of polybrominated diphenyl ether type substance as flame retardant in electronic products, can continue to be used until the expiration date of the registered or approval document.”(2014)	Investigation of river environmental distribution (2010, 2014-2016)	

item	chemical substances	related ministry	execution unit	Implementation Results		
				regulatory addition and revision	Environmental monitoring, products and foods sampling	others
			Toxic and Chemical Substances Bureau	Since December 28, 2016, the administrative affairs of toxic chemical substances have been transferred to Toxic and Chemical Substances Bureau. According to “Toxic and concerned chemical substances control act”, revise the toxic classification and control concentration of decabromodiphenyl ether, and newly add the mass operation standard as 50 kg (2019).	Investigation of river environmental distribution (2017-2019)	
			Department of Air Quality Protection	Include the applicability assessment of indoor air quality standards (2010-2012)		
			Department of Supervision, Evaluation and Dispute Resolution	Newly add specifications of environment friendly label (2012-2018)	Random sampling of environment friendly products (2013-2018)	

item	chemical substances	related ministry	execution unit	Implementation Results		
				regulatory addition and revision	Environmental monitoring, products and foods sampling	others
			Soil and Groundwater Remediation Fund Management Board		Monitoring of the surrounding lands and soils of general environmental baseline content with potential pollution sources of decabromodiphenyl ether (2017-2019) Investigation of groundwater from specialty chemicals and pharmaceutical and biochem industries (2014-2015) Investigation of river sediments (2009, 2014-2015)	
			Environmental Analysis Laboratory		Investigation of river environmental distribution (2015, 2017) Testing of river sediments in irrigation ditches (2019)	
		Ministry of Health and Welfare	Food and Drug Administration		Monitoring of foods (2010-2013)	Conduct food health risk assessment and introduce education advocacy (2010-2011)
			Health Promotion Administration			Complete one article of “Health effects of Decabromodiphenyl ether” (2017)

item	chemical substances	related ministry	execution unit	Implementation Results		
				regulatory addition and revision	Environmental monitoring, products and foods sampling	others
		Ministry of Economic Affairs	Bureau of Standards, Metrology, and Inspection	Establish and publicize the testing method for electrical and electronic control substances and the CNS national standards for equipment to reduce the restricted chemical substances (2010, 2013) Publicize that 277 products of “automatic data processors” and “wireless keyboards” are subject to product testing and required to show the restricted substances on labeling (2015-2019)	Testing of electrical and electronic products (2018)	Investigate the inspection methods, standards, related regulations, and management methods of fireproof building materials in various countries (2011)
7	Organic tin type (tributyltin)	the Environmental Protection Administration	Department of Environmental Sanitization and Toxic Substance Management	Add organic tin type (control number 148, serial number from 10 to 12, from 14 to 17, 23, 27, from 30, 32 to 35) as Class 4 toxic chemical substances (2012)	Investigation of river environmental distribution (2010, 2013) Sampling of marine antifouling paint products (2011-2014)	
			Toxic and Chemical Substances Bureau	Since December 28, 2016, the administrative affairs of toxic chemical substances have been transferred to Toxic and Chemical Substances Bureau.	Sampling of marine antifouling paint products (2018)	
			Department of Supervision, Evaluation and Dispute Resolution	Newly add specifications of environment friendly products (2011-2018)	Random sampling of environment friendly products (2012-2017)	
		Ministry of Health and Welfare	Food and Drug Administration			Monitoring and risk assessment of organic tin type substances in aquatic products (2013)

item	chemical substances	related ministry	execution unit	Implementation Results		
				regulatory addition and revision	Environmental monitoring, products and foods sampling	others
8	Dioxin /Furan	Ministry of Economic Affairs	Bureau of Standards, Metrology, and Inspection	Establish national standard regarding the testing method of organic tin in shoes (2015)	Sampling and testing of market purchased textile products (2011-2012, 2017-2019)	
		Council of Agriculture	Fisheries Agency		Monitoring of aquatic products before market (2011-2019)	
		the Environmental Protection Administration	Department of Air Quality Protection	Release 6 control standards and strengthen auditing (2010)	Monitoring of environmental air (2009-2019) Test emission from stationary pollution sources and establish emission inventory (2002-2018) Audit emission from stationary pollution sources (2015-2019)	
			Department of Environmental Sanitization and Toxic Substance Management		Testing of drinking water (2012-2019)	
			Department of Supervision, Evaluation and Dispute Resolution		Sampling of recycled building material products (2011)	

item	chemical substances	related ministry	execution unit	Implementation Results		
				regulatory addition and revision	Environmental monitoring, products and foods sampling	others
			Soil and Groundwater Remediation Fund Management Board	Revise and publicize “Soil pollution control standards” (2011) Establish and publicize “Classification, management and use restriction of river sediments quality index”(2012)	Monitoring of the surrounding lands and soils of general environmental baseline content with potential pollution sources of dioxin (2011-2019) Investigation of groundwater (2011-2014) Testing of river sediments in environmental water bodies (2009-2014, 2016-2019) As of December 31, 2019, 3 sites of dioxin polluted soil were publicized, and 2 sites were improved to be removed from the list of controlled sites.	
			Environmental Analysis Laboratory	Publicize “Dioxin and furan test method-isotope label dilution gas chromatography/tandem mass spectrometer method (NIEA M805.00B)” (2017) Publicize “Dioxin and furan test method-isotope label dilution gas chromatography/tandem mass spectrometer method (NIEA M805.01B)” (2018) Revise and publicize “Sampling method of dioxin and furan in water (W790.51B)” (2019)	Investigation of river environmental distribution (2015, 2017) Testing of river sediments in irrigation ditches (2019)	
			Department of Water Quality Protection	Revise the discharged water standard (2019)	Testing of dioxin in industrial wastewater (2018-2019)	

item	chemical substances	related ministry	execution unit	Implementation Results		
				regulatory addition and revision	Environmental monitoring, products and foods sampling	others
			Bureau of Environmental Inspection		Sampling of dioxin from emission pipelines in large incineration plants (2018) Commission sampling and testing of dioxin from stationary pollution sources (2018-2019)	
		Ministry of Health and Welfare	Food and Drug Administration	Revise and publicize “Regulations on handling foods containing dioxin and polychlorinated biphenyls” (2013, 2020) Publicize the table of prohibited substances in cosmetic products (2019)	Monitoring of foods (2010-2015-2019) Monitoring of aquatic products (2013-2015) Monitoring of domestic blood samples (2010, 2012-2013)	Estimate life-time average daily dose (LADD) for Hsinchu, Miali, eastern Hualian areas (2017-2018)
		Council of Agriculture	Fisheries Agency		Monitoring of aquatic products before market (2010-2019)	Public education and advocacy communication (2013-2019)
			Department of Animal Industry	Revise “Management regulations for livestock feeds” (2017)	Testing of fresh milk products before shipment from dairy product plants (2011-2019)	
			Agriculture and Food Agency		Sampling of neighboring crops from plants (2017-2019)	

item	chemical substances	related ministry	execution unit	Implementation Results		
				regulatory addition and revision	Environmental monitoring, products and foods sampling	others
			Agricultural Chemicals and Toxic Substances Research Institute, Department of Animal Industry		Monitoring of livestock feeds and livestock feeds additives (2017-2019)	
			Agricultural Chemicals and Toxic Substances Research Institute, Department of Animal Industry , Fisheries Agency		Testing of aquatic products and and livestock products (2017-2019)	
9	Bisphenol A	the Environmental Protection Administration	Department of Environmental Sanitization and Toxic Substance Management	Newly add bisphenol A as Class 4 toxic chemical substances (2009) Add that the use of nonylphenol, nonylphenol polyethoxy alcohol, bisphenol A as plasticizer, is exempt from the regulations by Toxic and Concerned Chemical Substances Control Act, if there is no environmental hazard through curing and under normal use condition. (2009)	Investigation of river environmental distribution (2013-2016) Testing of drinking water (2012-2019)	

item	chemical substances	related ministry	execution unit	Implementation Results		
				regulatory addition and revision	Environmental monitoring, products and foods sampling	others
			Toxic and Chemical Substances Bureau	Since December 28, 2016, the administrative affairs of toxic chemical substances have been transferred to Toxic and Chemical Substances Bureau.	Investigation of river environmental distribution (2017-2019)	
			Department of Supervision, Evaluation and Dispute Resolution	Newly add specifications of environment friendly label (2011)	Random sampling of environment friendly products (2017)	
			Department of Water Quality Protection		Testing of discharged water from petrochemical industry, basic metal industry, chemical industry, paper industry, industrial zone, or scientific industrial zone. (2018) Testing of original wastewater and discharged water from basic metal industry (coking process) and science industrial park. (2019)	
			Soil and Groundwater Remediation Fund Management Board		Investigation of groundwater from optoelectronic semiconductor and textile related industries (2019)	
		Ministry of Health and Welfare	Food and Drug Administration	Revise and publicize “Health standard of food wares, food containers and packaging” (2010, 2013)	Leaching test and monitoring of food wares (2010) Sampling and testing of plastic baby milk bottles (2014)	Complete food investigation and risk assessment (2016)

item	chemical substances	related ministry	execution unit	Implementation Results		
				regulatory addition and revision	Environmental monitoring, products and foods sampling	others
			Health Promotion Administration			Collect and compile domestic and foreign environmental distribution data for bisphenol A and nonylphenol (2015)
		Ministry of Economic Affairs	Bureau of Standards, Metrology, and Inspection	Revise, establish and publicize the CNS national standards for thermal paper, milk bottles, plastic utensils, pacifier clips (2009, 2012-2013, 2018) Publicize that testing is required for “thermal paper” product (2012)	Sampling and testing of market thermal paper products (2011, 2014)	
		Council of Agriculture	Department of Animal Industry		Testing of pork products (2011-2019)	
10	Perfluorooctanoic acid	the Environmental Protection Administration	Toxic and Chemical Substances Bureau	Since December 28, 2016, the administrative affairs of toxic chemical substances have been transferred to Toxic and Chemical Substances Bureau. Newly add and Publicize the Class 4 toxic chemical substances (2018)		

item	chemical substances	related ministry	execution unit	Implementation Results		
				regulatory addition and revision	Environmental monitoring, products and foods sampling	others
			Soil and Groundwater Remediation Fund Management Board		Investigation of soils in wafer and semiconductor manufacturing intensive science park and general soil baseline content (2017, 2019) Investigation of groundwater (2014-2015, 2019) Investigation of river sediments (2014-2015, 2018-2019)	
			Department of Water Quality Protection		Testing of discharged water from hospital medical institution, industrial zone or scientific industrial zone (2017) Testing of original wastewater and discharged water from printing and finishing industry, textile industry and chemical industry (2019)	
			Environmental Analysis Laboratory		Investigation of river environmental distribution (2019)	
			Department of Environmental Sanitization and Toxic Substance Management		Testing for water purification plants (2019)	

item	chemical substances	related ministry	execution unit	Implementation Results		
				regulatory addition and revision	Environmental monitoring, products and foods sampling	others
		Ministry of Health and Welfare	Food and Drug Administration		Leaching test of non-stick pans and grease-proof paper and risk assessment (2010) Monitoring of foods (2011) Monitoring of domestic blood samples (2011)	
11	PFOS	the Environmental Protection Administration	Toxic and Chemical Substances Bureau	Since December 28, 2016, the administrative affairs of toxic chemical substances have been transferred to Toxic and Chemical Substances Bureau. Revise the control concentration to 0.01%(2018)		
			Soil and Groundwater Remediation Fund Management Board		Investigation of soils in wafer and semiconductor manufacturing intensive science park and general soil baseline content (2017, 2019) Investigation of groundwater (2014-2015, 2019) Investigation of river sediments (2014-2015, 2018-2019)	
			Department of Water Quality Protection		Testing of discharged water from hospital medical institution, industrial zone, or scientific industrial zone (2017) Testing of original wastewater and discharged water from printing and finishing industry, textile industry and chemical industry (2019)	

item	chemical substances	related ministry	execution unit	Implementation Results		
				regulatory addition and revision	Environmental monitoring, products and foods sampling	others
			Environmental Analysis Laboratory		Testing of original water and clean water from water purification plants (2017-2018) Testing of environmental water bodies (mountain lakes and rivers) (2017) Investigation of river environmental distribution (2019)	
			Department of Environmental Sanitization and Toxic Substance Management		Testing for water purification plants (2019)	
		Ministry of Health and Welfare	Food and Drug Administration		Leaching test of non-stick pans and grease-proof paper and risk assessment (2010) Monitoring of foods (2011) Monitoring of domestic blood samples (2011)	
			Health Promotion Administration			Collect and compile health hazard data (2015)
		Ministry of Economic Affairs	Bureau of Standards, Metrology, and Inspection	Revise, establish and publicize the CNS national standards and testing methods for textile products (2015, 2017, 2019)		
		Ministry of Health and Welfare	Food and Drug Administration	Revise the pesticide residue tolerance standard (2015-2016)	Monitoring of residual pesticides in agricultural products from market (2011)	

item	chemical substances	related ministry	execution unit	Implementation Results		
				regulatory addition and revision	Environmental monitoring, products and foods sampling	others
		Council of Agriculture	Agriculture and Food Agency		Monitoring of residual pesticides in agricultural products (2017-2018)	
			Bureau of Animal and Health Plant Health Inspection and Quarantine	Re-assess use risk and expand the registration range of restricted use of pesticides (August 2017)		
		the Environmental Protection Administration	Environmental Analysis Laboratory	Publicize the testing method of environmental agents – sample preparation (NIEA D901.02B) (2019) Publicize the testing method of environmental agents – Chromatography (NIEA D902.0aB) (2019)		
13	Permethrin	Ministry of Health and Welfare	Food and Drug Administration	Revise pesticide residue tolerance standard (2015-2016)	Monitoring of residual pesticides in agricultural products from market (2011)	
		Council of Agriculture	Agriculture and Food Agency		Monitoring of residual pesticides in agricultural products (2017-2018)	
			Bureau of Animal and Health Plant Health Inspection and Quarantine	The tumor-causing Class C agents defined by US EPA are subject to risk assessment upon application as newly added pesticides		

item	chemical substances	related ministry	execution unit	Implementation Results		
				regulatory addition and revision	Environmental monitoring, products and foods sampling	others
		the Environmental Protection Administration	Environmental Analysis Laboratory	Publicize the testing method of environmental agents — sample preparation (NIEA D901.02B) (2019) Publicize the testing method of environmental agents — Chromatography (NIEA D902.0aB)(2019)		
14	Carbaryl	Ministry of Health and Welfare	Food and Drug Administration	Revise pesticide residue tolerance standard (2015-2016)	Monitoring of residual pesticides in agricultural products from market (2011)	
		Council of Agriculture	Agriculture and Food Agency		Monitoring of residual pesticides in agricultural products (2017-2018)	
			Department of Animal Industry		Sampling of residual pesticides in livestock feeds (2017-2019)	
			Bureau of Animal and Health Plant Health Inspection and Quarantine	Re-assess use risk and expand the registration range of restricted use of pesticides (March 2016)		
15	Methomyl	Ministry of Health and Welfare	Food and Drug Administration	Revise pesticide residue tolerance standard (2015-2016) Revise pesticide residue tolerance standard for animal products (2019)	Monitoring of residual pesticides in agricultural products from market (2011)	

item	chemical substances	related ministry	execution unit	Implementation Results		
				regulatory addition and revision	Environmental monitoring, products and foods sampling	others
		Council of Agriculture	Bureau of Animal and Health Plant Health Inspection and Quarantine	On February 17, 2014, Agricultural Prevention No. 103141489806 publicized that the pesticide of “24% methomyl solution” will be banned, starting January 1, 2016, from manufacturing, processing and import, and starting January 1, 2017, it will be banned from sales and use. On August 22, 2016, Preventive Inspection Third No. 0991485385 publicized that methomyl will accept application of new use method and registration of range.		
			Agriculture and Food Agency		Monitoring of residual pesticides in agricultural products (2017-2018)	
		the Environmental Protection Administration	Environmental Analysis Laboratory	Publicize the testing method of environmental agents – sample preparation (NIEA D901.02B)(2019) Publicize the testing method of environmental agents – Chromatography (NIEA D902.0aB) (2019)		
16	Polychlorinated biphenyls	the Environmental Protection Administration	Department of Environmental Sanitization and Toxic Substance Management		Investigation of river environmental distribution (2010, 2013)	

item	chemical substances	related ministry	execution unit	Implementation Results		
				regulatory addition and revision	Environmental monitoring, products and foods sampling	others
			Soil and Groundwater Remediation Fund Management Board	Revise and publicize:Soil pollution control standard”(2011) Establish and publicize the “Classification, management and use restriction of river sediments quality index”(2012)	Monitoring of the surrounding lands and soils of general environmental baseline content with potential pollution sources of polychlorinated biphenyls (2017-2019) Testing of river sediments in environmental water bodies (2009-2014, 2016-2019) As of December 31, 2019, 5 sites of publicize polychlorinated biphenyls polluted soil were publicized and 1 site was improved to be removed from the list of controlled sites.	

item	chemical substances	related ministry	execution unit	Implementation Results		
				regulatory addition and revision	Environmental monitoring, products and foods sampling	others
			Environmental Analysis Laboratory	<p>Publicize “Detection method of semi-volatile organic compounds in water-gas chromatography mass spectrometer method” (NIEA W801.53B) (2017)</p> <p>Publicize “Detection method of organic compounds in toxic chemical substances-gas chromatography mass spectrometry method” (NIEA T706.24B) (2017)</p> <p>Publicize “Detection method of polychlorinated biphenyls in water-liquid/liquid extraction/gas chromatograph/electron capture detector method” (NIEA W601.53B) (2017)</p> <p>Publicize “Detection method of PCBs in water-solid phase extraction/gas chromatograph electron capture detector method” (NIEA W602.52B) (2017)</p> <p>Publicize “Detection method of PCBs in soil, sediments and industrial waste-gas chromatograph method” (NIEA M619.04C) (2017)</p>	Investigation of river environmental distribution (2015, 2017)	

item	chemical substances	related ministry	execution unit	Implementation Results		
				regulatory addition and revision	Environmental monitoring, products and foods sampling	others
		Ministry of Health and Welfare	Food and Drug Administration	Revise and publicize “Regulations on handling foods containing dioxin and polychlorinated biphenyls” (2013, 2020) Publicize the table of prohibited substances in cosmetic products (2019)	Monitoring of aquatic products (2013-2015)	
			Health Promotion Administration			Collect and compile health hazard data (2013)
		Council of Agriculture	Fisheries Agency		Monitoring of aquatic products before market (2010-2019)	Public education and advocacy communication (2013-2019)
			Agriculture and Food Agency		Monitoring of honey products (2006-2019)	
			Agricultural Chemicals and Toxic Substances Research Institute, Department of Animal Industry		Monitoring of livestock feeds and and livestock feeds additives (2017-2019)	

item	chemical substances	related ministry	execution unit	Implementation Results		
				regulatory addition and revision	Environmental monitoring, products and foods sampling	others
			Agricultural Chemicals and Toxic Substances Research Institute, Department of Animal Industry , Fisheries Agency		Testing of aquatic products and livestock products (2017-2019)	
17	DDT	the Environmental Protection Administration	Soil and Groundwater Remediation Fund Management Board	Revise and publicize “Soil pollution control standard” (2011) Establish and publicize ”Classification, management, and use restriction of river sediments quality index” (2012)	Investigation of residual concentration in soils (2017) Investigation of residual concentration in farmland soils (2017) Testing of river sediments in environmental water bodies (2009-2014, 2016-2019)	
			Department of Water Quality Protection	Revise “Marine environmental classification and marine environmental quality standards” (February 2018). Since April 28, 2018, the administrative affairs of marine water quality have been transferred to the Ocean Affairs Council Ocean Conservation Administration.		

item	chemical substances	related ministry	execution unit	Implementation Results		
				regulatory addition and revision	Environmental monitoring, products and foods sampling	others
			Environmental Analysis Laboratory	Publicize “Semi-volatile organic compounds detection method-gas chromatography mass spectrometer method (NIEA M731.02C)” (2017) Publicize “Detection method of semi-volatile organic compounds in water-gas chromatography mass spectrometer method (NIEA W801.53B)” (2017) Publicize “Detection method of organic compounds in toxic chemical substances-gas chromatography mass spectrometry method(NIEA T706.24B)” (2017)	Investigation of river environmental distribution (2015, 2017) Testing of river sediments in irrigation ditches (2019)	
		Ministry of Health and Welfare	Health Promotion Administration			Collect and compile health hazard data (2016)
			Food and Drug Administration		Testing of agricultural products from market (2017-2019)	
		Council of Agriculture	Department of Animal Industry		Sampling of residual pesticides in livestock feeds (2017-2019)	

item	chemical substances	related ministry	execution unit	Implementation Results		
				regulatory addition and revision	Environmental monitoring, products and foods sampling	others
			Agricultural Chemicals and Toxic Substances Research Institute, Agriculture and Food Agency		Testing of crops (2017-2019) Monitoring of residual pesticides in agricultural products (2018-2019)	
			Bureau of Animal and Health Plant Health Inspection and Quarantine	The effective ingredient in the pesticide was banned since July 1, 1974.		
18	Polybrominated biphenyls	the Environmental Protection Administration	Toxic and Chemical Substances Bureau	Since December 28, 2016, the administrative affairs of toxic chemical substances have been transferred to Toxic and Chemical Substances Bureau.	Investigation of river environmental distribution (2017-2019)	
			Department of Supervision, Evaluation and Dispute Resolution	Newly add specifications of environment friendly label (2012-2018)	Random sampling of environment friendly products (2013-2015, 2018)	

item	chemical substances	related ministry	execution unit	Implementation Results		
				regulatory addition and revision	Environmental monitoring, products and foods sampling	others
19	Polycyclic aromatic hydrocarbons(PAHs)	Ministry of Economic Affairs	Bureau of Standards, Metrology, and Inspection	Publicize the testing method of controlled substances for electric and electronic products and CNS national standard for equipment to reduce the content of restricted chemical substances (2010, 2013) Establish testing technology (2016) Publicize that 277 products of “automatic data processors” and “wireless keyboards” are subject to product testing and required to show the restricted substances on labeling (2015-2019)	Testing of electrical and electronic products (2018)	
		Ministry of Health and Welfare	Health Promotion Administration			Collect and compile health hazard data (2016)
		the Environmental Protection Administration	Toxic and Chemical Substances Bureau	Since December 28, 2016, the administrative affairs of toxic chemical substances have been transferred to Toxic and Chemical Substances Bureau.	Investigation of river environmental distribution (2018-2019)	
			Department of Air Quality Protection		Exposure assessment of polycyclic aromatic hydrocarbons (PAHs) in indoor air (2013-2016)	
			Soil and Groundwater Remediation Fund Management Board	Establish and publicize “Classification, management and use restriction of river sediments quality index”(2012)	Testing of river sediments in environmental water bodies (2009-2014, 2016-2019)	

item	chemical substances	related ministry	execution unit	Implementation Results		
				regulatory addition and revision	Environmental monitoring, products and foods sampling	others
		Ministry of Economic Affairs	Bureau of Standards, Metrology, and Inspection	Revise the related national standards for polycyclic aromatic hydrocarbons in shoes and bag products. (2011-2012, 2014-2015) Publicize that “travel luggage” be subject to testing; publicize that “children playground spring and rocking equipment, ladder components and ground mats” be subject to voluntary product testing. (2011, 2013-2018)	Market sampling and testing of shoes, incense products (2010-2013, 2016)	
20	Hexaoxybenzene	the Environmental Protection Administration	Soil and Groundwater Remediation Fund Management Board	Revise and publicize “Soil pollution control standard” (2011)	Investigation of residual concentration in farmland soils (2017) Testing of river sediments in environmental water bodies (2016-2019)	

item	chemical substances	related ministry	execution unit	Implementation Results		
				regulatory addition and revision	Environmental monitoring, products and foods sampling	others
			Environmental Analysis Laboratory	Publicize “Semi-volatile organic compounds detection method-gas chromatography mass spectrometer method (NIEA M731.02C)” (2017) Publicize “Detection method of semi-volatile organic compounds in water-gas chromatography mass spectrometer method (NIEA W801.53B)” (2017) Publicize “Detection method of organic compounds in toxic chemical substances-gas chromatography mass spectrometry method (NIEA T706.24B)” (2017)	Investigation of river environmental distribution (2015, 2017) Testing of river sediments in irrigation ditches (2019)	
		Ministry of Health and Welfare	Food and Drug Administration		Testing of agricultural products from market (2017-2019)	
		Council of Agriculture	Agricultural Chemicals and Toxic Substances Research Institute, Agriculture and Food Agency		Testing of crops (2017-2019) Monitoring of residual pesticides in agricultural products (2018-2019)	

item	chemical substances	related ministry	execution unit	Implementation Results		
				regulatory addition and revision	Environmental monitoring, products and foods sampling	others
21	Pentachlorophenol	the Environmental Protection Administration	Department of Water Quality Protection	Revise “Marine environmental classification and marine environmental quality standard” (February 2018). The administrative affairs of marine water quality have been transferred to the Ocean Affairs Council Ocean Conservation Administration since April 28, 2018.		
			Environmental Analysis Laboratory	Publicize “Semi-volatile organic compounds detection method-gas chromatography mass spectrometer method (NIEA M731.02C)” (2017) Publicize “Detection method of semi-volatile organic compounds in water-gas chromatography mass spectrometer method (NIEA W801.53B)” (2017) Publicize “Detection method of organic compounds in toxic chemical substances-gas chromatography mass spectrometry method (NIEA T706.24B)” (2017)		
			Department of Supervision, Evaluation and Dispute Resolution	Newly add specifications of environment friendly label (2012)	Random sampling of environment friendly products (2017)	

item	chemical substances	related ministry	execution unit	Implementation Results		
				regulatory addition and revision	Environmental monitoring, products and foods sampling	others
			Soil and Groundwater Remediation Fund Management Board	Revise and publicize “Soil pollution control standard” (2011)	Monitoring of pentachlorophenol in soils of surrounding lands of potential pollution sources and general baseline content (2019)	
		Ministry of Economic Affairs	Bureau of Standards, Metrology, and Inspection		Testing of wood panels from market (2017-2019)	
		Council of Agriculture	Bureau of Animal and Health Plant Health Inspection and Quarantine	The pesticides containing this ingredient have been banned since April 19, 1984.		
22	Alachlor	Ministry of Health and Welfare	Food and Drug Administration	Revise “Pesticide residue tolerance standard” (2015-2016)		
		Council of Agriculture	Bureau of Animal and Health Plant Health Inspection and Quarantine	Publicize the use range of new restricted pesticides (July 24, 1985)		
23	Trifluralin	Ministry of Health and Welfare	Food and Drug Administration	Revise “Pesticide residue tolerance standard” (2015-2016)		
		Council of Agriculture	Bureau of Animal and Health Plant Health Inspection and Quarantine	The tumor-causing Class C agents defined by US EPA are subject to risk assessment upon application as newly added pesticides		

item	chemical substances	related ministry	execution unit	Implementation Results		
				regulatory addition and revision	Environmental monitoring, products and foods sampling	others
24	Vinclozolin	Ministry of Health and Welfare	Food and Drug Administration	Revise pesticide residue tolerance standard (2015-2016)		
		Council of Agriculture	Bureau of Animal and Health Plant Health Inspection and Quarantine	The tumor-causing Class C agents defined by US EPA are subject to risk assessment upon application as newly added pesticides.		
25	Atrazine	Council of Agriculture	Bureau of Animal and Health Plant Health Inspection and Quarantine	Publicize is restricted pesticide, and subject to risk assessment upon application as new pesticide use range (January 19, 1993)		
26	Simazine	Council of Agriculture	Bureau of Animal and Health Plant Health Inspection and Quarantine	Publicize is restricted pesticide, and subject to risk assessment upon application as new pesticide use range (January 19, 1993)		
27	Ziram	Council of Agriculture	Bureau of Animal and Health Plant Health Inspection and Quarantine	The pesticides containing the ingredient have been banned since March 7, 1997.		
28	Glyphosate	Ministry of Health and Welfare	Food and Drug Administration	Revise “Pesticide residue tolerance standard” (2015-2016)		
29	Malathion	Ministry of Health and Welfare	Food and Drug Administration	Revise “Pesticide residue tolerance standard” (2015-2016)		
		Council of Agriculture	Department of Animal Industry		Sampling of residual pesticides in livestock feeds (2017-2019)	

item	chemical substances	related ministry	execution unit	Implementation Results		
				regulatory addition and revision	Environmental monitoring, products and foods sampling	others
30	Metribuzin	Ministry of Health and Welfare	Food and Drug Administration	Revise “Pesticide residue tolerance standard” (2015-2016)		
31	2,4-Dichlorophenoxyacetic acid (2, 4-D)	Ministry of Health and Welfare	Food and Drug Administration	Revise “Pesticide residue tolerance standard” (2015-2016)		