臺灣「執行聯合國汞水俁公約推動計畫」

2024年執行成果年鑑

The Implementation Plan of Taiwan under the Minamata Convention on Mercury

2024 Implementation Results Yearbook



環境部化學物質管理署
Chemicals Administration
Ministry of Environment

臺灣「執行聯合國汞水俁公約推動計畫」

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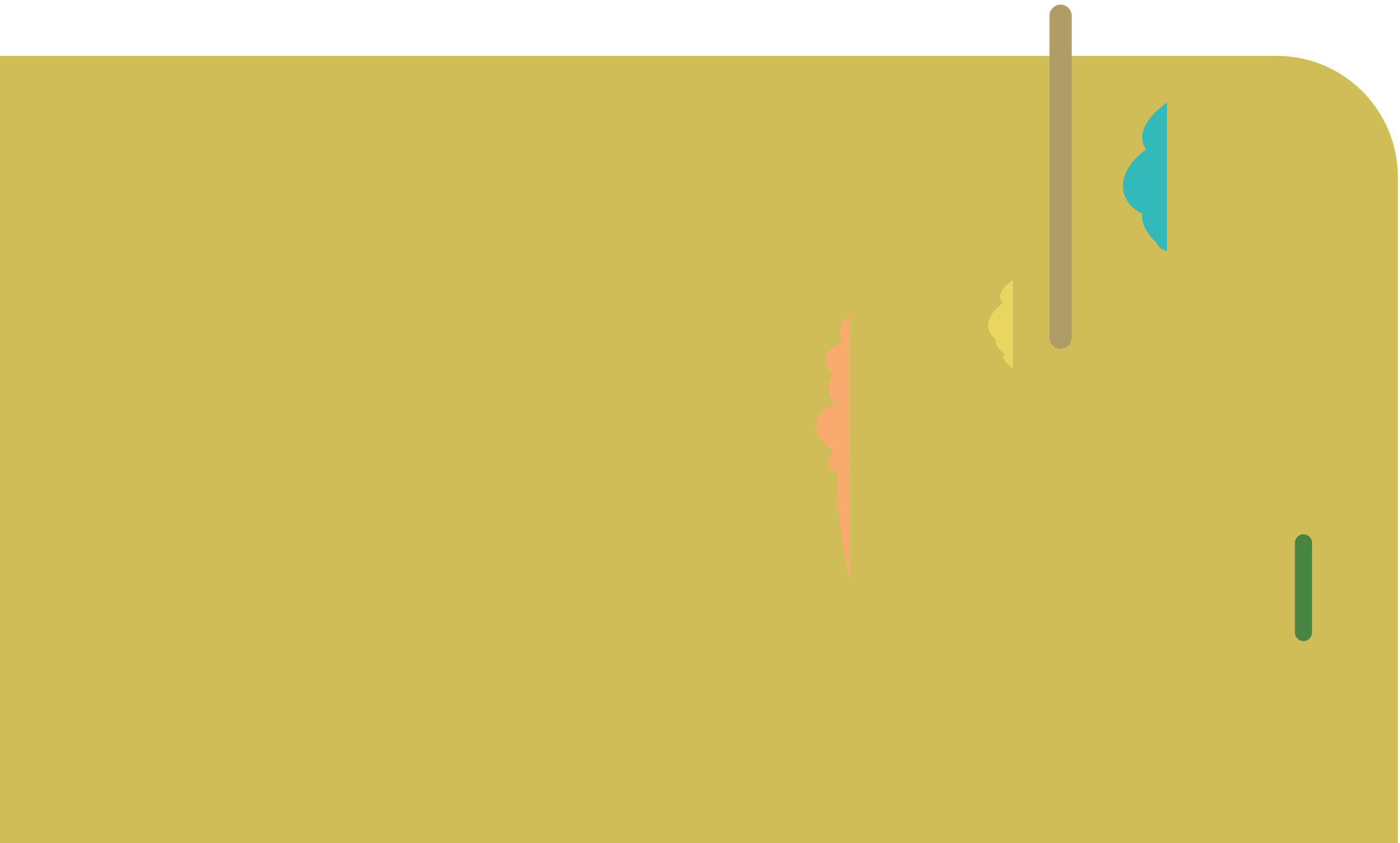
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前言
Introduction



臺灣「執行聯合國汞水俁公約推動計畫」2024 年執行成果年鑑

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第一章

前言

汞俗稱「水銀」，是一種有毒重金屬，廣泛應用於工業，如小規模 / 手工金礦開採、氯鹼生產、電石法聚氯乙烯生產，在人類生活中也很廣泛被應用，如體溫計、血壓計、電池、照明光源、化粧品以及補牙用的填料等。

鑑於汞可在大氣中遠距離遷移，亦可在人為排入環境後持久存在，同時會在各種生態系統中進行生物累積，進而對人體健康和環境產生負面影響，因此聯合國環境規劃署（United Nations Environment Programme，簡稱 UNEP）於 2013 年公布汞水俣公約（Minamata Convention on Mercury），並於 2017 年 8 月 16 日生效，期全球各方採取一致行動，限制甚至最終淘汰汞的開採和使用，對汞污染進行嚴格的管理和控制，降低汞排放。

為順應國際加強汞管理之潮流，以減低國人的暴露風險，環境部於公約生效前，即邀集經濟部、農業部、衛生福利部（簡稱衛福部）、勞動部職業安全衛生署（簡稱勞動部職安署）、財政部關務署及海洋委員會海洋保育署（簡稱海委會海保署），研擬推動「執行聯合國汞水俣公約推動計畫」，計畫於 2016 年 6 月 27 日奉行政院核定，作為跨部會協力推動汞管理工作之依據，並因應國內管理現況滾動修訂。

Chapter1

Introduction

Mercury (Hg) is a toxic heavy metal, which has been used in many applications, including artisanal and small-scale gold mining (ASGM), the chlor-alkali industry, the production of vinyl chloride, electrical and electronic equipment, measuring devices, cosmetics, dental amalgam and so on. However, once mercury enters environment as a pollutant, it is extremely harmful. Mercury is persistent, mobile, bioaccumulated and harmful to human health and environment. As a result, United Nations Environment Programme (UNEP) adoped the Minamata Convention on Mercury in 2013 that global actions are required to reduce the use and emissions of mercury.

Taiwan authority has drafted implementation plans and stays aligned with international partners to reduce the risk to human health and environment. On June 27, 2016, Taiwan Executive Yuan has approved the implementation plan as the foundation for mercury management, and allocated the responsibilities among various competent authorities, such as Ministry of Environment (MOENV), Ministry of Agriculture (MOA), Ministry of Health and Welfare (MOHW), Ministry of Economic Affairs (MOEA), Ministry of Finance (MOF), Ministry of Labor (MOL) and Ocean Affairs Council (OAC).

UN environment programme

MINAMATA CONVENTION ON MERCURY

02

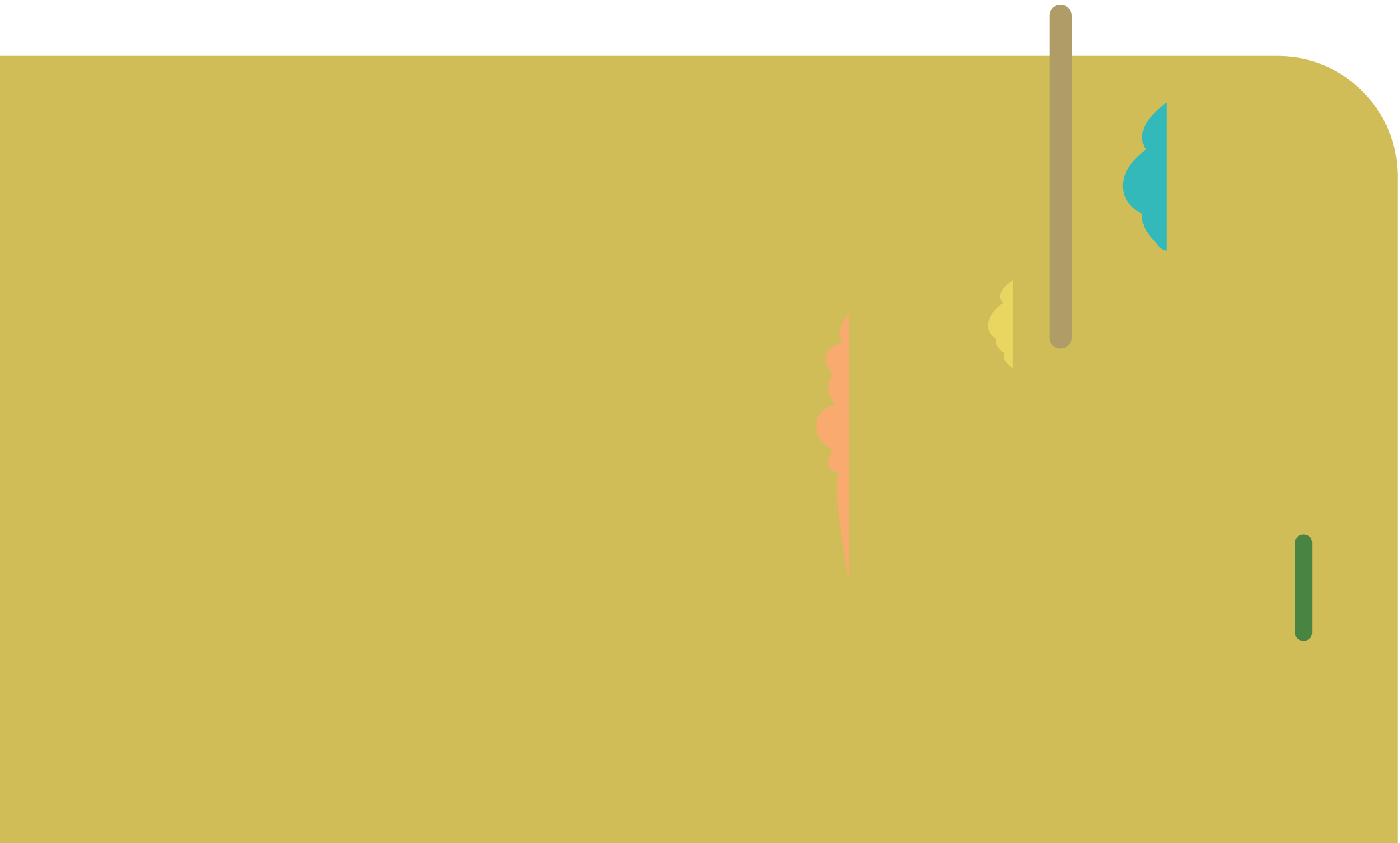
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何謂水俣病及「汞水俣公約」What is Minamata Disease and the Minamata Convention on Mercury?



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第二章

何謂水俣病及「汞水俣公約」

2.1 水俣病的緣由及影響

1956 年日本工業起飛，九州沿海的熊本水俣市成為工業村，其中「新日本窒素肥料」（窒素，中文為氮）公司使用含水銀的化合物作催化劑生產肥料，且工廠將未經處理之廢水直接排進大海，致汞被水中生物食用，轉化成甲基汞等化合物。

隨後，水俣市沿岸的水俣灣以及八代海（又名不知火海）開始出現魚貝類莫名死亡、貓出現走路顛簸、狂奔甚至死亡等怪事，市內上萬人出現不同程度的神經性疾病：包括口齒不清、走路不穩、聽力及言語障礙等症狀，人們稱之為「水俣病」。



Chapter2

What is Minamata Disease and the Minamata Convention on Mercury?

2.1 The causes and health effects of Minamata disease

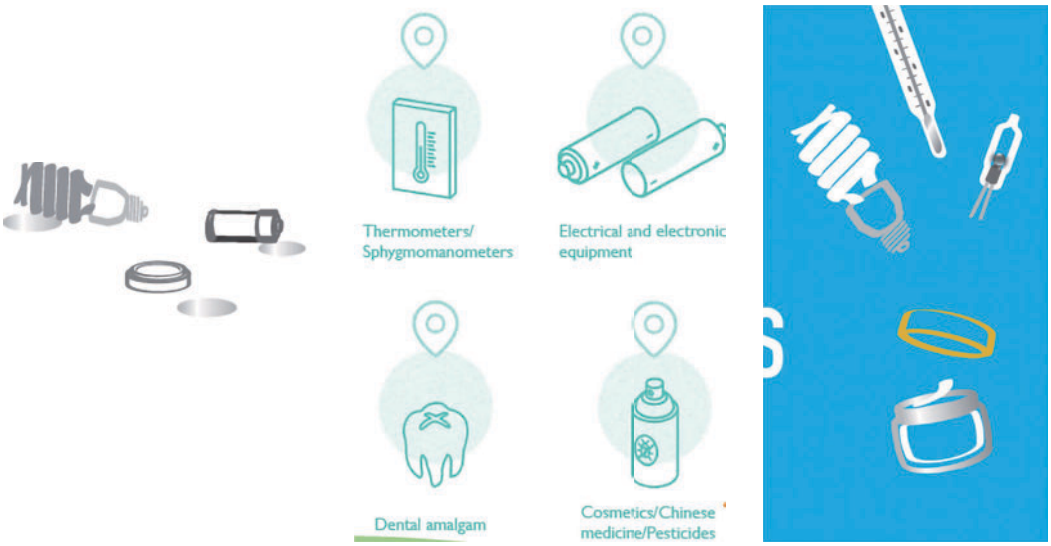
In the 1950s, Minamata city in Kumamoto Prefecture was suffered from serious incidents of industrial pollution. Chisso Corporation discharged mercury waste into the sea outside the city. The residents around Minamata Bay and the Yatsushiro Sea coast were at high risk of exposure to methylmercury. A toxic nervous disorder was caused by ingesting fish and shellfish contaminated with methylmercury compounds discharged by Chisso Corporation. Thousands of people from this area were suffered from health problems or were left paralyzed or permanently disabled. This form of mercury toxicity in humans is now called Minamata disease.



2.2 「汞水俣公約」介紹

1956 年日本熊本縣水俣市居民之水俣病公害事件，在人類歷史上史無前例，為日本留下長期的環境及健康問題，因而日本呼籲國際社會應重視汞對全球環境與人類健康所帶來的負面影響，並立即採取行動，因此 2002 年 UNEP 公布關於汞引起的地球規模的環境污染與健康危害的「全球汞評估報告」，並於 2013 年公布「汞水俣公約」。

汞水俣公約之總體目標是保護人類健康和環境免受汞及其化合物人為排放之影響，公約主要領域包括禁止新的汞礦、逐步淘汰現有汞礦、逐步淘汰和逐步減少在許多產品和製程中使用汞、控制向空氣之排放以及向土地和水中釋放的措施。該公約還解決了汞的無害化儲存、含汞廢棄物及污染場址以及健康問題。



含汞產品示意

2.2 The Minamata Convention on Mercury

Minamata disease was officially acknowledged in 1956. The severity of damage to health and environment was an unprecedented in Japanese history. As a result, the first global assessment of mercury and its compounds was published by UNEP in 2002. By 2013, the Minamata Convention on Mercury has been formally adopted.

The objective of the Convention is to protect human health and environment from anthropogenic emissions and releases of mercury and its compounds. Major highlights of the Minamata Convention include a ban on new mercury mines, the phase-out of existing ones, the phase-out and phase-down of mercury use in a number of products and processes, and control measures on emissions to air and on releases to land and water. The Convention also addresses interim storage of mercury and its disposal once it becomes waste, sites contaminated by mercury as well as health issues.



03

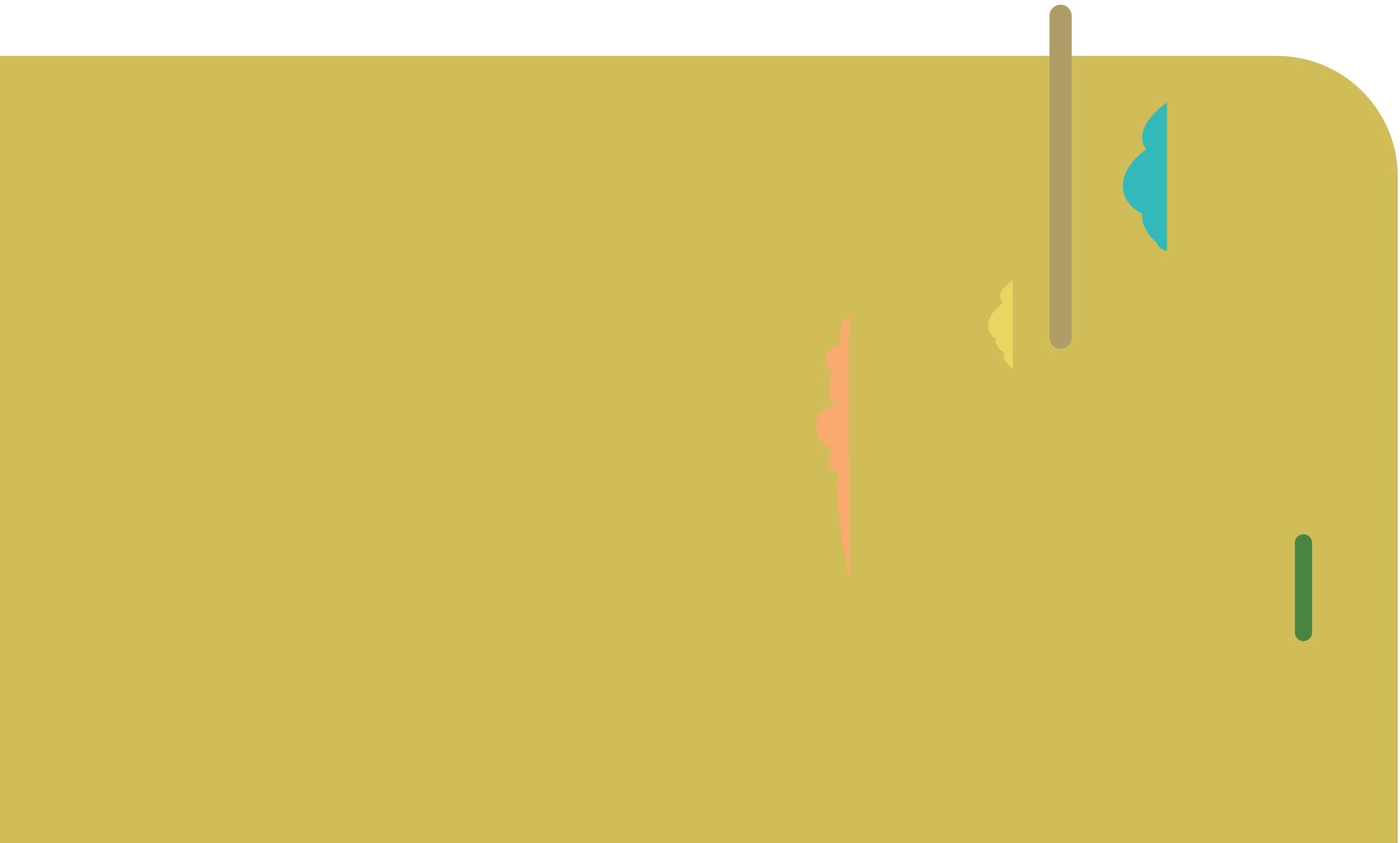
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臺灣如何管理汞物質
How does Taiwan Manage Mercury?



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第三章

臺灣如何管理汞物質

為能逐步符合汞公約管制事項，臺灣已訂定「執行聯合國汞水俣公約推動計畫」，透過跨部會分工，落實汞之管理機制，減少環境中之汞污染，保護民眾健康與環境免受汞物質的危害。

3.1 汞物質源頭管理

「毒性及關注化學物質管理法」於 1991 年將汞列為第一類毒性化學物質，規定得使用用途，並禁止使用於製造穀類防蟲劑、溫度計之製造及工業用催化劑，2021 年 1 月 1 日起禁止汞用於製造電池、開關及繼電器、日光燈或螢光燈、高壓汞燈及非電子測量儀器（遵循公約例外豁免）。透過源頭管制，我國 2024 年毒化物汞之使用量已降至 0.01 公噸，相較於 2010 年已下降 99.8%。國內亦無原生汞礦開採行為及使用汞進行手工和小規模採金活動，已有效落實汞污染防治。

3.2 含汞產品管理

我國已如期於 2020 年底前完成特定電池、開關與繼電器、普通照明緊密型螢光燈、電子顯示螢光燈、普通照明直管型螢光燈、普通照明高壓汞燈、化粧品、農藥 / 生物殺蟲劑 / 局部抗菌劑及非電子量測儀器類等 9 類含汞產品之禁止製造及進口，與公約期程一致。並推動廢照明光源及廢乾電池回收，其回收量呈現降低趨勢，可見近年國內實施限汞措施已獲成效。

3.3 環境標準及調查

我國制定「廢棄物焚化爐空氣污染物排放標準」、「電力設施空氣污染物排放標準」、「放流水標準」、「土壤污染管制標準」、「地下水污染管制標準」、「底泥品質指標之分類管理及用途限制辦法」等環境標準，進行排放調查及環境檢測，減少汞排（釋）放。

Chapter3

How does Taiwan Manage Mercury?

To promote public health and reduce mercury in our environment, Taiwan authority has approved implementation plan to phase in the Minamata Convention on Mercury.

3.1 Mercury sources control

Taiwan has managed mercury by “Toxic and Concerned Chemical Substances Control Act” as class 1 toxic chemical substances since 1991. It restricts usable purpose, and banned the use on the production of pesticides, thermometers and catalysts. From January 1, 2021, mercury have banned the use on the production of batteries, switches and relays, lamps, certain lamps, and non-electronic measuring devices (follow the exception on Convention). Taiwan's mercury source control has reduced the use of mercury to 0.01 tons in 2024, a 99.8% decrease compared with 2010. There are no primary mercury mining activities or artisanal and small-scale gold mining operations. Taiwan has effectively implemented mercury pollution control measures.

3.2 Management of mercury-added products

By the end of 2020, Taiwan had prohibited the manufacture and import of nine categories of mercury-added products, including batteries, switches and relays, certain lamps, cosmetics, pesticides, biocides and topical antiseptics, and measuring devices, in line with the convention schedule. And Taiwan is promoting the recycling of waste lighting sources and dry batteries, with recycling volumes showing a decreasing trend, indicating that recent mercury-limiting measures implemented have been effective.

3.3 Mercury standards and survey

To reduce emission (or releases) of mercury, Taiwan has regulated the standards in “Waste Incinerator Air Pollutant Emissions Standards”, “Electrical Utility Air Pollutant Emissions Standards” , “Effluent Standards” and “Soil Pollution Control Standards”, etc. and conducted emission surveys and environmental testing.

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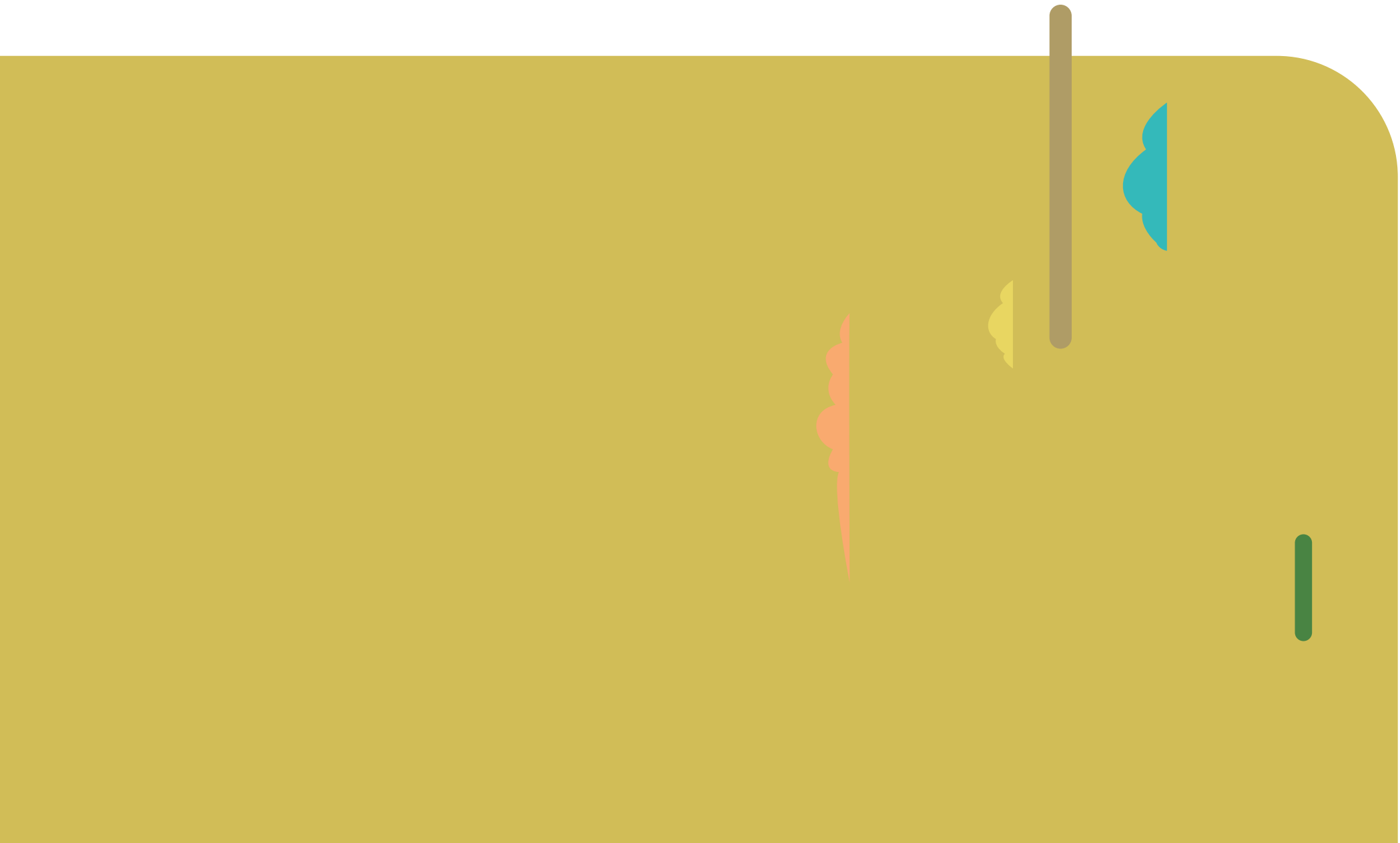
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汞在臺灣環境之概況
Status of Mercury in the Environment of Taiwan



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第四章

汞在臺灣環境之概況

4.1 汞的環境流布及排放

為能掌握環境中汞流布狀況，則有針對國內大氣、水體、底泥、土壤、飲用水等介質之含量或濃度進行調查或監測。2007 ～ 2024 年環境空氣氣狀汞平均濃度為 1.67 ～ 3.99 ng/m^3，均符合日本或世界衛生組織空氣品質基準值。2011 ～ 2024 年河川及海域水質重金屬汞監測皆符合國內相關環境品質標準。最新 2024 年河川底泥汞濃度未檢出，飲用水水質汞濃度均符合飲用水水質標準，2023 年汞大氣排放量約為 1.357 公噸與 2020 年相比下降約 20%，展現有效的汞污染管控成果。

於 2006 年在鹿林山設置連續自動監測大氣汞的儀器，自 2006 年 4 月開始進行大氣汞監測，且臺灣環境部與美國環保署、美國大氣沈降計畫（National Atmospheric Deposition Program, NADP）及國立中央大學合作，共同推動亞太汞監測網，協助亞太地區夥伴國家建立汞監測分析技術。



圖片來源為環境部臺灣空氣品質監測網

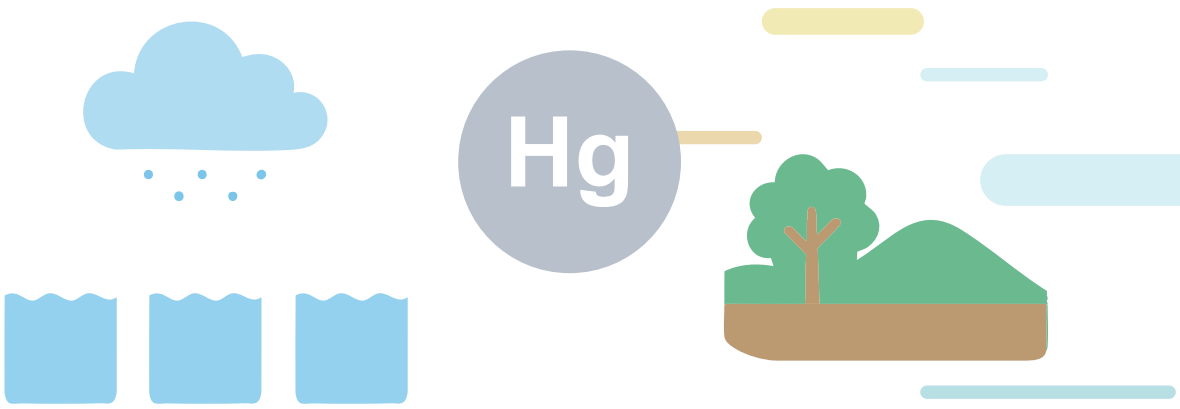
Chapter4

Status of Mercury in the Environment of Taiwan

4.1 Environmental distribution and emission of Mercury

To understand the distribution of Mercury, Taiwan has conducted surveys and monitoring of POPs concentrations in air, water, sediments, soil and drinking water. The average concentration of gaseous mercury in atmospheric from 2007 to 2024 is 1.67 to 3.99 ng/m^3, all meeting Japan's or the World Health Organization's air quality standard. All of the monitoring results of mercury contents in environmental water bodies and seas are complied with the environmental quality standards from 2011 to 2024. The mercury concentration in river sediments in 2024 was not detected, and the mercury concentration in drinking water met the drinking water standards. In 2023, atmospheric mercury emissions were 1.357 tons, a decrease of about 20% compared with 2020, demonstrating effective mercury pollution control results.

On April, 2006, Taiwan authority has installed Lulin Atmospheric Background Station to monitor the atmospheric mercury. Taiwan Ministry of Environment, USEPA, National Atmospheric Deposition Program of United States and National Central University in Taiwan have coordinated to establish Atmospheric Mercury Net in Asia-Paci¬c. This partnership will assist cooperation in Asia-Paci¬c develop technologies of mercury monitoring.



4.2 市售食品及產品

我國也嚴格訂定食品、水產品、補助飼料汞含量標準，進行市售食品及水產品等汞含量調查，2024 年檢驗合格率達 100%。透過制定市售商品標準進行抽樣檢驗，減少商品使用有害物質，降低消費者的暴露風險。

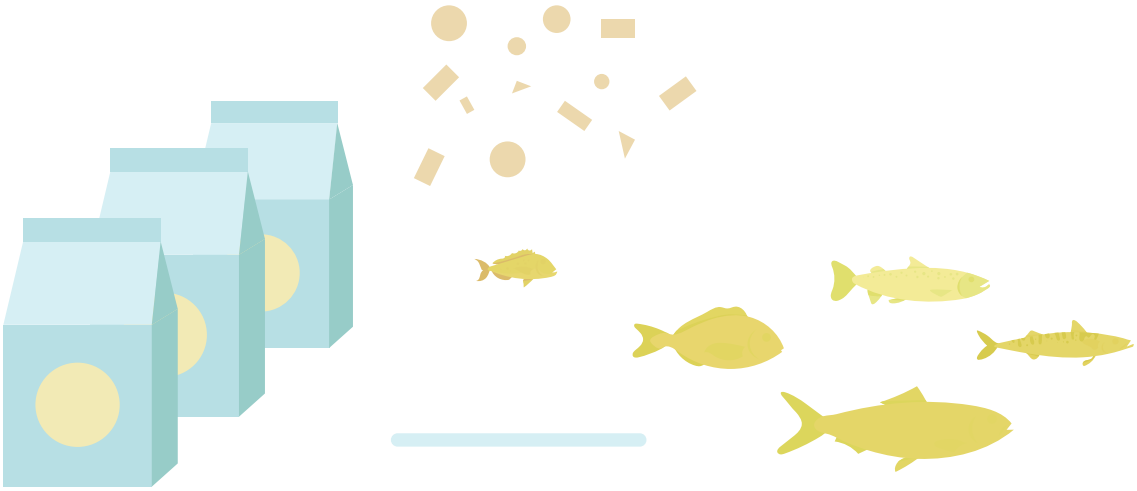
針對牙科汞合金部分，我國不鼓勵在牙科修復中使用牙科汞合金，牙體復形使用銀粉充填（Amalgam restoration）的情形 2024 年已較 2000 年使用人次下降 95%，大幅減少民眾可能接觸之機會。2024 年執行化粧品汞含量檢驗，合格率達 100%.



4.2 Mercury concentration in food and products

Taiwan has established the Mercury containing standards of food, aquatic products and feeds, and surveyed Mercury levels in commercial food products and aquatic products, etc., all the investigation results of mercury contents in 2004 are complied with the standard. By setting standards for commercial products and conducting inspections, the use of hazardous substances in goods is reduced, thereby lowering consumer exposure risks.

Regarding dental amalgam, Taiwan does not encourage its use in dental restorations. Amalgam restorations have seen a 95% decrease in usage by 2024 compared to 2000, significantly reducing potential exposure. In 2024, mercury content testing for cosmetics was carried out with a 100% pass rate.



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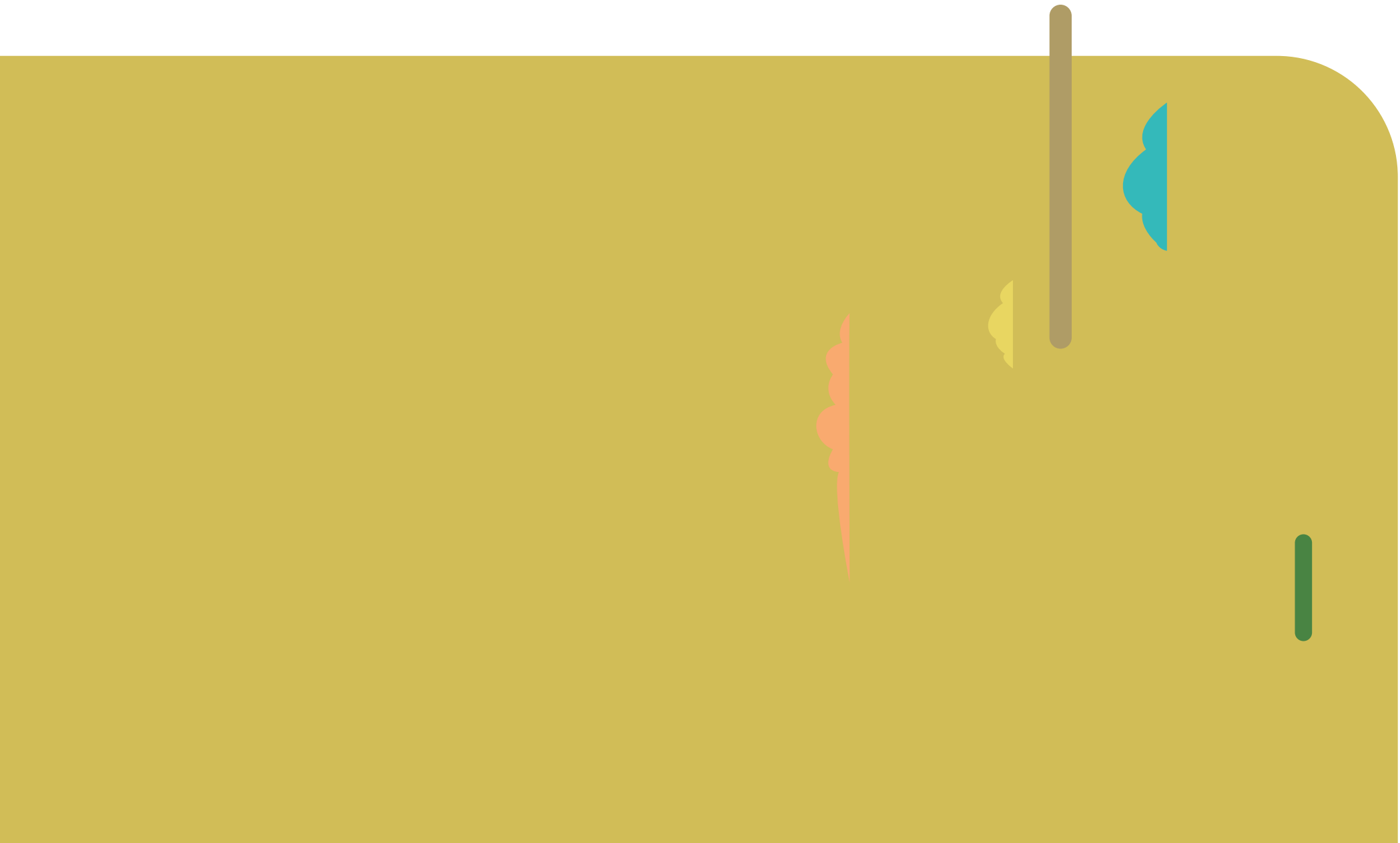
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教育宣導
Educational promotion



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第五章

教育宣導



有鑑於孕婦及哺乳婦可能對部分重金屬（如：甲基汞等）的危害較為敏感，所以衛福部國民健康署出版之「孕婦衛教手冊」，針對懷孕或授乳的婦女，建議攝取各種小型魚類，以達到補充魚類營養素及分散汞重金屬濃度累積風險之功效。

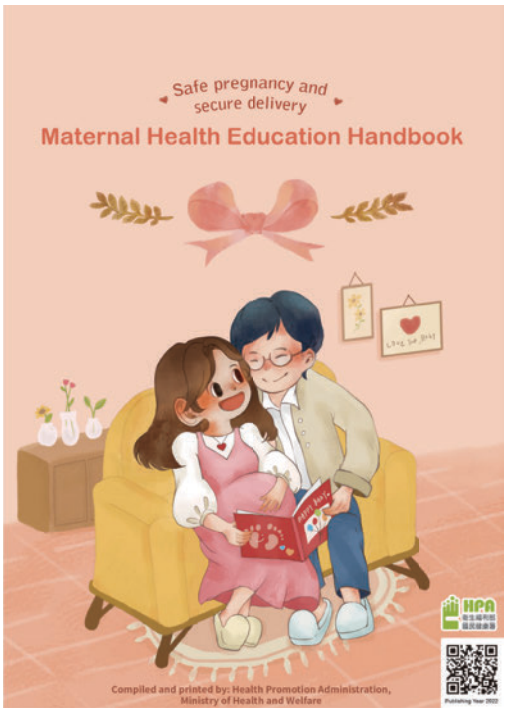
衛福部食品藥物管理署出版之「孕婦、育齡婦女及 1~6 歲兒童魚類攝食指南」，針對敏感族群提出魚類攝食量，建議孕婦及育齡婦女每週攝食大型魚類（如鯊魚、旗魚、鮪魚和油魚等）量，不宜超過 35~70 公克，6 歲以下兒童每個月以攝食不超過 35 公克為宜。

環境部建置汞水俁公約資訊網站，引導民眾了解汞對環境與人體的危害以及避免影響的方式。



Educational promotion and International Cooperation

Pregnant women and nursing mothers may be more sensitive to some of the heavy metals (e.g. methyl mercury..., etc.), so far Health Promotion on Administration, MOHW, has published the “Maternal Health Education Handbook”, it is recommended pregnant women and nursing mothers to obtain the necessary nutrients and spread the risk by taking moderate amounts of other small fish.



The Food and Drug Administration, MOHW, publishes the "Guidelines on Fish Intake for Pregnant Women, Women of Childbearing Age, and Children from 1 to 6 Years Old", which proposes fish intake for sensitive groups. It is recommended that weekly consumption of large fish (such as sharks, swordfish, tuna, and oilfish) for pregnant women and women of childbearing age should not exceed 35 to 70 grams. Children under 6 should not consume more than 35 grams per month.

The MOENV has established the Minamata Convention on Mercury information website to make the public understand the harm of mercury to the environment and the human body, as well as the ways to avoid it.

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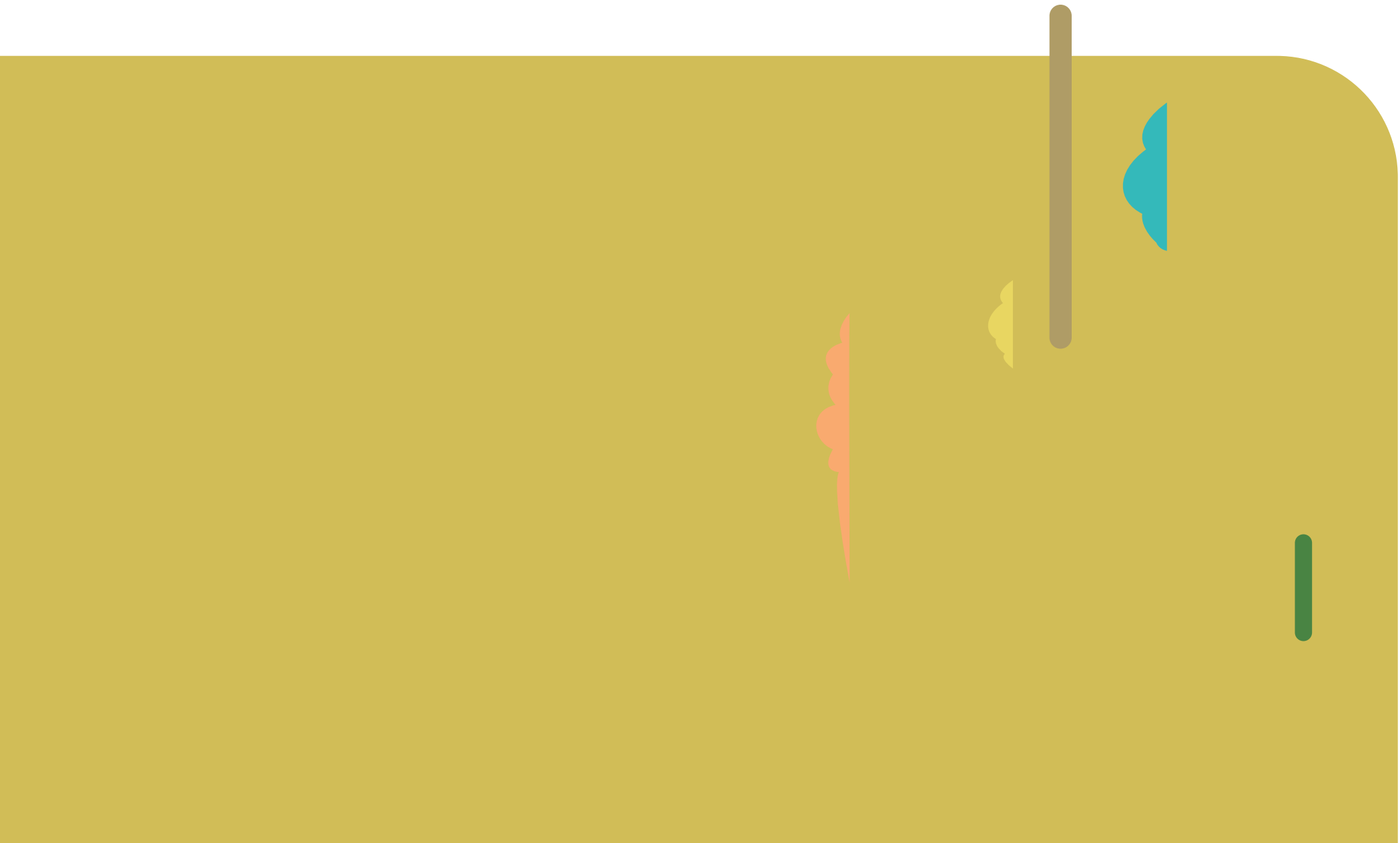
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結語
Conclusion



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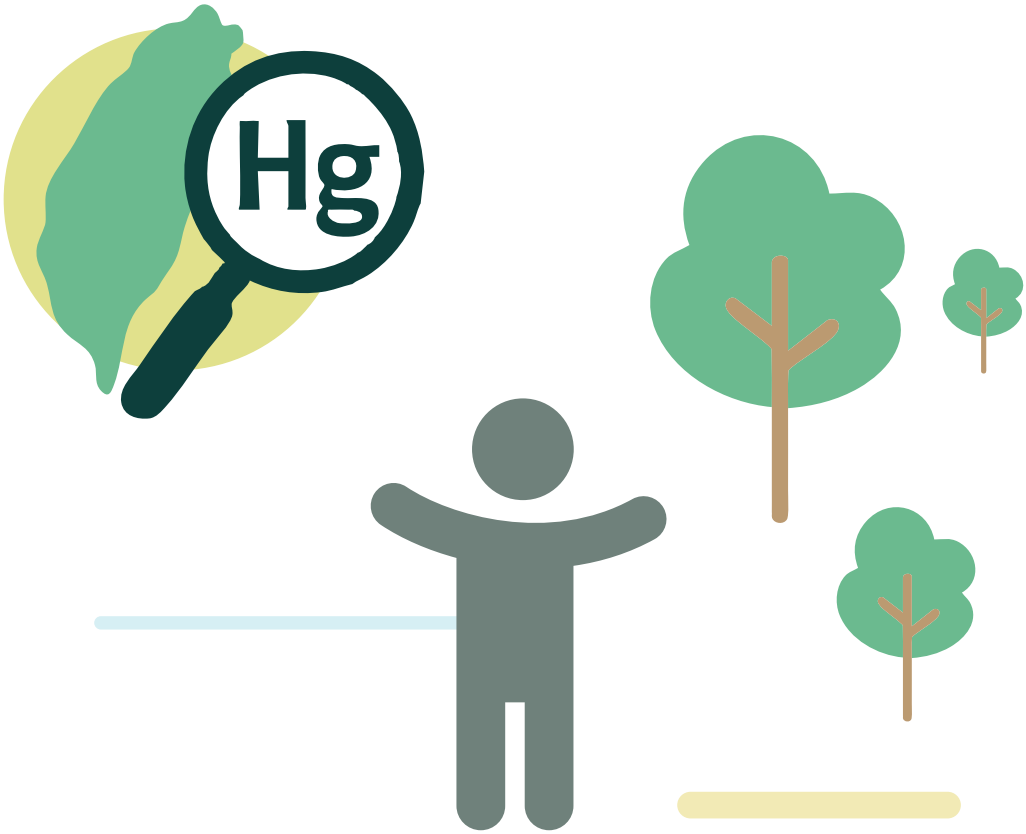
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第六章

結語

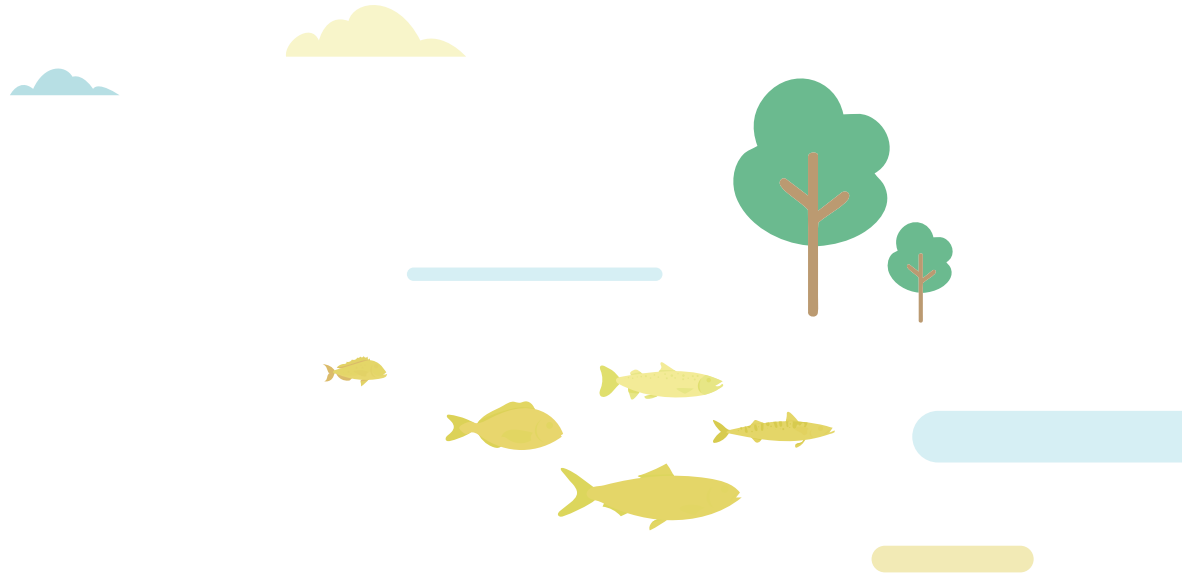
為了減少國人汞物質暴露及確保民眾健康生活環境，臺灣仍會持續關注汞公約最新發展，加強跨部會協力合作，推動減少汞之源頭使用，逐步淘汰含汞產品，鼓勵產業使用無汞替代品，加強含汞廢棄物管理，減少汞向環境之排（釋）放。並透過環境介質、生物基質、食品與商品中汞之監控，掌握環境中之汞流布，持續加強教育宣導，提升民眾環境保護意識，共同達成維護環境安全，營造健康永續之生活環境。



Chapter6

Conclusion

In order to reduce the mercury exposure and ensure a healthy living environment for the people, Taiwan authority will keep paying attention to the latest developments of the Convention, strengthen cooperation among departments, promote the reduction of mercury sources, phase out mercury-added products, encourage industries to use mercury-free alternatives, strengthen the management of mercury waste, and reduce the emission/release of mercury to the environment. By monitoring of mercury in environmental media, biological substrates, food, and commodities, we may understand the mercury distribution in the environment. The education and public awareness will be promoted continuously to enhance the public's consciousness of environmental protection that the government can create a healthy and sustainable living environment with the people collaboratively.

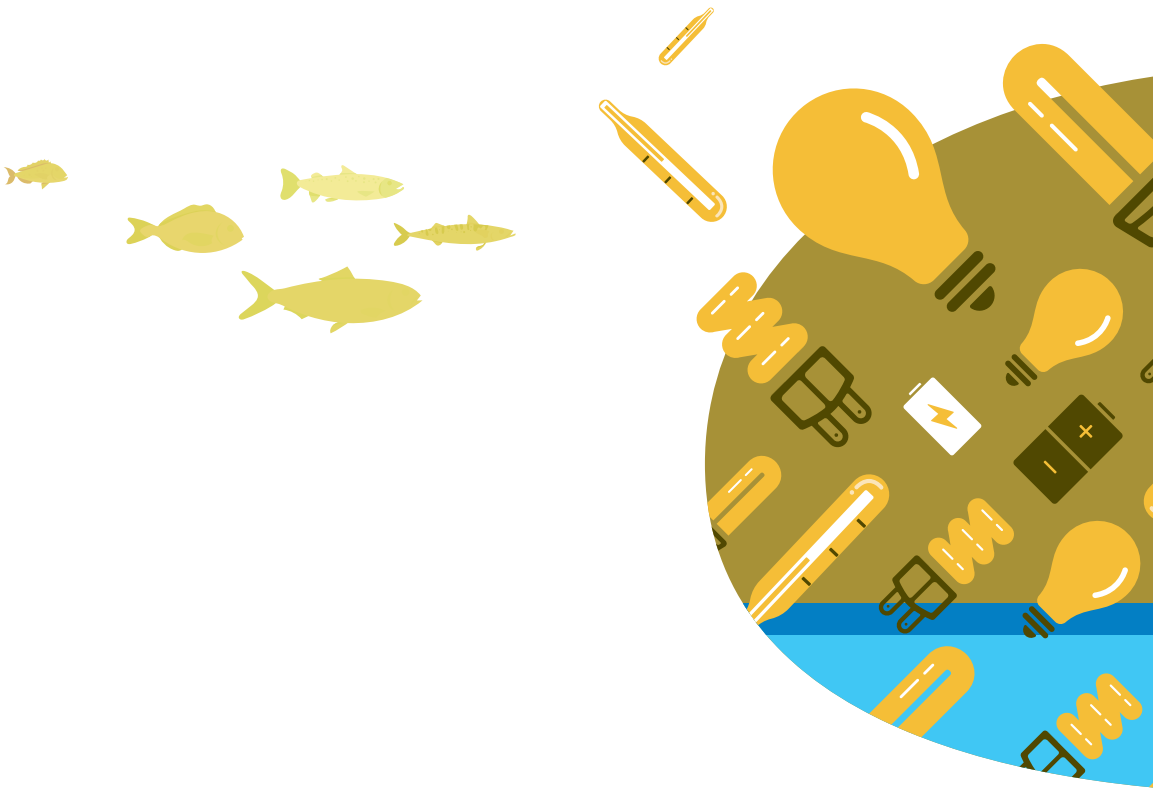


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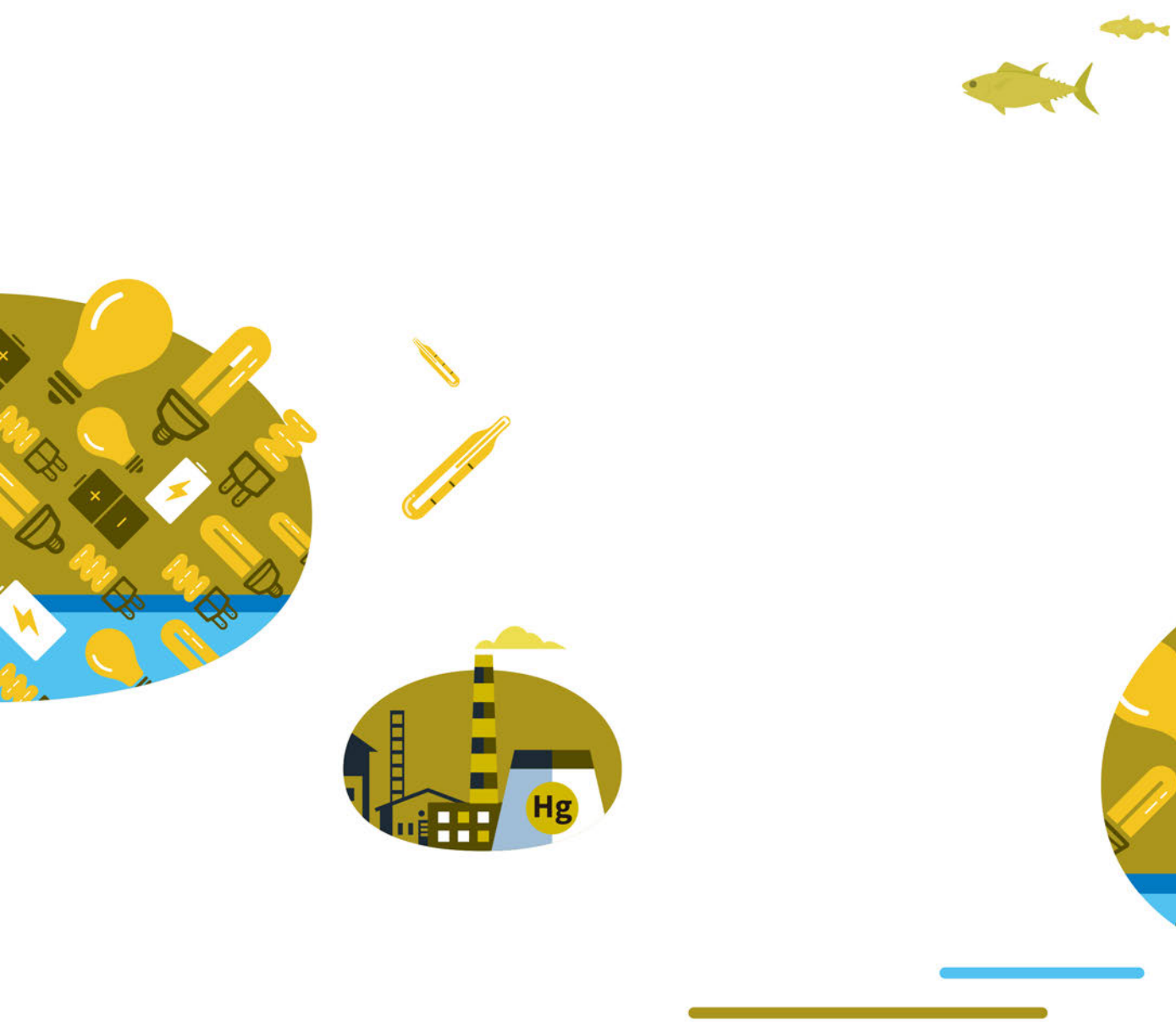
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環境部化學物質管理署
Chemicals Administration
Ministry of Environment