

# 2019 Annual Report

行政院原子能委員會  
108 年年報

The logo for the Atomic Energy Council (AEC) consists of the letters 'A', 'E', and 'C' in a bold, blue, sans-serif font. The letters are slightly shadowed and have a small circular dot at the bottom of each letter. The logo is centered within a large, stylized graphic of a DNA double helix. The helix is composed of numerous small, colorful circles in shades of blue, yellow, orange, and green, arranged in two parallel strands that curve upwards and then downwards. The background of the cover features faint, light gray molecular structures and a green silhouette of a family (a man, a woman, and two children) walking on a grassy hill at the bottom right.

Atomic Energy Council,  
Executive Yuan



放射性廢棄物處置概念影片

# 2019 108 年年報 Annual Report

# AEC Atomic Energy Council, Executive Yuan

AEC of the People Guardian of Nuclear Safety 全民的原能會 核安的守護者



行政院原子能委員會  
ATOMIC ENERGY COUNCIL, EXECUTIVE YUAN

行政院原子能委員會 編印



# Words from the Minister and 原能會願景 Chairman

## 主委的話

原能會是我國原子能安全管制的主管機關，有感於過往與民溝通的方式較為傳統，因此在 108 年原能會捨棄舊思維，導入設計能量，結合所屬單位，以貼近民眾生活的原子能科技之識及「環保、永續、友善環境」為策展的規劃內容，近距離與民眾接觸，並運用互動體驗、闖關遊戲及同仁們親切淺顯的說明，讓民眾對原子能科技帶來的驚奇與樂趣有感，並創造 3 場生動有趣、「接地氣」的科普活動！

回顧 108 年原能會的工作，除了以原子能科技科普展公開資訊，並擴大社會各界參與和溝通，爭取民眾的信任外；另為照顧輻射屋居民，原能會亦擴大辦理年輻射劑量為 1 至 5 毫西弗的輻射屋居民免費健康檢查；在環境輻射監測方面，持續新增全國輻射自動監測站 6 站，使總站數達到 57 站，讓全國輻射偵測網更為綿密；還持續發展核電廠除役、核後端、核醫藥物、放射醫材與綠能科技等有關技術。

在核能安全方面，台電公司在取得核一廠除役許可後，核一廠於 108 年進入除役階段。原能會在除役期間將視察及審查台電公司執行的相關作業，確認台電公司確實依除役計畫，推動除役拆除等作業，並妥善辦理除役期間各項輻射防護、用過核子燃料與放射性廢棄物管理、環境輻射監測及工程管理工作，以維護民眾健康與環境安全。

原能會秉持政府非核家園的政策，施政主軸就是「如期除役」以及「核廢處理」，因此我希望同仁，在原子能安全的監督工作上，務必要嚴守中立、資訊公開透明，並且秉持專業向民眾說明。未來面對核二、三廠的除役管制工作，更應主動與全民進行對話與討論，廣泛聽取各界意見，除提升全民對原能會施政措施的參與外，並可於決策時納入公眾之意見，使原能會獲得民眾的信任與支持，成為「全民的原能會」。

主任委員

謝曉星

AEC is Taiwan's competent authority for nuclear safety and regulation. Because we feel that the methods we used to communicate with the public in the past were overly traditional, we discarded the old way of thinking in 2019 and introduced a design to combine all our subordinate units. Atomic energy technology and knowledge more in touch with people's lives and an exhibition theme of "environmental protection, sustainability, and environmental friendliness" are used to narrow the communication gap with the public. Interactive experiences, games, and easy-to-understand explanations by our colleagues provide people with fun offered by interesting atomic energy technology. Three lively science exhibition activities have been created to be more "in touch with the people!"

In 2019, AEC not only published information at the atomic energy technology science exhibition, but also expanded social participation and communication to gain the public's trust. To ensure the health of people living in radioactive houses, we have increased free healthcare checkups to people with exposure to 1 – 5 mSv of radiation. In 2019, six automated radiation monitoring stations were established across Taiwan to monitor environmental radiation, increasing the total number of radiation monitoring stations to 57, thereby providing Taiwan with a denser radiation detection net. In addition, we continue to develop technology related to nuclear power plant decommissioning, nuclear back-end, nuclear medicine, radioactive medical material, and green energy.

In regard to nuclear safety, Taipower has obtained the decommissioning permit for the Chinshan Nuclear Power Plant, which entered the decommissioning stage in 2019. During the decommissioning stage, AEC will observe and review Taipower's implementation to ensure that Taipower complies with the decommissioning plan during the decommissioning process, while ensuring adequate management and oversight for radiation protection, spent fuels and radioactive wastes, environmental radiation monitoring, and construction during decommissioning to ensure the safety of the public and the environment.



AEC adheres to the government's nuclear-free homeland policy. Our main themes are "on-schedule decommissioning" and "nuclear waste management". Thus, I implore all colleagues to maintain neutrality and information transparency in their nuclear safety regulation work, as well as provide professional explanation to the public. In the future decommissioning of the Kuosheng Nuclear Power Plant and the Maanshan Nuclear Power Plant, we will actively engage the public in dialogues and discussions, and listen to opinions from different fields. In addition to increasing public participation in our administrative measures, we will include public opinions when making decisions so that we can gain the trust and support from the public to become "AEC of the people".

Minister and Chairman

## 2019 Annual Report

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行政院原子能委員會 108 年年報



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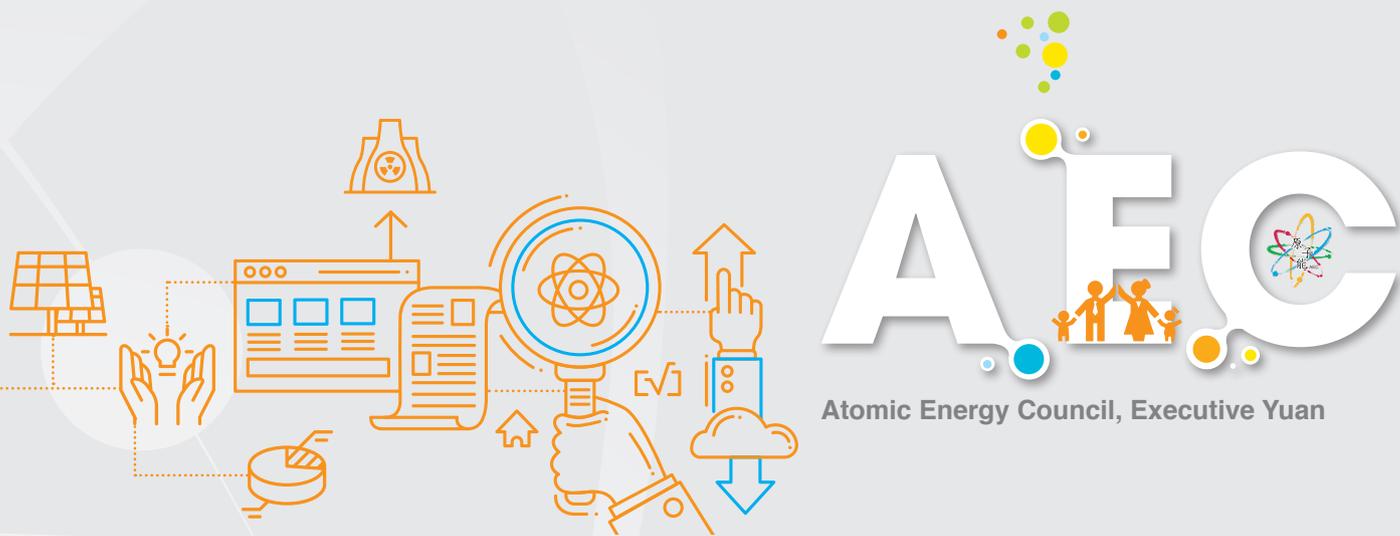
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# Organizational Structure

## 組織架構



A.E.C



### 委員會議

原能會委員係由行政院就有關機關人員或學者專家派兼或聘兼。

### 主任委員

### 副主任委員

### 主任秘書

綜合計畫處

核能管制處

輻射防護處

核能技術處

秘書處

人事室

主計室

政風室

核能研究所

放射性物料管理局

輻射偵測中心

核子事故緊急應變基金管理會

內部委員會

原子能科學技術研究發展成果審議委員會

核子反應器設施安全諮詢會

核能四廠安全監督委員會

游離輻射安全諮詢會

放射性物料安全諮詢會

國家賠償事件處理會

法規委員會

性別平等專案小組

性騷擾申訴處理委員會

訴願審議委員會

核子事故調查評議委員會★

核子事故復原措施推動委員會★

★為非常設之委員會



**Council member meetings**

The Atomic Energy Council members are appointed by the Executive Yuan from the personnel of relevant government agencies, scholars or experts.

- Minister
- Deputy Minister
- General Secretary

- Department of Planning
- Department of Nuclear Regulation
- Department of Radiation Protection
- Department of Nuclear Technology
- Secretariat
- Personnel Office
- Accounting Office
- Government Ethics Office

- Institute of Nuclear Energy Research
- Fuel Cycle and Materials Administration
- Radiation Monitoring Center

- Nuclear Emergency Response Foundation
- Internal Council Member Committee, Consultation Committee
- Evaluation Committee on Research and Development Achievements
- Advisory Committee on Nuclear Facility Safety
- Supervising Committee on Nuclear Safety of the Lungmen Station
- Advisory Committee on Ionizing Radiation Safety
- Advisory Committee on Radioactive Materials Safety
- Advisory Committee on Handling of State Compensation Cases
- Advisory Committee on Nuclear Legislation
- Gender Equality Committee
- Complaints Committee against Sexual Harassment
- Appeal Review Committee
- Nuclear Accident Investigation and Evaluation Committee ★
- Nuclear Emergency Recovery Committee ★

★ non-standing committee

## 3

參

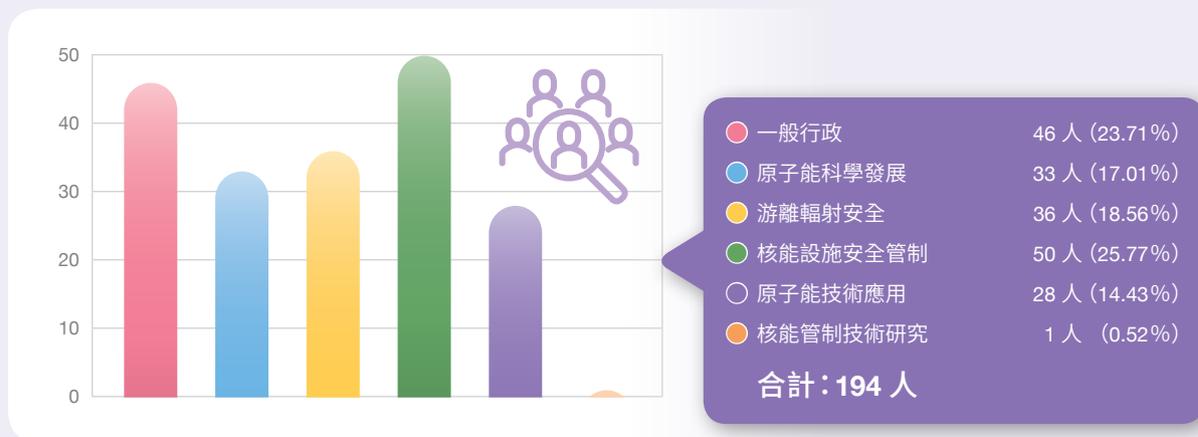
# Manpower and Budget

## 人力與經費

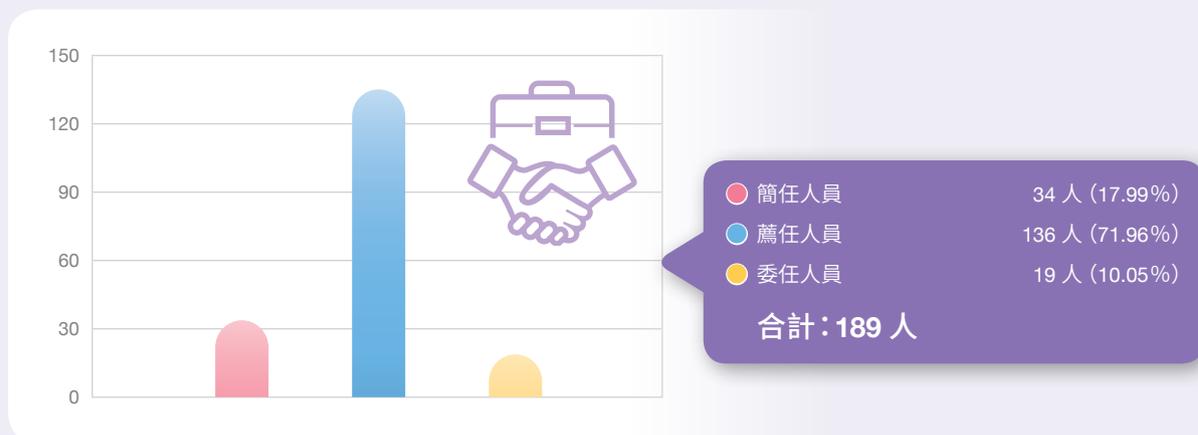


## 行政院原子能委員會

### 一、108 年度職員 (含聘用人員 5 人) 業務性質分配



### 二、108 年度職員官等分配

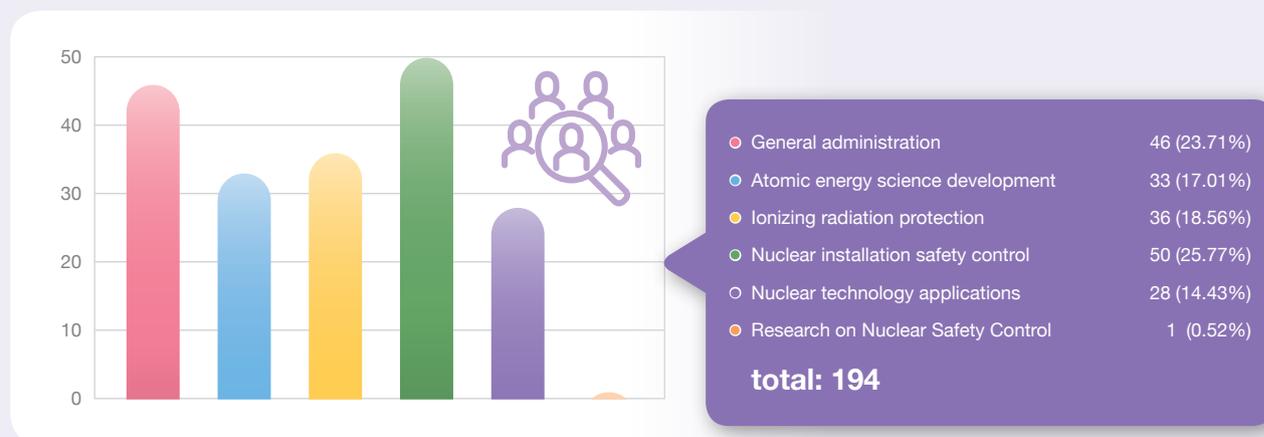


### 三、108 年度經費支用概況

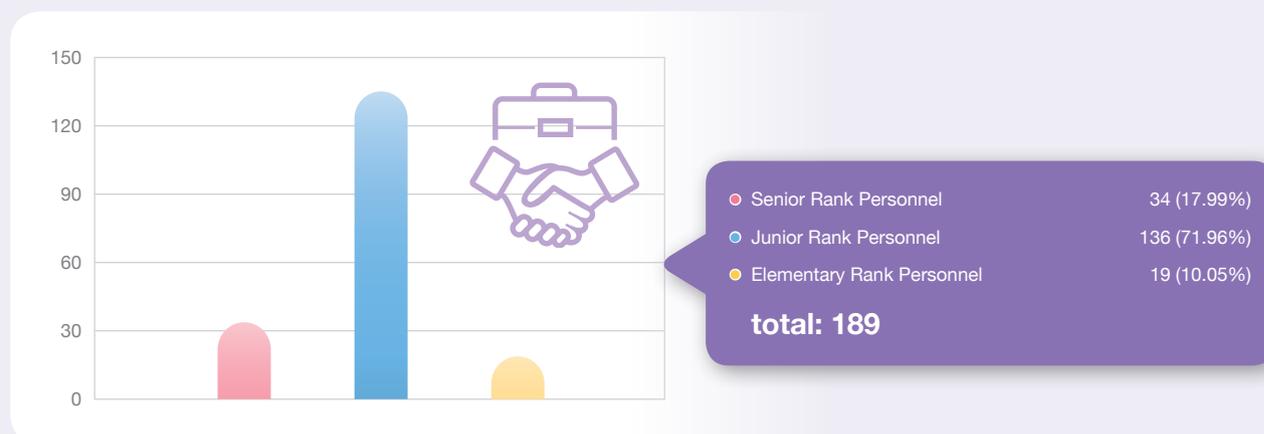


## The Atomic Energy Council

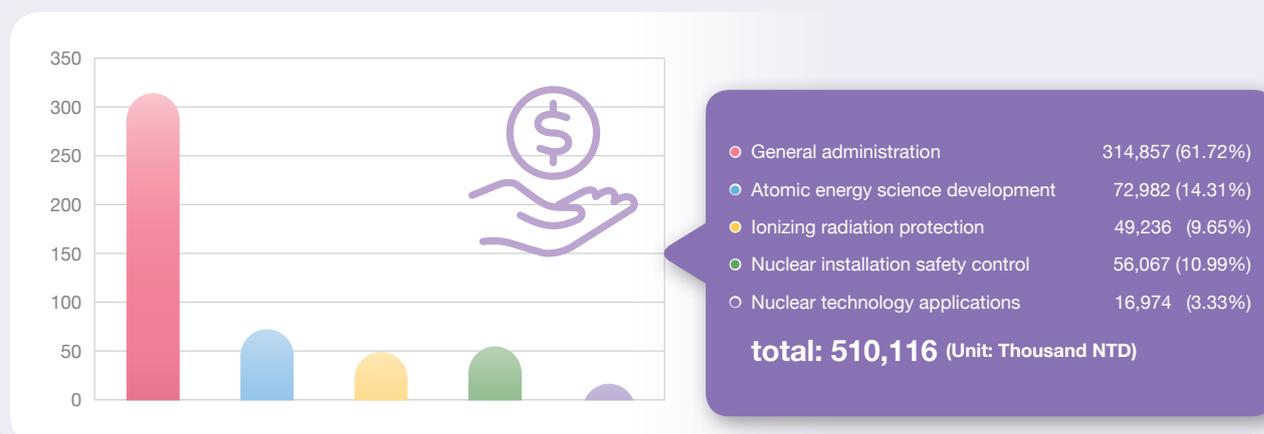
### A. 2019 Human Resources Breakdown (Including five hiring staffs)



### B. 2019 Employee Ranking Breakdown



### C. 2019 Budget / Expenditure Allocation



# 4

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## Important Governance Outcomes

### 重要施政成果





AEC



第 5 屆台日核能管制資訊交流會議與會人員合照

Group photo of the 5<sup>th</sup> AEC-NRA Nuclear Regulatory Information Exchange Meeting

## 一、國際核安管制合作交流紀要

為吸取國際相關經驗，使我國非核家園政策得以順利推動與執行，原能會持續深耕於美、日兩國雙邊國際合作交流。「第 5 屆台日核能管制資訊交流會議」業於 7 月 16 至 17 日於東京舉行，由原能會綜計處王處長率團出席；台灣日本關係協會、日本台灣交流協會亦派員到場致詞。會中除分享雙方電廠安全相關管制近況，以及核電廠資通安全管制之外，日方亦簡報目前福島電廠災後相關管制近況。會後我方一行亦赴福島電廠及周圍相關機構與設施參訪，透過實地走訪了解當地目前復原近況。

2019 年台美民用核能合作會議，亦於 12 月 17 至 18 日假台北市舉行。會中循例我方就目前原能會管制近況、核電廠除役管制作業、後端處置計畫執行情形、相關研究計畫之進展等方面簡報；亦討論雙方合作項目之執行情況並規劃來年之交流內容，目前合作項目共有 64 項。會後於 12 月 19 日與美方訪團共赴核研所參訪，向訪賓一行介紹我國能源相關科技應用之發展近況。

## A. Summary of International Cooperation and Exchange on Nuclear Safety Regulation

In order to draw on the relevant experiences of the international community and to successfully implement the Nuclear-Free Homeland Policy, the Atomic Energy Council (AEC) continues to engage in bilateral cooperation and exchanges with the United States and Japan, respectively. The 5<sup>th</sup> “AEC-NRA (the Nuclear Regulation Authority of Japan) Nuclear Regulatory Information Exchange Meeting” was held on July 16<sup>th</sup> and 17<sup>th</sup> in Tokyo, and the AEC delegation was led by Director General Wang of the Department of Planning; both the Taiwan-Japan Relations Association and the Japan-Taiwan Exchange Association sent staffers to the meeting to give speeches. In addition to sharing updates on nuclear power plant safety-related and cyber security regulation from both sides, the Japanese delegation also shared the current status of related regulations after the Fukushima Daiichi nuclear accident. After the meeting, the Taiwan delegation also visited the Fukushima Daiichi Nuclear Power Plant and its surrounding institutions and facilities to learn the local recovery progress.

The 2019 TECRO (Taipei Economic and Cultural Representative Office) - AIT (American Institute in Taiwan) Joint Standing Committee (JSC) Meeting on Civil Nuclear Cooperation was held on December 17<sup>th</sup> and 18<sup>th</sup> in Taipei City. As per routine, the Taiwan delegation reported on the AEC’s recent regulatory status, nuclear power plant decommissioning regulatory measures, implementation of back-end disposal plan, and developments in related research projects. Both parties also discussed bilateral cooperation items and implementation status, as well as planned future exchanges. Currently, there are 64 cooperation items. After the meeting, on December 19<sup>th</sup>, the US delegations visited the Institute of Nuclear Energy Research (INER), where the staff presented Taiwan’s recent developments on energy-related technology and applications to the guests.



2019 台美民用核能合作會議與會單位代表合照

Group photo of participants at the 2019 TECRO- AIT JSC Meeting on Civil Nuclear Cooperation

## 二、「資訊透明 民眾參與」完備資訊公開及強化溝通

### (一) 資訊透明

#### 1. 開放監督 強化公眾參與除役乾貯安全管制

原能會迄今已辦理 16 次「核一廠除役及乾式貯存訪查活動」，邀請新北市政府、石門區公所與里長、地方代表及環保團體參加，實地訪查並聽取與會代表建言。為有效提升民眾對核一廠除役及乾貯安全管制的了解，落實民眾參與及資訊公開，本年度辦理 2 次訪查活動。

108 年 5 月 23 日於台電公司核一廠辦理用過核子燃料乾式貯存設施統合演練作業期間，舉辦訪查活動，邀請訪查代表實地觀摩相關作業演練。本次訪查活動由台電公司簡報「核一乾貯 108 年度實作訓練規劃」及「核一乾貯邊坡穩定自動化監測設備更新作業」，並安排現勘乾貯場邊坡穩定措施，由台電公司介紹水土保持各項工程與自動化監測設備。最後進行訪查後會議，聽取與會代表建言。

原能會於 106 年 6 月完成核一廠除役計畫安全審查作業，108 年 7 月 12 日核發核一廠除役許可，並自 7 月 16 日起生效，核一廠正式進入除役階段。為增進核一廠除役管制資訊公開透明，促進各界了解，於 108 年 9 月 26 日辦理訪查活動，邀請訪查代表現勘核一廠除役的必要設施之二期乾貯設施預定地。本次訪查活動分別由台電公司及原能會簡報「核一廠除役作業近期規劃及辦理情形」、「核一廠除役許可核發作業管制」，最後進行訪查後會議，充分聽取並討論與會代表建言，有關訪查代表對於地方回饋、除役及乾貯安全等議題，原能會將持續追蹤台電公司辦理情形，並上網公開。

原能會持續推動公眾參與，做好公眾溝通。除了定期公開核一廠除役及乾式貯存安全管制資訊外，訪查活動有關訊息，亦會登載於原能會網站，以落實資訊公開透明，讓民眾能夠安心、放心。



核一廠除役及乾式貯存訪查活動

Chinshan Nuclear Power Plant decommissioning and dry storage site-visit activity

## B. “Information Transparency and Public Participation” – Integrated Information Disclosure and Improved Communication

### (A) Information transparency

#### 1. Openness for supervision – improving public participation in dry storage safety regulation during the decommissioning period

To date, AEC has conducted 16 “Site Visits to Chinshan Nuclear Power Plant Decommissioning and Dry Storage Facilities”. For each event, officials from New Taipei City Government, village chiefs of Shimen District, and representatives from local communities and environmental groups were invited to take part in on-site visits and provide their suggestions. To effectively improve the public’s understanding of the Chinshan Nuclear Power Plant’s decommissioning and dry storage safety regulation, and to realize public participation and information disclosure, two visits were organized this year.

On May 23, 2019, Taipower’s Chinshan Nuclear Power Plant organized an integrated drill for dry storage facility. During the drill, a visit was organized and representatives were invited to observe the drill on site. During the visit, Taipower reported on the “2019 Chinshan Nuclear Power Plant dry storage drill plan” and the “Automated monitoring equipment update for Chinshan Nuclear Power Plant’s dry storage slope stabilization.” Site survey of the dry storage site’s slope stabilization measures was arranged, where Taipower introduced water and soil conservation works and automated monitoring equipment. After the site visit, a post-survey meeting was conducted to hear the recommendations from the representatives.

The AEC completed the safety review of Chinshan Nuclear Power Plant’s decommissioning plan in June 2017. After the Environmental Protection Administration (EPA) approved Taipower’s environment impact report, AEC issued the decommissioning permit for the Chinshan Nuclear Power Plant on July 12, 2019, and the permit went into effect on July 16<sup>th</sup>, the day Chinshan Nuclear Power Plant officially entered the decommissioning period. To increase the disclosure and transparency for Chinshan Nuclear Power Plant’s decommissioning regulatory information and to promote understanding in various fields, a site visit was organized on September 26, 2019. Representatives were invited to visit the site for the planned second-phase dry storage at Chinshan Nuclear Power Plant that is necessary for decommissioning. For this visit, Taipower and the AEC reported on the “near-term Chinshan Nuclear Power Plant decommissioning plan and implementation status,” and the “Regulation on issuing Chinshan Nuclear Power Plant decommissioning permit” respectively. After the visit, a post-survey meeting was held to hear and discuss the recommendations from the representatives. The AEC will follow up on Taipower’s handling of matters that the representatives brought up, such as local give-back, decommissioning and dry storage safety. Relevant information has been disclosed on the AEC’s website.

The AEC remains committed to promoting public participation and communication with the public. In addition to periodically disclosing relevant Chinshan Nuclear Power Plant decommissioning and dry storage safety regulation information, AEC also publishes information on its website about visits for information disclosure and transparency so as to enhance public’s confidence and peace in mind.

## 2. 推動地方民眾參與蘭嶼地區環境輻射平行監測活動

為落實資訊公開、民眾參與及第三方驗證取樣偵測分析，原能會於5月7日至8日連續第9年辦理蘭嶼地區環境輻射平行監測作業，邀請蘭嶼當地民眾、蘭嶼鄉公所、蘭嶼鄉代會、台東縣政府及原住民族委員會等共同參與，一同進行蘭嶼各部落之環境取樣作業，以了解蘭嶼地區環境輻射情形。

為使參與人員了解取樣作業流程，假台電公司蘭嶼貯存場會議室進行取樣作業說明會，分別採集六個部落的農產品、土壤、水樣及草樣等環境試樣各3份，採樣地點由參與民眾指定，後續樣品分析工作委由經財團法人全國認證基金會（TAF）認證的清華大學原子能科學中心執行，另分送樣品至輻射偵測中心及台電公司放射試驗室進行比對驗證。

試樣分析結果報告由清華大學原科中心直接寄送各參與單位，原能會亦將該分析報告公開於官方網站。自100年起歷年的蘭嶼環境試樣分析結果，均在背景劑量變動範圍內，沒有發現輻射異常。



蘭嶼環境輻射平行監測作業前說明會  
Briefing session before the Environmental Radiation Parallel Monitoring Activity in Lanyu Area



蘭嶼環境輻射平行監測參與人員合照  
Participants of the Environmental Radiation Parallel Monitoring Activity in Lanyu Area

## 2. Promoting local residents to participate in the Environmental Radiation Parallel Monitoring Activity in Lanyu Area

To meet the objectives of information disclosure, public participation, and environmental radiation sampling and analysis by third-party, the AEC organized the Environmental Radiation Parallel Monitoring Activity in Lanyu Area for the consecutive ninth year on May 7<sup>th</sup> and 8<sup>th</sup>, 2019. Lanyu residents and officials from the Lanyu Township Office, the Lanyu Township representative council, the Taitung County Government, and the Council of Indigenous Peoples were invited to take part in the environmental sampling processes to comprehend environmental radiation in the Lanyu Area.

To facilitate the participants' understanding of the sampling procedure, a briefing session was held in the meeting room of Taipower's Lanyu Storage Site. Three sets of samples comprising agricultural products, soil, water, and grass samples were taken in each of the six tribes, and the sampling locations were designated by the participants. The follow-up sample analysis was conducted by the Nuclear Science and Technology Development Center (NSTDC), National Tsing-Hua University (NTHU), which was accredited by the Taiwan Accreditation Foundation (TAF). The other two sets of samples were sent to AEC Radiation Monitoring Center and Taipower Radiation Laboratory for validation.

The sample analysis results were sent by NTHU-NSTDC to each of the participating group and disclosed on the AEC website. Since 2011, no abnormal radiation has been detected in the environmental samples collected in Lanyu area. All data and the derived radiation doses are within the variation range of background radiation.



蘭嶼環境輻射平行監測活動－採集水樣及草樣

Environmental Radiation Parallel Monitoring Activity in Lanyu Area – collecting grass and water samples

## (二) 民眾參與

### 1. 讓我們玩在一起 原子能科技科普展

原能會為營造優質科普學習環境，使全民共享精采的科普資源，除持續與國立臺灣科學教育館合作，參加新竹縣及苗栗縣科學園遊會、第 59 屆中小學科展科學博覽會及「科學玩意節」活動外，更融合新興載具互動體驗、闖關遊戲、簡淺解說及社群直播等多元活動，自行辦理 3 次原子能科技科普展，分別是 108 年 2 月 15 日至 17 日及 7 月 5 日至 8 日在台北華山文創產業園區，以「認識生活中科學的大小事」、「原子能小知識」及「Fun 科學」為策展主軸，分別有 3,551 及 10,333 的參觀人次；另在 6 月 22 日至 23 日於台中至善國中辦理社區型「環保、生活、酷科學」原子能科技科普展，有 1,156 人次參觀，此外還結合暑期學習單甄選獎勵方式，鼓勵老師引導國小學生將原子能科普知識與生活經驗結合，提昇學生的學習興趣，獲得甄選優選的學生有 42 人、佳作有 126 人。

每場科普展原能會都近距離與民眾接觸互動，並受到參觀民眾及多位立法委員的肯定，以及獲得媒體報導是生動有趣、「接地氣」及貼近民眾生活的科普展。未來在原子能科普教育的路途上，應盡量發揮多元化的「過程」學習，相信每個孩子都是小小科學家的種子，總會有一畝適合的田地，供他們發芽成長並開花結果！



7 月 5 日科普活動開幕儀式

Opening ceremony of science fair on July 5<sup>th</sup>



「環保、生活、酷科學」原子能科技科普展暑期學習單

“Environmentally friendly, life, and cool science” atomic science fair summer learning list



暑期學習單甄選獲獎學生合影

Group photo of the summer learning sheet selection award students

## (B) Public participation

### 1. Let's have fun together – the atomic science exhibition

In order to create a superior science learning environment so that the public can share marvelous science learning resources, the AEC is not only cooperating with the National Taiwan Science Education Center and participating in the Hsinchu County and Miaoli County science fairs, the 59<sup>th</sup> National Primary and High School Science Fair, and “Science Carnival” activities, but is also integrating new carrier interactive experiences, games, simple explanations, and social media streaming activities. The AEC organized three atomic science fairs in 2019, two of which were held at the Huashan 1914 Creative Park from February 15<sup>th</sup> to 17<sup>th</sup> and from July 5<sup>th</sup> to 8<sup>th</sup>, respectively. The themes for these two fairs were “getting to know science in daily life”, “atomic energy knowledge” and “fun science” ; overall, 3,551 and 10,333 people attended, respectively. The third fair was held at the Taichung Municipal Chih Shan Junior High School from June 22<sup>nd</sup>-23<sup>rd</sup>. This fair was a community oriented “environmentally friendly, daily, and cool science” atomic science fair that was visited by 1,156 people. Furthermore, the summer learning sheet selection reward method was adopted to encourage teachers to help elementary school students synthesize atomic science knowledge with everyday living experience, thereby increasing students’ learning interests. Overall, 42 students were selected for superior work awards, and 126 students received fine work awards.

For each science fair, the AEC interacted closely with the public and received the recognition from visitors and several legislators. The media reported that the science fair was lively, fun, down-to-earth, and close to people’s everyday life. In the future, the AEC will work towards diversifying “process” learning in atomic science education. We believe that every child has the potential to be a scientist, and that one day each will find the field most suited for them and develop their potential!



主任委員與小朋友互動體驗遊戲  
The Minister interacting with the children



民眾踴躍參觀原子能科技科普展  
People visiting the atomic science fair



直播報導方式宣傳科普展活動  
Using streaming to promote science fair activities

## 2. 辦理核二廠除役計畫審查地方說明會

原能會為周延核二廠除役計畫安全審查作業，於 107 年 12 月 27 日收到台電公司提報之核二廠除役計畫及相關文件後，即召集專家學者與會內同仁組成專案審查團隊，並將除役相關資料公布於原能會對外網頁。原能會於 108 年 3 月 22 日邀請核電廠所在地之地方政府與民意代表、公民團體等參加核二廠除役計畫審查地方說明會，傾聽地方公眾意見，作為審查作業之參考。會議除由台電公司與原能會分別簡報除役規劃現況與除役計畫審查作業外，並開放與會人士進行意見表達，所提意見涵蓋乾貯與廢棄物處置安全及時程、地方回饋與就業等議題。原能會並就民眾所提意見提出回應，讓民眾了解原能會對除役安全之管制作為。原能會另已將會議紀錄及回復說明等公開於對外網頁，供民眾參閱。原能會秉持除役安全主管機關的角色，嚴格審查除役計畫，並持續落實資訊公開，強化公眾參與，使除役安全管制作業更為完善。



原能會張欣處長於核二廠除役計畫審查地方說明會致詞  
AEC Department Director General Chang gave a speech at the public meeting of the Kuosheng Nuclear Power Plant decommissioning plan review



與會來賓於核二廠除役計畫審查地方說明會表達意見

Participants of the Kuosheng Nuclear Power Plant decommissioning plan review public meeting expressed their opinions

## 2. Holding a public meeting on “Reviewing the Decommissioning Plan of Kuosheng Nuclear Power Plant”

Upon receiving the request for approval of the Decommissioning Plan for Kuosheng Nuclear Power Plant on December 27, 2018, the AEC immediately organized a task force which consisted of specialists from the AEC and academia experts, and published relevant information on the AEC’s website. On March 22, 2019, the AEC held a public meeting and invited representatives from the local government, general public and non-government groups to share their thoughts and comments. During the meeting, the TPC (or Taipower) and the AEC briefed on the status of decommissioning plan and reviewing process. Participants were free to express their opinions and concerns on various topics such as the dry storage and waste disposal safety and schedule, compensation fee, and employments. In replying questions from these participants, the AEC explained its policy and strategy of regulation, and the meeting minutes and responses on these questions are published on the AEC’s website. The AEC will strictly review the decommissioning plan and disclose information to enhance public involvement and make the decommissioning regulation more comprehended.



萬里區粘區長於核二廠除役計畫審查地方說明會致詞  
Chief Nian of Wanli District gave a speech at the Kuosheng Nuclear Power Plant decommissioning plan review public meeting



與會來賓於核二廠除役計畫審查地方說明會提問  
Participants of the Kuosheng Nuclear Power Plant decommissioning plan review public meeting raised their questions

### 3. 在地參與製作核安防災地圖

為使核子事故緊急應變計畫區內民眾了解萬一災害發生，需緊急疏散時正確的避難路線，並增進民眾參與公共事務之機會，近年來原能會與專業學術團隊合作，深入核三廠週邊社區，以「里」為單位，結合在地思維與特色，逐年協助社區建立核子事故避難疏散地圖，並採用符合社區居民需求的方式呈現，例如大型看板、文宣海報、切割墊、餐墊或束口袋等，藉此方式提升民眾核安防護知識，強化災害防救中自助與互助能量，並有助社區的永續發展。迄今年已完成核三廠緊急應變計畫區全部 19 個村里的核安防災地圖，未來並將朝向北部核電廠緊急應變計畫區推動。

### 4. 執行屏東家庭訪問計畫，了解核災應變民眾需求

原能會為了解核電廠緊急應變計畫區 (EPZ) 民眾應變需求並提供相關防護資訊，108 年執行核安演習之核三廠地區實施家庭訪問，透過與里長溝通合作，由在地民眾擔任家訪員，逐戶拜訪 1 萬餘戶，藉以了解住戶對於核子事故警報聲及防護作為認識程度、家中碘片存放情形、疏散方式選擇與特殊載具需求、疏散避難選擇去處、對演習之滿意度等，並宣導防護知識，以強化民眾自我防護能力。參與里長對此做法均給予高度肯定，認為有助於民眾對防災知識的紮根，訪查過程中，原能會並發送 109 年防護月曆，希藉月曆長期保存之特性，讓防護資訊垂手可得，以及了解核災防護要領。



屏東核安防災地圖融入在地思維與特色，並以符合居民需求的方式呈現

Pingtung nuclear safety maps integrate local ideals and characteristics, and are expressed in forms that conform to the needs of residents

### 3. Local communities participated making the nuclear emergency evacuation maps

In the event of a nuclear accident, residents in the emergency planning zone (EPZ) must know the routes for evacuation. To effectively promote the public's participation in public affairs, AEC has worked with professional academic teams to establish nuclear emergency evacuation map by interacting with communities around the Maanshan Nuclear Power Plant and integrating local ideas and characteristics into the maps. These maps are rendered in a manner that conforms to the community residents' needs, such as large billboards, promotional posters, cutting mats, placemats, or drawstring pouches. Through this process, the team effectively increase the public's awareness on nuclear emergency and protective actions, improves the conception of self-help and mutual-help during disaster rescue, and also helps communities to develop sustainably. Till this year, the nuclear emergency evacuation maps for all 19 villages in EPZ of the Maanshan Nuclear Power Plant's have been completed. Next goal will be making the maps of northern nuclear power plants.



訪員於里民大會中進行宣導

Interviewers promoting safety during the village residents meeting

### 4. Implementing the Pingtung family interview plan to understand the public's needs during nuclear emergency response

To understand the needs of residents in the EPZ of nuclear power plant during an emergency response and to provide related protection information, the AEC implemented a family interview survey after the 2019 nuclear emergency exercise for the Maanshan Nuclear Power Plant area. By communicating and cooperating with village chiefs, local residents were hired to be family interviewers. Over 10,000 families were interviewed during this survey, which helped the AEC better understands how much the residents know about nuclear accident alarms and protective actions, the iodine tablet stored in homes, choice of evacuation method and special vehicle need, choice of shelters, and drill evaluation. The AEC also promoted protection knowledge to improve the public's self-protection capability. Village chiefs who participated in this event gave high recognition to this method and believe that the family interviews help the public to better understand protective actions in nuclear accident. During the interview process, the AEC also issued the 2020 protection calendar. It is expected that the long-term storage characteristic of the calendar can let people easily assess the information and essentials of protection in nuclear accident.



原能會 109 年防護月曆  
AEC's 2020 protection calendar



訪員訪問住戶情形  
Interviewers inquiring about residence situation

### 三、切實監督核電廠安全

#### (一) 完成我國首座核一廠除役許可核發作業

原能會依核子反應器設施管制法第 23 條及相關法規之規定，邀請核能安全等各領域之專家學者，與原能會各相關局處同仁組成專案審查團隊，嚴格審查台電公司所提之核一廠除役計畫，並於審查過程中，於網站設立專區，公開核一廠除役管制相關資訊，並舉辦除役審查說明會，加強公眾參與及意見搜集，增進地方鄉親對核一廠除役計畫審查結果的了解與落實資訊公開。

原能會於 106 年 6 月 28 日審查同意核一廠「除役計畫」及「技術與管理能力及財務基礎評估報告」，確認除役計畫足以保障公眾之健康安全，符合相關法令規定，且台電公司之技術與管理能力及財務狀況足以勝任除役之執行。有關核一廠除役計畫之環境影響評估則於 108 年 7 月 4 日經環保署同意符合環境保護及生態保育相關法令，原能會依法於 108 年 7 月 12 日核予台電公司核一廠除役許可，並自 108 年 7 月 16 日起生效，為我國第一座進入除役階段的核電廠。

台電公司取得核一廠除役許可後，須依核定之除役計畫執行相關作業，原能會亦於除役期間執行視察及審查作業，確認台電公司確實按照除役計畫，推動除役拆除等相關作業，並妥善辦理除役期間之各項輻射防護、用過核子燃料與放射性廢棄物管理、環境輻射監測及工程管理工作，以監督台電公司能在安全的前提下，落實完成除役各項工作，確保民眾健康與環境安全。



原能會於新北市石門區公所辦理核一廠除役計畫審查地方說明會

AEC organizing the local meeting at the New Taipei City's Shimen District Office for the Chinshan Nuclear Power Plant decommissioning plan review

## C. AEC's endeavor to effectively supervise nuclear power plant safety

### (A) Completing the issuance of the first decommissioning permit for Chinshan nuclear power plant

In accordance with the Article 23 of “Nuclear Reactor Facilities Regulation Act”, the AEC organized a task force which consisted of specialists from the AEC and experts in nuclear safety fields to scrutinize the decommissioning plan of Chinshan Nuclear Power Plant (hereafter Chinshan) that the Taiwan Power Company (TPC) submitted. In order to facilitate the public's understanding of the plan review results, as well as to meet the objective of information transparency, the AEC set up a web page dedicated to the pertinent decommissioning regulatory information about Chinshan. Besides, the AEC held public meetings to collect comments from the public and encourage public observations of review process.

The AEC approved the “Decommissioning Plan for Chinshan” and its appendix “The Report on Technical and Management Ability and Financial Assurance of Chinshan” on June 28, 2017. The review confirmed the plan of decommissioning was able to protect the public health and safety and comply with relevant regulations. Therefore, the AEC concluded that the TPC was competent both technically and administratively to decommission Chinshan. Together with the approved environmental impact assessment (EIA) report regulated by the Environmental Protection Administration on July 4, 2019, the AEC issued the decommissioning permit, the first one in Taiwan, for Chinshan on July 12, 2019, taking effect on July 16, 2019.

After the issuance of the decommissioning permit for Chinshan, the AEC will continue overseeing the TPC, to ensure that the decommissioning and dismantling (D&D) activities covering areas including radiation protection, spent fuel storage, radioactive waste disposal management, environmental radiation monitoring, and engineering management are consistent with the approved decommissioning plan therefore to assure public health and environmental safety.



原能會於核一廠舉辦核一廠除役計畫第一次訪查活動  
AEC holding the first on-site visit at the Chinshan Nuclear Power Plant for decommissioning plan oversight



原能會執行核一廠隔離停用作業視察  
AEC inspectors conducted a system isolation and suspension work inspection at the Chinshan Nuclear Power Plant



原能會執行核一廠主變壓器至開關場間  
連絡鐵塔拆除方案審查作業現場視察前會議  
AEC inspectors attended the review meeting for the removal of the transmitting towers between the main transformers and the switchyard at the Chinshan Nuclear Power Plant

## (二) 持續嚴格監督運轉與除役中核電廠安全

### 1. 嚴謹執行核一廠除役過渡階段安全管制作業

核一廠目前因乾式貯存設施尚未啟用，因此在反應器中仍存放用過核子燃料，在核一廠核子燃料未移出反應器設施前之除役過渡階段，原能會為確保核子燃料與後續除役作業安全，要求台電公司需依運轉期間設計修改管制要求，建立仍需運轉之系統設備維護測試及停用隔離作業管制機制，原能會並持續派員進行駐廠視察，以及規劃實施專案視察計畫，定期組成視察團隊赴核一廠就各項除役作業執行情形進行查核，確保台電公司落實作業管制機制與品保要求。

為督促台電公司確實按照核一廠除役計畫辦理相關作業，台電公司執行廠房建物設備等之除役拆除作業前，需檢附拆除作業計畫向原能會提出申請。台電公司於 108 年 7 月 23 日提報拆除僅具電力輸出功能之主變壓器至開關場間連絡鐵塔之拆除方案，原能會除依除役計畫就輻射影響分類及評估結果、拆除方式、應變措施、廠務管理等面向進行審視外，並赴核一廠進行現場查證，確保台電公司已依核定之拆除方案，妥適規劃拆除作業，並於 108 年 11 月 13 日審查同意台電公司鐵塔拆除方案。台電公司於 108 年 11 月 20 日展開連絡鐵塔拆除作業，原能會並持續進行視察，督促台電公司落實相關規定要求，以完成連絡鐵塔拆除工作。

## (B) Continuously overseeing operating and decommissioning nuclear power plants

### 1. Strictly regulation on the decommissioning activities of Chinshan during the transitional phase

Because of the dry storage facility is unavailable and spent fuel pools are full at the Chinshan, the spent fuels are still kept in the reactor vessels and spent fuel pools after the permanent shutdown. Therefore, many requirements based on operation status are remained effective in the transitional period to ensure the safety of spent fuels and the decommissioning works. The AEC continues to dispatch daily inspector, carry out on-site inspections and conduct team inspections on the Chinshan to ensure decommissioning activities meet safety requirements.

To ensure that the decommissioning activities are consistent with the approved decommissioning plan for the Chinshan, the TPC must submit dismantling activities plan to the AEC for approval prior to dismantling any building or facility. On July 23, 2019, the TPC applied for dismantling the electricity transmitting towers (with only power output function) between main transformers and the switchyard. The AEC not only reviewed the plan, but also conducted on-site inspections to ensure dismantling activities are consistent with the approved plan. The AEC approved the dismantling plan for towers on November 13, 2019, and the TPC began the first tower dismantlement on November 20, 2019. The AEC continues to conduct inspections to ensure that the TPC completes the dismantlement of the transmitting tower while meeting the safety requirements.



原能會執行台電公司核一廠主變壓器至開關場間連絡鐵塔拆除方案審查作業現場視察

AEC conducted the site survey for the steel tower removal project (between the main transformer and the switchyard) at the Taipower Chinshan Nuclear Power Plant

## 2. 核二廠 2 號機及核三廠 1 號機機組大修專案視察與管制作業

核二廠 2 號機及核三廠 1 號機於 108 年間分別進行機組大修作業，並於機組完成大修後起動運轉，原能會於大修期間派員加強視察並查證電廠各項作業符合安全要求，確保機組安全。核二廠及核三廠於機組進行大修作業前，依法規規定提出機組大修計畫，經原能會嚴格審查後，依大修計畫執行，原能會於大修期間執行大修專案視察，以確保台電公司各項大修作業符合要求。

原能會在台電公司完成機組大修，接獲再起動臨界申請後，進行送審文件內容審查及執行大修後加強視察，嚴格審查確認臨界申請文件、大修期間現場查證、再加強查證結果，在送審文件內容及機組現場狀態確認均可符合起動要求後，同意機組再起動申請。台電公司完成起動後各項系統功能測試提出併聯申請時，原能會亦增派視察員赴現場查證各項測試作業，審查相關申請文件，並整合起動過程間各項現場查證結果，確認機組運作狀態符合併聯要求後，才會同意併聯申請。

核二廠 2 號機及核三廠 1 號機分別於 108 年 5 月 22 日及 11 月 22 日由原能會同意機組起動運轉，並持續運轉中。108 年間各機組核安管制紅綠燈均維持綠燈，機組並未發生自動急停事件。



核二廠 2 號機第 25 次機組大修專案視察

The 25<sup>th</sup> refueling outage inspection for the Kuosheng Nuclear Power Plant Unit 2

## 2. Safety inspections and regulations for Kuosheng Nuclear Power Plant Unit 2 and Maanshan Nuclear Power Plant Unit 1 during the refueling outage

There were two refueling outage inspections conducted in 2019, one for Kuosheng Nuclear Power Plant Unit 2 (hereafter Kuosheng #2) and the other for Maanshan Nuclear Power Plant Unit 1 (hereafter Maanshan #1). Before the outage works started, an outage plan was submitted to the AEC for approval and the AEC conducted inspections to verify if the procedures were followed.

After the TPC completed the outage works, the AEC required another review and inspection before the re-startup. After re-startup and before sending out electricity to the power grid, the TPC had to perform many function tests witnessed by the AEC inspectors, and the AEC combined paper reviews to assure safety and then give permit to the TPC.

Through the above processes, Kuosheng #2 and Maanshan #1 re-started on May 22 and November 22, 2019, respectively. The two units have operated smoothly since then. There were no automatic scram in 2019 and all inspection findings show green light which means there were no safety concerns of operating power units in 2019.



核三廠 1 號機 108 年機組大修專案視察期間冷停機安全查核

Cold shutdown safety inspection during the Maanshan Nuclear Power Plant Unit 1 refueling outage in 2019

### (三) 地方參與核電廠安全管制及資訊公開

#### 1. 邀請新北市政府參與核一廠及核二廠核安管制視察

原能會為使核電廠所在地方政府了解原能會對核電廠視察管制作業情形，積極邀請地方政府參與觀察核電廠安全管制活動，其中核一廠部分，邀請新北市政府代表參與觀察原能會 108 年 11 月 20 日核一廠「消防演練成效評估」視察活動，一同赴核一廠 2 號機控制室觀察機組值班人員於失火演練狀況之通報處置情形、緊急柴油機廠房失火狀況之處置、消防設備操作演練等。核二廠部分於 12 月 3 日核二廠火災防護實際演練時，邀請新北市政府參與觀察並於演練後提出相關評核意見。



原能會及新北市政府人員於核一廠第 5 台緊急柴油機廠房內及廠房外觀察消防演練

AEC staffers and New Taipei City Government's representatives observed the firefighting drill in the Chinshan Nuclear Power Plant's 5<sup>th</sup> emergency diesel generator building and outside the building

### (C) Local government's involvement on the nuclear power plant regulation and information disclosure

#### 1. Invited the New Taipei City Government's representatives to participate in inspections at Chinshan and Kousheng nuclear power plant

To help local government understand how the AEC regulate NPPs, the AEC has actively invited local governments to participate and observe several regulatory activities. For example, the AEC invited the New Taipei City Government's officials to observe a firefighting drill at Chinshan on November 20, 2019, and at Kousheng on December 3, 2019.



原能會及新北市府人員於核一廠 2 號機組控制室外觀察台電公司值班人員消防演練

AEC staffers and New Taipei City Government's representatives observed Taipower personnel's firefighting drill response outside the control room of Chinshan Nuclear Power Plant Unit 2



原能會、新北市府及台電公司人員於核一廠消防演練後進行會議討論

AEC staffers, New Taipei City Government's representatives, and Taipower personnel exchange opinions at the Chinshan Nuclear Power Plant after the firefighting drill



原能會及新北市府人員進行核二廠不預警專案視察

AEC staffers and New Taipei City Government's representatives conducted an unannounced inspection at the Kuosheng Nuclear Power Plant

原能會於各項視察結束後，邀請新北市府代表與電廠相關人員就演練過程之觀察發現進行意見交換，並提出精進方向，以提升電廠安全。此外，原能會於 108 年間，與新北市府共同於 3 月 26 日執行第 1 次核二廠不預警視察，查證現場值班人員執勤精神狀況、抄表與記錄的正確性、系統與設備的掌握情況等，使地方政府了解原能會視察管制作為，增進其對電廠運作情形之認識，使核電廠管制及安全與運作之資訊公開透明。

## 2. 邀請屏東縣政府參與核三廠核安管制視察

原能會於 108 年 5 月 2 日邀請屏東縣政府參與觀察核三廠火災防護視察，觀察假設核三廠 2 號機汽機廠房起火，電廠消防隊之滅火作業演練，亦邀請屏東縣參與觀察人員，就核三廠演練發現進行意見交流，了解核三廠火災防護作業及原能會視察作業情形。



原能會視察人員會同屏東縣政府參與觀察人員就核三廠火災防護作業進行討論

AEC staffers and the Pingtung County Government's representatives discussing the firefighting drill of the Maanshan Nuclear Power Plant



原能會及新北市府人員視察核二廠火災防護演練

AEC staffers and New Taipei City Government's representatives observed firefighting drill at the Kuosheng Nuclear Power Plant

The local government's representatives provided comments on the drills to help improving safety. In addition, the AEC and New Taipei City Government jointly conducted an unannounced inspection at Kousheng NPP on March 26, 2019. The major activities included the verification of the alertness of plant operators, the accuracy of the meter readings and records, and system/equipment functions. This inspection helps local government's representatives to understand the AEC's regulation over NPP, so as to implement the information disclosure policy.

## 2. Invited the Pingtung County Government's representatives to participate in inspections at Maanshan nuclear power plant

The AEC invited the Pingtung County Government's officers to observe the fire protection inspection on May 2, 2019. The scenario for the drill involved a fire breaking out at Maanshan NPP unit 2's turbine building and firefighting team put out the fire. The Pingtung County Government's representatives were invited to exchange their opinions with the AEC regarding items they discovered during observations of the drill, so as to understand the fire protection and the AEC's requirements.



## 四、精進輻射防護安全管理

### (一)「保護輻射工作人員的健康」精進放射線照相檢驗業輻射防護之管制作為

放射線照相檢驗廣泛應用在工業及工程的品質驗證上，由於檢驗工作的特殊性，常常需要在夜間工作，工作環境條件不佳，工作場所空間也有限制，因此會造成較高的輻射風險。

為保護工作環境及人員的輻射安全，原能會深入檢討並參酌國際管制資訊及國內輻射事件案例，全面加強監督機制，且透過擴大教育宣導、違規業者加重處分及跨部會合作管理等措施，提升管制強度，相關說明如下：



#### 1. 加強輻射安全稽查，督促自主管理

- (1) 除例行輻射安全業務檢查外，加強執行作業現場不預警稽查。
- (2) 與事業單位合作建立共同監督機制，確實查核承攬人資格及輻射防護措施。
- (3) 規定放射照相設備最大使用射源活度由 100 居里降為 50 居里、增加照射器導管長度，要求於輻射防護不易執行之作業環境使用適當鉛衣或鉛板屏蔽。
- (4) 規劃建置線上通報平台，要求業者事前通報作業資訊，事後回報現場輻射防護管制措施等執行結果。

#### 2. 擴大教育宣導，落實輻射安全文化

- (1) 為提昇工作人員的安全意識與認知，落實輻射安全文化，每年皆辦理輻防管制宣導會，108 年更擴大辦理 10 場輻防管制宣導會，並邀請勞動部職安署派員講授游離輻射作業造成之人體危害與職業傷病權益。
- (2) 未來將持續辦理輻射安全管制宣導會，並加強宣導從業人員務必配戴劑量徽章及重視輻射作業現場之安全防護。

## D. Improving radiation protection and safety management

### (A) The health of radiation protection work personnel – improving radiographic inspection and radiation protection regulation

Industrial radiographic testing is widely used in industries and quality verification. Because of its special working condition, the inspection work must often be done at night in poor work environments. These sites often have limited space, which contributes to higher radiation risks.

To protect the work environment and personnel from radiation, the AEC has conducted in-depth discussions and referenced international regulatory information and domestic radiation events to improve oversight mechanism. We have also expanded education and propaganda, increased penalties for violators, and conducted cross-departmental cooperation management and other measures to improve regulation. Related descriptions are as follows:

#### 1. Improving radiation safety audits and promoting self-management

- (1) In addition to regular radiation safety work and checks, the number of unannounced site audits has also been increased.
- (2) Cooperate with business units to establish a mutual oversight mechanism to ensure the qualifications of contractors and radiation protection measures.
- (3) Decrease the maximum radioactivity used by radiography equipment from 100 curies to 50 curies. Increase the drive cable length for the irradiator and require the use of lead clothing or lead shield in work environments where radiation protection cannot be easily implemented.
- (4) Plan the establishment of an online reporting platform and require operators to report work information prior to work, as well as report the results of implementing a site's radiation protection control measures after the event.

#### 2. Expanding education and propaganda to implement radiation safety culture

- (1) The AEC has organized annual radiation prevention and regulatory seminars to increase the safety knowledge and awareness of work personnel and to realize radiation safety culture. In 2019, the number of radiation prevention and regulatory seminars was increased to ten. Lecturers from the Occupational Safety and Health Administration of the Ministry of Labor were invited to speak on the harm ionizing radiation work can damage the human body, as well as workers' occupational injury rights.
- (2) In the future, the AEC will continue to organize radiation safety regulatory seminars, increase propaganda for radiation workers wearing dosage badges, and emphasize safety protection at radiation work sites.

### 3. 違規業者加重處分，嚴懲不法

- (1) 針對業者教唆所屬輻射工作人員不依法令配戴人員劑量佩章之情事，原能會將視為違規情節重大，依法廢止設施經營者許可證。
- (2) 訂定「從事放射線照相檢驗之輻射工作人員與僱主之聘僱契約應約定及不得約定事項」，請放射線照相檢驗業據以訂定契約，並納入輻射防護計畫。
- (3) 研擬於修正游離輻射防護法時納入鼓勵檢舉機制，藉以補強管制效能，發掘業者不法行為。

### 4. 跨部會合作監督管理，整合管制資源

- (1) 與勞動部職業安全衛生署進行跨部會合作，強化各項游離輻射作業勞工健康權益措施。
- (2) 與勞動部職安署整合跨部會管制資源，分階段實施管制資料線上交換查察，第一段採人工比對；第二段將規劃跨部會系統介接。
- (3) 與勞動部職安署建立游離輻射作業勞工健康管理合作機制，透過職安署通報原能會辦理勞工健康管理之後續追蹤列管。
- (4) 與衛生福利部、勞動部建立游離輻射之職業傷病案件通報機制，並與勞動部勞工保險局研議工作人員劑量重建與驗證方式。



與勞動部職安署辦理聯合稽查

Organizing co-audit with the Occupational Safety and Health Administration

### 3. Increasing penalties for violators to severely punish law-breaking

- (1) If an operator instructs radiation workers to violate the law by not wearing personnel dosage badges, the AEC will perceive this as a major violation and terminate the facility operator's permit.
- (2) Establish the "Items That Should and Should Not be Included in the Employment Contract between Radiation Workers Engaged in Radiographic Inspection and Employers," have the radiography licensee set contracts according to these items, and include them in the radiation protection plan.
- (3) When revising the Ionizing Radiation Protection Act, consider including mechanisms for encouraging whistleblowing to improve regulatory effectiveness and discover illegal behavior by operators.

### 4. Cross-departmental cooperation in oversight and management to integrate regulatory resources

- (1) Conduct cross-departmental cooperation with the Occupational Safety and Health Administration to improve various health rights measures for ionizing radiation workers.
- (2) Integrate cross-departmental regulation of resources with the Occupational Safety and Health Administration. Implement online exchanges and checking of regulatory data in stages. The first stage uses manual comparison, and the second stage plans cross-departmental system links.
- (3) Establish an ionizing radiation workers' health management cooperation mechanism with the Occupational Safety and Health Administration. The AEC will conduct follow-up tracking after worker health management through reporting by the Occupational Safety and Health Administration.
- (4) Establish an ionizing radiation occupational injury reporting mechanism with the Ministry of Health and Welfare and the Ministry of Labor. Work with the Bureau of Labor Insurance of the Ministry of Labor to develop a worker dosage reevaluation and verification method.



與勞動部職安署辦理職安及輻安管制宣導

Organizing occupational safety and radiation safety regulation propaganda with the Occupational Safety and Health Administration

## (二)「寵物醫療的福音」輻射在寵物診療的應用與安全

毛小孩的健康是飼主最關心也最重視的事。過去，寵物的醫療診斷大多靠症狀或生化數據判斷，容易受病程發展或數據精準度影響判斷結果，若寵物不幸罹患癌症，大多以外科手術或藥物控制，但腫瘤手術需要切除較大範圍的病灶，造成組織或器官功能受到影響，而藥物治療也可能伴隨較大副作用，影響毛小孩的生活品質。

放射治療是利用游離輻射殺死腫瘤細胞或抑制腫瘤細胞的成長及增殖，在使用上具有免開刀、無傷口、副作用較低等優勢，並可使用在無法以外科切除的部位。放射治療在人體醫學上雖已廣泛地被應用，但在動物醫療界受限於儀器昂貴、缺乏專業人員及團隊等因素，故於近年才開始逐漸發展，目前約有 100 多例的毛小孩接受過相關治

療，其中許多毛小孩是無法由傳統方式治療或年齡無法承受外科手術的高齡寵物，經轉介使用放射治療後，已有效控制病情並重獲新生。除了放射治療成功為毛小孩開啟癌症治療的新紀元，核醫掃描檢查也開始應用於寵物醫療界，利用含放射性藥物在體內的分佈，以特殊的攝影掃描器來確認是否有腫瘤的存在，並可幫助了解腫瘤的位置、種類及期別，有了這項新技術的幫助，獸醫師們將可以更精準的判斷病因並及時治療。

在動物放射診療發展同時，相關的輻射安全是原能會最重視的議題，針對相關的設施除進行申請文件的書面審查、實地量測外，亦會實施不定期現場稽查，在飼主、工作人員、民眾及環境擁有最完善的輻射安全防護措施的前提下，讓毛小孩接受最好的醫療照顧。



圖片來源：中臺科技大學 動物放射治療研究中心

圖片來源：中臺科技大學 動物放射治療研究中心

寵物的輻射醫療診斷

Radiation medical diagnosis and treatment for pets

## (B) Blessing for pet medical treatment – application and safety of radiation in pet medical treatment

The health of pets is one of the most important things to pet owners. In the past, the medical diagnosis of pets mostly relied on symptoms or biochemical data. However, the diagnostic result is easily affected by the progression of the disease or data inaccuracy. If a pet unfortunately develops cancer, surgery or chemicals are usually used for treatment. However, cutting away large areas in tumor surgery can affect tissue or organ function, while drug treatment can also have deleterious side effects, both of which can affect the living quality of pets.



圖片來源：中臺科技大學 動物放射治療研究中心

寵物的輻射醫療診斷

Radiation medical diagnosis and treatment for pets

Radiation therapy is a type of treatment that uses ionizing radiation to kill or suppress the growth of tumor cells. This treatment has no need to operate, leaves no scars, and has fewer side effects. In addition, it can be used in locations that cannot be operated on. Radiation therapy has been widely used in human medical treatment. However, because the instruments of radiation therapy are expensive and there is a lack of professional personnel and teams in the animal medical treatment industry, this treatment has only developed in recent years. Currently, there are over 100 cases of pets receiving similar treatment. Most of these pets cannot be treated via traditional methods or involve older pets that cannot undergo surgery. After receiving radiation therapy, the pets' diseases are under control and they can start life anew. In addition to radiation therapy being successfully used to treat cancer in pets, nuclear medical scans are also being utilized in the pet medical treatment industry. This treatment uses radioactive medicine and special scanners to determine whether tumors remain, as well as to understand the location, type, and the stage of the tumors. With help from this new technology, veterinarians can make more precise diagnoses and provide more rapid treatment.

While animal radiation treatment is being developed, AEC is focusing on related radiation safety. We conduct review of applications for related equipment, measure the equipment at the actual site, and implement irregular site audits so that pet owners, workers, the public, and the environment can receive the most comprehensive radiation safety and protection measures, while pets receive the best medical treatment.

### (三) 「兼顧便民與安全」輻射源進出口通關雲端管理

輻射源已經廣泛的應用在我們的日常生活中，包括在醫療院所、獸醫院、公司行號、研究機構、軍警海巡與其他政府單位，民眾對游離輻射的安全也非常關切。

為精進輻射源進出口的邊境管制，善用網路線上服務及雲端資訊整合，原能會「輻射源進出口簽審通關系統 2.0 版」於 108 年 9 月 28 日正式上線啟用，並與關務署「關港貿單一窗口」報關及港務系統完成介接，就海關進出口「報關單」與原能會進出口「同意書」的資料進行線上檢核比對，加強科技執法與智慧監管，簡化申辦流程及整合操作介面，以提供優質的申辦及通關服務，並兼顧資訊安全、個資安全及邊境安全管制。

原能會於 108 年 7 月在台北、台中、高雄及花蓮辦理 5 場次「全國輻射源進出口簽審系統 2.0 版更新說明會」，讓業者了解新系統之內容與操作介面，並將常見實務問題與業者進行宣導與交流，業者對於政府提供便民措施，均表示肯定。

**行政院原子能委員會**  
Atomic Energy Council

## 輻射源進出口簽審通關系統

帳號登入 憑證登入

LOGIN 登入

聯絡我們

帳號 請輸入帳號

密碼 請輸入密碼

部門編號 如無設定不需填寫

驗證碼 請輸入驗證碼 **3718** 重新產生

確定送出

帳號申請及異動 忘記密碼 重新輸入

最新消息 MORE

108/10/01 有關第一次登入系統注意需知。

相關連結

- 進出口同意文件轉海關報單
- 單證比對結果查詢
- 簽審核准資料查詢
- 證照電子文件(PDF檔)驗證

原能會 AP2\_AEC0101\_Create

原能第一科技股份有限公司台北分公司 (test0001) (TEST0001) 剩餘時間：29:46 聯絡我們 登出

首頁

輻射設備/配件/物質申辦查詢

新案件申請

案件異動及查詢

可發生游離輻射設備配件查詢

簽審會辦作業

切換至輻射防護雲化系統

新案件申請 輸入案件

暫存 確認送出 回上頁

基本資料

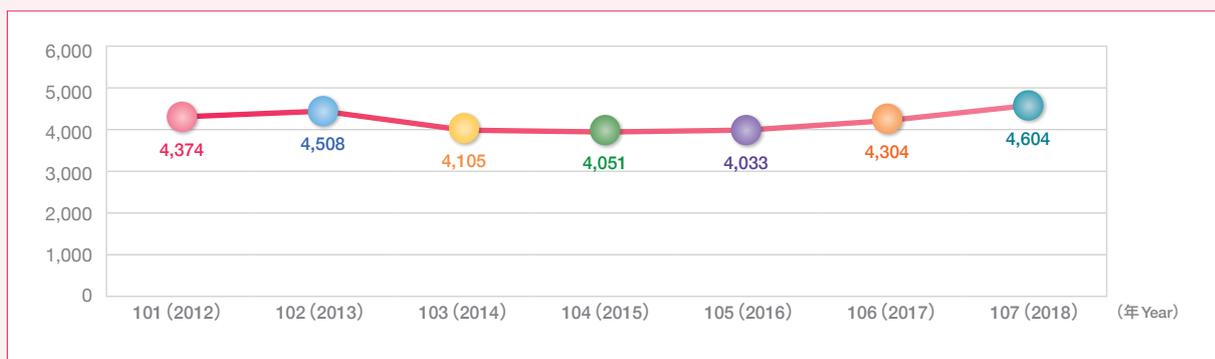
文件類別	1-貨品進口同意書申請書(可發生游離輻射設備及附件)(一證一用)	貨品類別	03-登記備查類可發生游離輻射設備
簽審收文號		簽審核准文號	
簽審機關識別代號	AE-原子能委員會	受理單位代號	輻防處
訊息編號	10000009001912177282	狀態	100-新申辦
申請日期	108/12/17	申請時間	16:41:36

### (C) “Convenient and safe” cloud management for radiation source import/export customs process

Radiation sources are being widely used in our daily lives, including in medical institutions and veterinary hospitals, as well as by companies, research institutes, the military, police, the coast guard, and other government agencies. The public also cares highly about ionizing radiation safety.

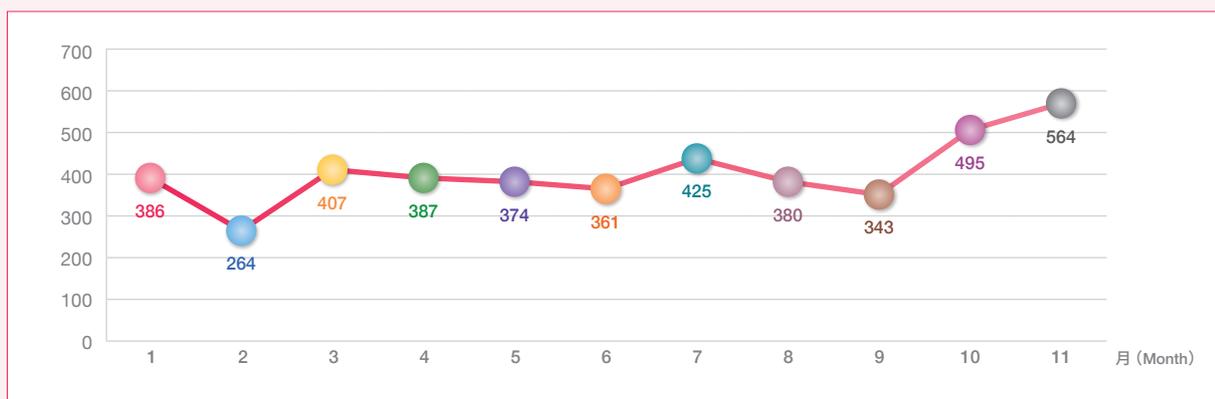
To improve border regulation for the import/export of radiation sources, online services and cloud information are being integrated. AEC’s “Radiation Source Import/Export Customs Licensing System V.2” officially went online on September 28, 2019, and successfully linked with the Customs Administration’s “CPT Single Window” customs and port affairs system. The Customs Agency’s import/export “customs declaration form” and AEC’s import/export “consent form” are checked and compared online to improve the implementation of laws and smart monitoring with technology. This simplifies the application procedure and integrates the operation interface to provide superior applications and customs clearance service, as well as to take into account information security, personal information security, and border security regulation.

AEC organized five National Radiation Source Import/Export Customs Licensing System V.2 Update Seminars in July 2019 in Taipei, Taichung, Kaohsiung, and Hualien to teach operators the new system and operation interface. We promoted the system and conducted exchanges with operators on the frequent and practical issues, while operators appreciated and recognized the government’s convenient measures.



101 至 107 年輻射源通關件數

The number of radiation source customs clearance items from 2012 to 2018



108 年 1 至 11 月輻射源通關件數

The number of radiation source customs clearance items from January to November 2019

## 五、強化輻災應變與整備能量及資通安全防護

### (一) 多元創新核安演習

108 年核安第 25 號演習於核三廠及鄰近地區舉行，分兵棋推演及實兵演練二階段實施，由中央與地方政府、國軍及民眾協力完成，總參與人數計 8,021 人。本次演習除邀請民間團體參與演習評核組，與無預警狀況設計小組，另邀請新聞專長評核委員參與討論，提升演練內容與溫度。

原能會自 106 年起已連續三年，邀請國際外賓蒞臨觀摩演習，108 年人數達 25 位，包含美國核能管制委員會 (NRC)、美國能源部國家核子保安局 (DOE/NNSA)、日本原子力規制委員會 (NRA)、日本內閣府 (Cabinet Office) 等單位及各國駐台機構，以促進國際合作與經驗交流。

#### 1. 兵棋推演

於 8 月 2 日辦理兵棋推演，本次推演情境係首次與國家災害防救科技中心合作，設計災損情境，有效統合救災資訊。在議題設計中，借鏡日本福島核災經驗，及過去民眾關切議題，納入個人藥品短缺、居家掩蔽時之民眾物資與飲用水提供議題，另探討應變單位對於核災發生時，跨區域動員整合狀況，與民眾分區分時疏散之策略，尋求最適方案。本次推演另納入假訊息議題，相關單位依簡淺易懂原則完成假訊息澄清稿，提升應變作業熟稔度。



核子事故中央災害應變中心前進協調所演練

The National Nuclear Emergency Response Center – Frontline command and coordination post

## E. Improving radiological disaster response, preparation, and information security

### (A) Nuclear Emergency Exercises with diversity and innovation

The 2019 Nuclear Emergency Exercise was carried out in the area around Maanshan Nuclear Power Plant (Maanshan NPP) and nearby areas. Divided into two phases, the table top exercise and the full participation exercise, it was successfully completed with participation and collaboration by a total of 8,021 attendees from the central government, the local government, the military, and the public. In addition to inviting local communities to the assessment panel and the unannounced drill planning team, news-experienced members of the assessment panel were invited to attend the discussion to increase the accessibility and credibility of the exercise contents for the public.

For three consecutive years (since 2017), the AEC has invited international guests to participate in and observe exercises. For the 2019 exercise, 25 guests from the NRC (U.S.), DOE/NNSA (U.S.), NRA (Japan), Japanese Cabinet Office, and other foreign agencies stationed in Taiwan participated in this international cooperation and experience exchange.

#### 1. The table top exercise

The table top exercise was held on August 2<sup>nd</sup>. It was for the first time to cooperate with National Science and Technology Center for Disaster Reduction (NCDR) to devise the scenario of disaster and effectively integrate information of disaster relief. Reflecting upon the Fukushima nuclear disaster experience of Japan, issues of individual medicine shortage and the necessities/food/water supply for the public while sheltering in house were included. Moreover, the most suitable solution was explored with the examination of inter-regional mobilization ability of response units during nuclear disasters and the strategy of evacuation of the public in “segment area in time sequence”. Issues of misinformation were also included in this exercise, and the relevant authorities released press of clarifications for misinformation according to the principle of simplicity and digestibility. The overall goal was to improve the personnel familiarity with response procedures.



屏東縣核子事故災害應變中心演練  
Pingtung County's Nuclear Emergency  
Response Center

## 2. 實兵演練

原能會於 9 月 8 日 (星期日) 非上班時間至核三廠執行無預警動員測試。藉由該項測試，惕勵應變人員之警覺性，維護電廠安全，核三廠及台電公司受測人員皆於指定時間內到齊並完成應變中心開設。

另於 9 月 9 日至 11 日執行廠內及廠外各項演練，透過演練已達到驗證應變人員危機處理能力、相關作業程序之可操作性以及讓民眾有更多參與實際演練機會之目標，過程中並完成許多首次執行項目，包括：辦理防災社區運作演練，提升民眾自助與互助能力；以多元訊息管道通知民眾，並增列警察廣播電台、民防廣播系統及 LINE 等，使核安多一分保障；辦理學生疏散安置演練，完備學生安置及復學機制；執行海上疏運演練，讓疏散方式多元化；進行中部化學兵、高雄市消防局、台電公司修護處與其他核電廠、北部輻射監測中心等之跨區域動員，呈現支援機制及能量；增加空勤總隊參與空中偵測演練，完備空域輻射偵測能量；以輻射數據圖像化整合系統，整合陸域環境輻射監測資訊，協助決策下達。另於核三廠機組搶修演練過程中，原能會臨時發布 3 項突發狀況，檢驗電廠人員應變能力。



空中輻射偵測  
Aerial radiation detection



防災社區運作編組啟動  
Activation of the community disaster prevention team

## 2. The full participation exercise

On September 8<sup>th</sup> (Sunday), the AEC implemented the unannounced mobilization drill during non-working hours at the Maanshan NPP to prompt the alertness of the responding staff and maintain safety of NPP. All the emergency response staff of Maanshan NPP and Taipower Company have arrived and reported for position duty within time limit, and completed setting up the Response Center.

Various on-site and off-site exercises were implemented from September 9<sup>th</sup> to 11<sup>th</sup>. The exercises verified the sufficient ability of the response personnel to handle a crisis, operability of relevant work procedures and more opportunities for the public to participate. Numerous drills were implemented for the first time, including (1) exercising a community of disaster prevention to improve residents' self-help and mutual assistance capability; (2) using diversified information channels to notify the public, and improving nuclear safety by further including police broadcast radios, civil defense radio broadcasting systems and LINE APP; (3) implementing drills of evacuation and host for students, bettering the mechanism of hosting and school returning for students; (4) executing drills of maritime evacuation and transportation so that evacuation methods can be more diversified; (5) mobilizing cross-regional personnel, such as central Taiwan chemical warfare troops, Kaohsiung City fire departments, Taipower maintenance departments, other nuclear power plants, and the northern region Radiation Monitoring Center to exhibit support mechanism and capability; (6) participation by the National Airborne Service Corps to conduct aerial monitoring drill and achieve capability of airborne radiation detection; and (7) integrating of terrestrial environmental radiation monitoring information with the Radiation Monitoring Data Visualization System to assist decision making. During the Maanshan NPP emergency repair drill, the AEC announced three unforeseen events to test the response ability of the NPP personnel.



安置學生演練  
Student host drill



海上疏運  
Maritime evacuation and transportation

## (二) 強化核電廠核子保安與資安防護

### 1. 嚴格執行核電廠核子保安審查與視察

召開核電廠核子保安議題會議，就各面向之議題要求台電公司切實執行，並完成核電廠保安人員資格檢定及訓練作業要點審查。嚴格審查各核電廠保安反恐演練腳本並視察演練績效。另執行不預警保安視察，以惕勵核電廠保安人員提高警覺性。

### 2. 邀請國際專家授課，精進核子保安專業知能

為強化核子保安專業知能，分別在 5 月及 8 月邀請美國能源部專家來台辦理「核子保安效能測試」及「核子保安桌上演練」兩項訓練，計 53 人參與，並將所學運用於管制與防護實務，如將系統效能評估納入保安視察、精進警衛效能測試方法等，並推動以兵棋推演方式進行核電廠保安弱點分析。

### 3. 嚴格執行核電廠資通安全審查與視察

召開核電廠資通安全議題會議，要求台電公司落實關鍵數位資產資通安全各項防護措施。完成各核電廠資通安全計畫審查，要求精進關鍵數位資產辨識程序，並定期執行視察。

### 4. 推動與國際核能資安防護技術同步

自 107 年參加首屆在加拿大舉行的核能網路安全論壇推動會議後，今年推動由核電廠資安技術主管參加第一屆論壇會議，就核電廠特有的工業控制系統安全架構，與各國分享交換核電廠資安防護技術。並透過技術會議，和美國核能管制委員會 (NRC) 等，交換核電廠資安管制與視察經驗，獲得實質回饋。



## (B) Enhancing nuclear security and cybersecurity protection at nuclear power plants

### 1. Strictly implementing nuclear security review and inspection at nuclear power plants

AEC held topical meetings on nuclear security of nuclear power plants and requested Taipower to implement various requirements. AEC also completed the review of “Guidance of nuclear power plant security personnel qualification check and training requirements.” The scenarios of nuclear security and anti-terrorism exercise for nuclear power plants were strictly reviewed and the drills were inspected. AEC also implemented unannounced security inspections to keep nuclear power plant security personnel on alert.



### 2. Inviting international experts to conduct training courses and improve professional nuclear security knowledge

To increase professional nuclear security knowledge, AEC invited experts from the United States Department of Energy to conduct the “Nuclear Security Performance Testing” and the “Nuclear Security Tabletop Exercise” in May and August, respectively. Overall, 53 people participated in the events. AEC used what have learned and applied it to regulation and protection practice, such as including system performance evaluation methods into security and safety inspection, improving security response performance evaluation methods, and promoting nuclear power plants to perform vulnerability analysis using tabletop exercise.

### 3. Strictly implementing nuclear power plant cyber security review and inspection

AEC convened topical meetings to discuss nuclear power plant cyber security issues and requested Taipower to implement and enhance various protective measures for critical digital asset. AEC also completed nuclear power plant Cyber Security Plan reviews, required Taipower to improve critical digital asset identification procedures, as well as performed routine cybersecurity inspections.

### 4. Keeping with the trend of international nuclear cyber security protection

After participated in the 2018 NTI Cyber-Nuclear Forum steering meeting held in Canada, AEC promoted the nuclear power plants' computer department supervisors to participate in the first Forum to share the protection technology with other nations for the industrial control system safety framework unique to nuclear power plants. Through bilateral technical meeting, AEC exchange nuclear power plant cyber security regulation and inspection experience with the US Nuclear Regulatory Commission (NRC) and received practical feedback.



於地方政府輻射災害防救講習中進行放射性物質意外事故兵棋推演

Table-top exercise conducting in the local government radiation disaster prevention and rescue forums

### (三) 強化輻射事故安全防護網

#### 1. 強化地方政府輻災應變與整備能量

透過輔導、訓練、演練三管齊下，充實第一線應變人員輻射災害防救知能，並攜手地方政府，強化輻射災害聯防作業，增進國家整體輻災防救能量。

(1) 輔導：配合行政院執行地方政府災害防救與全民防衛動員計畫審查及業務訪評、辦理輻射災害防救業務計畫撰擬說明，輔導地方政府落實輻射災害整備工作。

(2) 訓練：為增進第一線應變人員及業務承辦人員對輻射災害應變機制與防救措施之了解，辦理北中南東 4 場次「地方政府輻射災害防救講習」，計有 206 人參與，透過課程講授與放射性物質意外事故之兵棋推演，協助地方政府人員了解應變

要領、熟稔應變與協調聯繫之流程。另外，結合地方政府辦理的訓練或講習，更加擴展輻射災害應變訓練的量能，並提升地方政府第一線應變人員處理輻射災害與維護自身安全的能力，108 年共進行 47 場次訓練，計 2,310 人參訓。

(3) 演練：與新北市、台南市、雲林縣、新竹市等四縣市合作辦理輻射災害防救演練，協助情節設計、提供輻射專業諮詢，同時指派原能會輻射應變技術隊參與演練，強化中央與地方的聯合應變機制。



雲林縣政府於 108 年災害防救演習中演練輻射災害應變課目

Yunlin County Government holding a radiation disaster response procedure in the 2019 disaster prevention and rescue drill

## (C) Improving safety protection of radiation incidents

### 1. Improving the capability of radiation disaster response and preparedness for local governments

Guidance, training, and drills are conducted to strengthen the radiation disaster prevention and rescue knowledge of first responders. Local governments are included in the improvement of cooperative radiation disaster prevention work to increase Taiwan's overall capability on radiation disaster prevention and rescue.

(1) Guidance: AEC cooperates with the review and assessment of the Executive Yuan's implementation of local government disaster prevention and rescue and the All-Out Defense Mobilization plan. We also draft and clarify radiation disaster prevention and rescue plans, and guide local governments in the implementation of radiation disaster preparedness work.

(2) Training: AEC organized four "Local Government Radiation Disaster Prevention and Rescue Forums" in Northern, Southern, Eastern, and Western Taiwan to improve the first responders' understanding of radiation disaster response mechanism and disaster prevention and rescue measures. Course lectures and table-top exercises were used in the forums to help local government understand response essentials and become familiar with response procedures. Overall, 206 people participated. In addition, training or forums organized by local governments were held to expand the capability on radiation disaster response as well as self-protection for first responders. In 2019, a total of 47 training sessions were held and 2,310 people participated.

(3) Drills: AEC cooperated with New Taipei City, Tainan City, Yunlin County, and Hsinchu City on organizing radiation disaster prevention and rescue drills. We provide scenario design and radiation consultation, and assign the radiation response team to participate in the drills. The objective is to improve the co-response mechanism of the central and local governments.



台南市政府於 108 年民安 5 號演習中演練輻射災害應變項目

Tainan City Government holding radiation disaster response in the 2019 Ming An No. 5 Exercise

## 2. 精進輻射應變技術隊的輻災應變專業

為精進輻射應變技術隊對國家整體災防機制的認識，以助輻射災害應變規劃，並響應國家防災士推動政策，辦理「防災士訓練」，原能會共計 31 人取得防災士認證。另為提升我國對輻射彈事件的了解，12 月邀請美國專家來台辦理「輻射彈應變訓練」，藉由課堂講授與案例推演，使學員了解如何安排應變行動及應變時期的溝通要領，可提升我國相關應變處置能力，共 33 人參訓。除持續訓練，也配合行政院 108 年金華演習，派遣輻射應變技術隊攜帶各類輻射偵檢器執行應變演練，圓滿達成任務，並獲總統肯定。

## (四) 推動原能會資安管理制度

### 1. 導入資安管理制度 (ISMS)

原能會為保護資訊資產的機密性、可用性與完整性，提升資安防護水準，106 年起積極進行資訊安全管理 (ISMS) 導入及驗證作業，成立資通安全管理推動會及工作小組，以規劃並執行相關工作，並在專業顧問團隊的協助下持續推動。

### 2. 遵循資安法推動 ISMS

原能會 ISMS 的推動，係遵循資通安全管理法，經由審查作業流程，訂定資通安全政策，再進行資產盤點及風險評鑑作業，制訂適合各單位作業的資通安全相關文件，並透過資通安全宣導活動、資通安全教育訓練、內部稽核結果與緊急事件通報的檢討，持續改進資通安全管理作業。

### 3. 108 年通過後續審查，ISO 27001 證書持續有效

原能會 ISMS 於 106 年通過 ISO 27001 驗證並取得證書，其有效期間為 3 年，第 2 及第 3 年仍需通過後續審查，以確保 ISMS 之持續有效。第三方驗證單位於 108 年 11 月 4 日至原能會進行後續審查作業，ISO 27001 證書經覆核結果為持續有效。



108 年金華演習輻射事件應變訓練  
Radiation incident response drill in the 2019 Jin Hua Exercise



108 年輻射應變技術隊防災士培訓課程  
The 2019 disaster prevention technician training course for RERT



輻射彈應變訓練  
Counter-RDD training

## 2. Improving the professional competence of the radiation emergency response team (RERT)

The “disaster prevention specialist training” was conducted to improve the radiation emergency response team’s knowledge of Taiwan’s overall disaster prevention mechanism, help plan response for radiation disasters, and promote Taiwan’s disaster prevention technician policy. Overall, 31 participants were certificated. In addition to improve Taiwan’s handling ability of radiological dispersal devices (RDD), the “Counter-RDD training” was hold in December and U.S. experts were invited to conduct lectures and table-top exercises to demonstrate how to arrange response action and communication essentials during response periods. In total, 33 RERT members were participated in the training. Other than conducting courses, AEC also cooperated with the Executive Yuan in the 2019 Jin Hua Exercise and dispatched the RERT with various radiation detection devices to carry out the drill. The task was successfully completed and the President gave high recognition.

## (D) Implementing the AEC information security management system

### 1. Introducing the information security management system (ISMS)

To protect the confidentiality, usability, and integrity of information assets, and to improve the level of information security protection, the AEC has actively conducted the ISMS implementation and verification since 2017. An ISMS promotion committee and task force was established to plan and carry out related work, and continue promotion with the assistance of professional consultation teams.

### 2. Complying with Cyber Security Management Act in the promotion of ISMS

AEC’s implementation of ISMS complies with the Cyber Security Management Act. Review procedures are used to establish information security policies and conduct asset inventory and risk assessment work, as well as establish information security documents suitable for different departments. Information security proganda activities, information security training, internal audit results, and review of emergency reporting are used to continuously improve information security management work.

### 3. The ISO 27001 certification remains valid after passing review in 2019

AEC’s ISMS passed ISO 27001 verification and obtained the certificate in 2017. The certificate is valid for 3 years, and a follow-up review must be passed in the second and third years for the ISMS to remain valid. The third-party verification unit conducted a review at the AEC on November 4, 2019, and determined that the ISO 27001 certification shall remain valid.

## 六、精進原子能科技研發

### (一) 榮獲第十六屆國家新創獎—低劑量三維X光造影儀開發

#### 1. 低劑量三維X光造影儀—Taiwan TomoDR介紹

核研所開發低劑量三維X光造影儀—Taiwan TomoDR，除一般二維造影功能外，能以小角度掃描及低輻射劑量，呈現三維診斷影像，且影像品質與電腦斷層掃描(Computed Tomography, CT)相近，使病灶一覽無遺，協助醫師做更精確之判讀，為放射影像診斷之一大利器。



低劑量三維X光造影儀—Taiwan TomoDR  
Low-dose 3D X-ray imaging scanner — Taiwan TomoDR

#### 2. Taiwan TomoDR特色

Taiwan TomoDR應用受國際矚目之數位斷層合成(Digital Tomosynthesis)技術，加入可任意方向掃描以及能依病灶部位的不同，簡便切換仰躺或站姿造影之專利機構設計，其獨特的專利三維影像重建技術，突破習用技術限制，使影像重建速度達商用要求，多項創新設計與特色，達到降低病患吸收劑量，提供最佳影像品質與縮短整體造影流程時間之目標。

#### 3. Taiwan TomoDR研發進程

Taiwan TomoDR已取得醫電設備相關安規認證，108年1月起正式於台大醫院新竹分院影像醫學部進行臨床試驗，其臨床實力受影像醫學部、骨科醫師肯定，在臨床案例的有力佐證下，目前同步與國內廠商洽談技轉，期能為國內醫用器材產業引進新成長動力，造福國內每年X光造影高達千萬人次之需求，成為國民大眾第一線的健康守護者。



## F. Advancing the research and development of atomic energy technology

### (A) Winning the 16<sup>th</sup> National Innovation Award – developing the low-dose 3D X-ray imaging scanner

#### 1. Low-dose 3D X-ray imaging scanner – introducing the Taiwan TomoDR

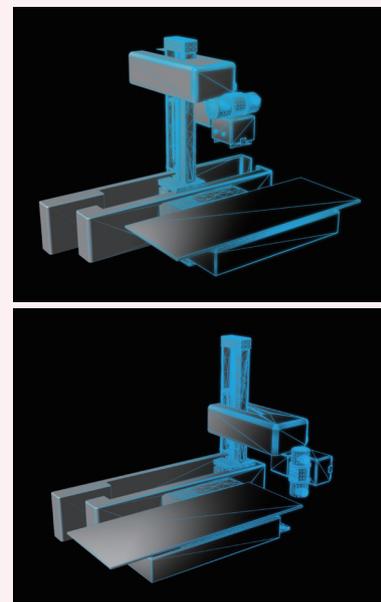
The Institute of Nuclear Energy Research (INER) developed a low-dose 3D X-ray imaging scanner: the Taiwan TomoDR, which not only can produce normal 2D images, but can also provide 3D sectional information to eliminate tissue overlap problems. Taiwan TomoDR improves the ability to detect small lesions and acquires 3D images at much lower radiation dose than computed tomography (CT). This imaging system is a good alternative diagnostic tool for radiology which can help doctors make more accurate diagnosis.

#### 2. Characteristics of Taiwan TomoDR

Taiwan TomoDR applies the digital tomosynthesis technology, an emerging radiological procedure. By adding patented mechanism design, TomoDR can scan in multiple directions and easily switch between supine or standing posture modes depending on the location of the lesion. The unique patented 3D image reconstruction technology breaks through the limitations of conventional technology and achieves the image reconstruction speed required for commercial use. The multiple innovative designs and characteristics can lower the dose absorbed by patients, provide the best image quality, and shorten the overall imaging process time.

#### 3. Taiwan TomoDR development progress

Taiwan TomoDR has already obtained a safety certificate related to medical electrical equipment and began clinical trial in January 2019 at the National Taiwan University Hospital Hsin-Chu Branch's Department of Medical Imaging. The clinical capability of the TomoDR has been recognized by the Department of Medical Imaging and orthopedic doctors. With clinical trial proof, INER is currently negotiating technology transfer with domestic vendors with the hope of introducing new growth in Taiwan's medical equipment industry, as well as benefiting tens of millions of people who require X-ray imaging each year. This device will be the front-line protector of the public health.



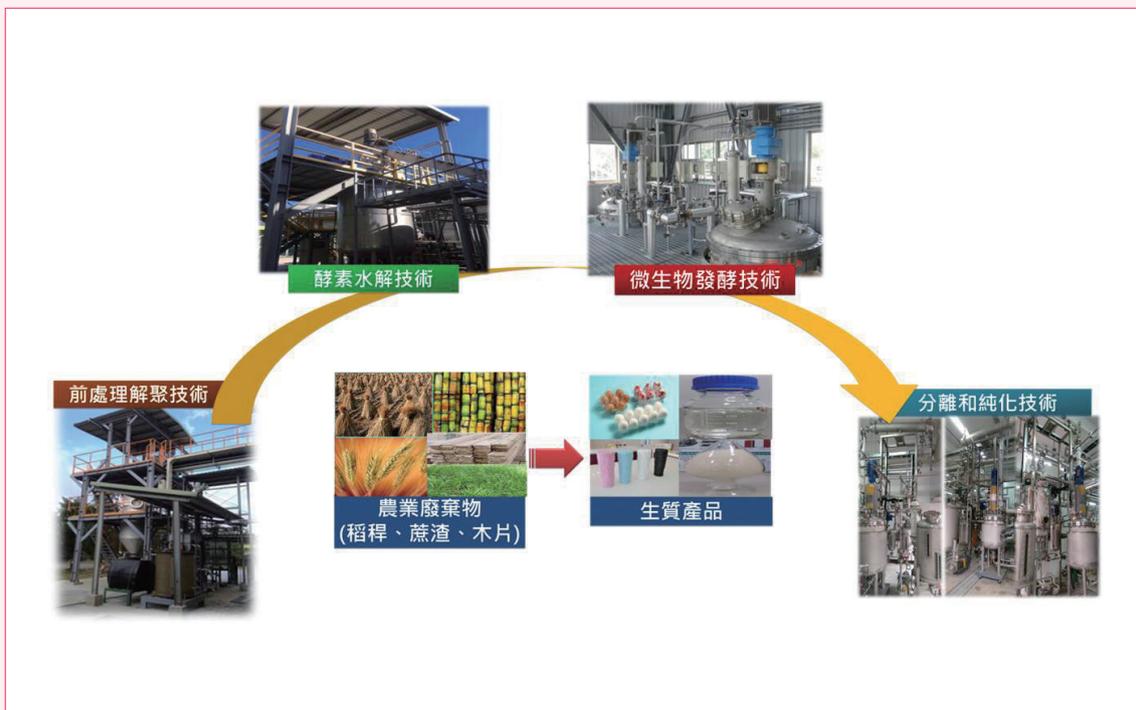
Taiwan TomoDR 專利機構設計  
Taiwan TomoDR's patented mechanism design

## (二) 農林廢棄物變綠金的技術

### 1. 農林廢棄物之華麗轉身－生質精煉綠色製程技術

所謂生質精煉 (Biorefinery) 技術，即利用生質物 (Biomass) 作為原料，以生物與化學之方法，將生質物轉化為生質化學品、生質燃料、生質材料的一種過程。舉凡農作物、草木本植物、農林廢棄物均為常見之生質物。相較於傳統之石化精煉技術，生質精煉技術具有原料不虞匱乏、低碳排、低污染之優點，不僅可減低對於石化能源之依賴，也可達到減碳之成效，故為一兼具能源、環保、經濟效益之綠色製程。生質精煉傳統上以糧食作物作為原料選擇，然而為避免與民爭糧之疑慮並減少原料成本，以農業廢棄物或能源作物等非糧作物為原料，已為現行生質精煉技術發展之趨勢。

有鑑於此，核研所長期致力於農業廢棄物生質精煉技術之研發，並建置國內唯一具噸級規模之生質精煉測試平台，主要之核心技術包含解聚糖化 (Depolymerization and Saccharification)、微生物發酵以及產品純化回收製程。生活中常見之稻稈、木片、蔗渣等農業廢棄物，可藉由核研所之解聚糖化技術，有效地將其纖維素、半纖維素中的糖提取出來，再藉由後續發酵、純化回收等程序，生成各類生質產品。綜上所述，看似無用之農業廢棄物，可藉由生質精煉技術轉化為加值化產品，進而達到轉廢為用、轉廢成金之效益。核研所於生質精煉領域之研發多有成果，其中『可多元化應用之纖維生質物解聚糖化技術』，於 105 年度榮獲第 13 屆國家新創獎，且獲取多項專利，並於 108 年度再度榮獲第 16 屆國家新創獎年度續獎殊榮，再次顯示其對於本研發成果之期許及認同。

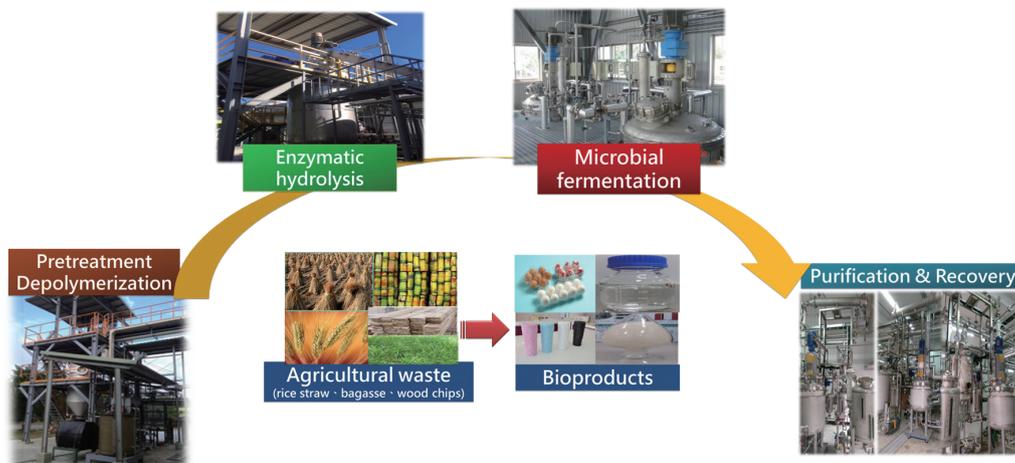


## (B) Turing agricultural and forestry waste into green gold

### 1. Elegant conversion of agricultural and forestry waste – green biorefinery technology

Biorefinery technology uses biomass as the raw material and converts it into biochemical products, biofuels, and biomaterials through biological and chemical methods. Commonly seen biomass includes agricultural products, grassy and woody plants, and agricultural/forestry waste. Compared to traditional petrochemical refining technology, biorefinery technology has no lack of raw materials and is low in carbon emission and pollution. Not only can this technology decrease our dependence on petrochemical energy, but it can also reduce our carbon production; this makes biorefinery technology a green process that can produce energy, as well as environmental and economic benefits. Traditionally, biorefinery uses food crops as the raw material. However, to avoid food competition with people and reduce raw material costs, non-food material such as agricultural waste and energy crops are being used in the current development of biorefinery technology.

In view of this, the INER has long worked on the development of agricultural waste biorefinery technology, and has set up the unique ton-scale biorefinery test platform in Taiwan. The main core technology includes depolymerization and saccharification, microbial fermentation, and product purification and recovery process. The INER's depolymerization and saccharification technology can effectively extract the sugars from cellulose and hemicellulose in commonly seen rice stalks, wood chips, and sugarcane remains. Fermentation, purification, and recovery are then used to produce various types of bioproducts. In summary, biorefinery technology can process seemingly useless agricultural products into valuable products and convert waste into economic benefits. The INER has produced various results in the biorefinery field, of which "The Technology with Diverse Applications for Depolymerizing and Saccharifying Lignocellulosic Biomass" won the 13<sup>th</sup> National Innovation Award in 2016, as well as received multiple patents. In 2019, this technology once again won the 16<sup>th</sup> National Innovation Award, showing expectation and recognition toward this research result.



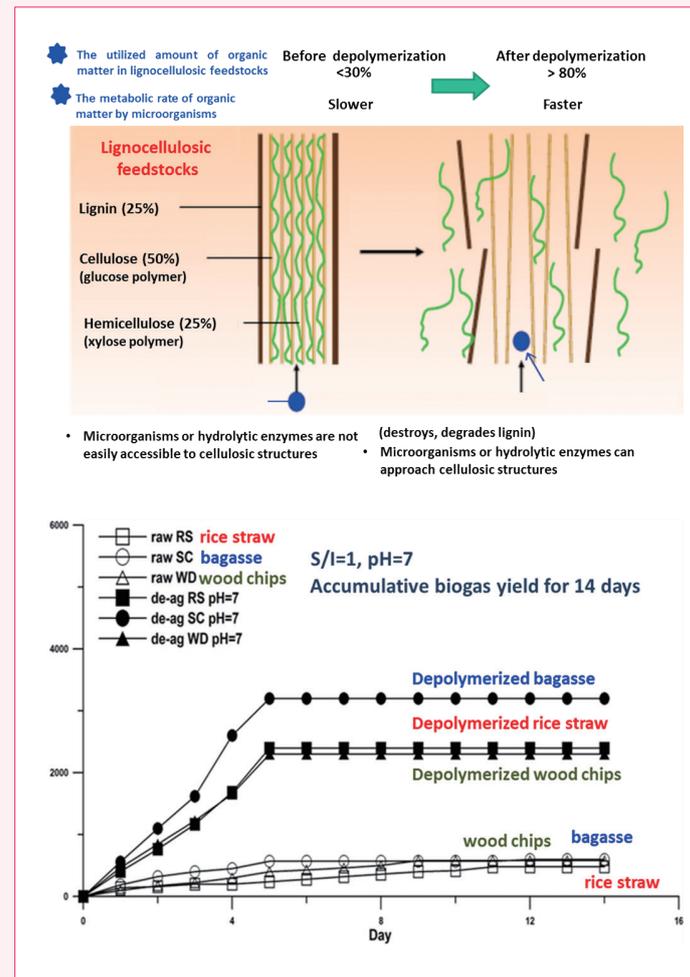
The INER biorefinery technology



## 2. Diverse applications of green biorefinery production technology

Currently, the INER's biorefinery technology can not only be used to produce animal feed or health foods such as molasses, xylose, and xylooligosaccharides, but can also convert agricultural waste into biofuels such as bioethanol and aviation biofuel. The process can also be used to produce polylactic acid (PLA) and other biomaterials. PLA is an environmentally friendly plastic. Compared to traditional petrochemical plastic, PLA can naturally biodegrade under industrial composting conditions, which significantly reduces its negative environmental impact. PLA is currently being widely used as packaging material, textile fiber, 3D printing thread, and medical treatment material. As such, it is the future star of the biomaterial industry with great potential.

Furthermore, the INER's biorefinery technology can be used to produce biogas. This biogas can be directly burned to produce biomass green power or further purified into bio natural gas, which is used as transportation or power generation fuel. Recently, the INER used the aforementioned depolymerization and saccharification technology as the foundation to establish anaerobic co-digestion biogas production technology for agricultural waste. This technology effectively increased the biogas production quantity and improved the competitiveness of biogas power generation, as well as increased domestically produced biomass green power. Because of its complex structure, the biogas production rate of general agricultural waste is low. The INER's depolymerization and saccharification technology first breaks down the lignocellulosic structure of agricultural waste to effectively increase biogas production two to four-fold, and reduces the reaction time required for biogas production by 50%. The research result of this technology – "Integration of Depolymerization and Anaerobic Digestion to improve the Biogas Production Efficiency of lignocellulosic biomass" won the bronze medal in the 2019 Taiwan Innotech Expo's invention competition, which shows people's recognition of this study result.



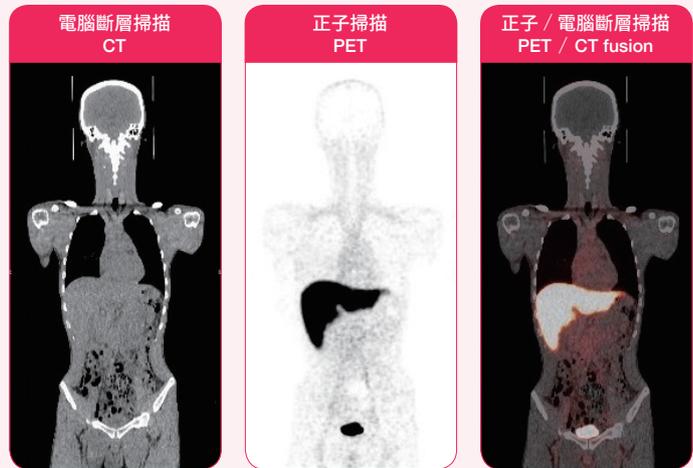
The R&D achievements of INER biogas technology

### (三) 透視肝功能的革命性藥劑：核研多蓄克鎳肝功能造影劑完成一期臨床試驗

#### 1. 透視肝功能的重要性

肝臟宛如一個工廠，工廠須有工人才能運作，肝臟也需要有一定數量的肝實質細胞才能發揮肝臟功能，若太多肝細胞缺席，肝臟就會因為衰竭而必須關廠。肝癌無論在全球、美國和台灣都是重大的十大癌症死因（全球排名第四、美國排名第八、台灣排名第三），若有肝癌一定要接受治療，因為不管是哪一個期別，只要沒治療，很快瀕臨死亡。治療策略包括切肝、換肝、射頻燒

灼術、肝動脈栓塞化療、系統性化療與最佳支持性療法。然而無論選擇哪一項治療策略，都必須事前評估會不會因為治療造成肝衰竭，正確診斷才能帶來適切治療，透過正確肝功能診斷，確保治療後個體還能存活，是治療策略擬定的最重要工作。



核研多蓄克鎳肝受體造影劑之一期臨床造影結果

The images of clinical phase I study by INER liver imaging agent

#### 2. 透視肝功能的策略

去唾液酸糖蛋白受體是肝細胞膜的表面受體，負責血液糖蛋白的恆定，具有吸收、代謝與排除等功能，所以受體的數量可以反應肝細胞功能。要知道肝受體的數量剩下多少，可以在超音波導引下做組織切片檢查，但此方法會有取樣誤差、再現性低以及不同病理判讀差異，並有研究表示臨床上肝穿刺取樣有 0.03% 的死亡率、0.3% 的嚴重不良反應以及 30% 受試者的疼痛。核研所以其分子影像平台之優勢，透過多聚乳醣標靶肝受體技術，完成透視肝功能造影藥劑開發。經過 6 年的長期研究，證實非侵襲性肝受體造影技術可以實際反應肝臟組織上的受體變化。

#### 3. 核研多蓄克鎳肝功能造影劑完成一期臨床試驗

核研多蓄克鎳肝功能造影劑獲核准於台大醫院執行臨床一期試驗，是台灣本土創新發明。可應用在肝殘存功能評估，作為臨床切肝與換肝治療策略擬定之依據。於 108 年 2 月 12 日開始第 1 例試驗，8 月 9 日完成第 12 例安全性評估與有效性評估。臨床試驗期間 12 例參加的受試者皆是通過篩檢的健康人方得以進入臨床試驗，並需於造影當日前及造影後連續兩周，接受一連串理學檢查、心電圖檢查、心跳血壓脈搏等生命跡象檢查，以及血液、生化、尿液等實驗室檢驗。檢驗數據皆在健康參考值範圍，無任何不良反應事件通報，獲得其為高安全性藥物之佐證，是世界上第一個使用在人體的類胜肽肝功能造影劑。

核研多蓄克鎳肝功能造影劑對肝臟受體具高專一性，順利完成臨床一期安全性驗證，未來可提供國內醫界進行相關肝功能學術臨床研究。

## (C) Revolutionary medicine for inspecting liver function: INER Dolacga liver imaging agent completing the first-phase clinical trial

### 1. The importance of examining liver function

The liver is like a factory, and a factory needs workers to operate. The liver also needs a certain number of hepatocytes to be able to carry out liver functions. If too many liver cells are losing, the liver will become exhausted and have to shut down. Everywhere around the world, liver cancer is one of the top 10 causes of cancer deaths (fourth place globally, eighth place in the United States, and third place in Taiwan). Liver cancer patients must be treated. No matter what the cancer's stage is, if not treated, death is imminent. Treatment strategy includes hepatectomy, liver replacement, radiofrequency cauterization, transcatheter arterial chemoembolization, systematic chemotherapy, and the best supportive care. Regardless of the type of treatment selected, assessment must be made to determine if the treatment will cause liver failure. Only an accurate diagnosis can lead to appropriate treatment. An accurate liver function diagnosis can ensure a higher patient survival rate and is the most important part of determining treatment strategy.

### 2. Strategy for inspecting liver function

Asialoglycoprotein receptor (ASGPR) is the receptor on the liver cell's membrane and is responsible for maintaining blood glycoproteins. ASGPR serves absorption, metabolism, and removal functions. Thus, the number of receptors can reflect liver cell function. To determine the number of liver receptors, a tissue section can be done with ultrasound guidance. However, there is a sampling margin of error with this method, which can lead to low reproducibility and different pathological interpretations. Some studies also indicate 0.03% mortality and 0.3% severe adverse reaction rate involved with clinical liver penetration and sampling, and that 30% of patients feel pain. The INER uses the advantages of its molecular imaging platform and the polygalacturonase liver receptor technology to develop imaging capable of testing liver function. After six long years of development, it is verified that non-invasive liver receptor imaging technology can actually reflect receptor changes in liver tissue.

### 3. INER Dolacga liver imaging agent completing the phase I clinical trial

The INER Dolacga liver imaging agent was approved for phase I clinical trial at National Taiwan University Hospital. This is a Taiwanese invention that can be used to evaluate residual liver function. The result can serve as a basis for clinical hepatectomy and liver transplantation strategy. The first subject for this agent began on February 12, 2019. By August 9<sup>th</sup>, safety and effectiveness assessments of the 12 subjects had been completed. The 12 subjects passed screenings and were certified as healthy before being accepted for clinical trial. During the trial period, the subjects were required to receive a series of physical, electrocardiogram, and life sign (heartbeat, blood pressure) examinations on the day of the imaging and two consecutive weeks after the imaging. Blood, biochemical, and urine samples were also taken. The test data from all the subjects were in the healthy scope and no adverse reaction was reported. This proves that INER Dolacga is highly safe, and is the first-in-human peptide-like liver function imaging agent in the world.

The INER Dolacga liver imaging agent is highly unique to liver receptors. This agent has completed the phase I clinical safety test, and can be used by Taiwan's medical field for liver function clinical studies in the future.

## (四) 用過核子燃料最終深層地質處置工程設計及安全評估技術

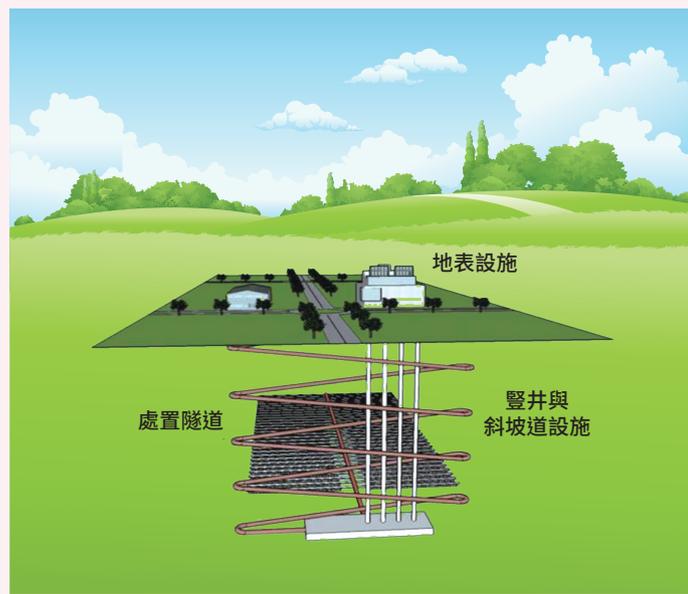
我國核電廠反應器機組自 107 年起陸續達到 40 年運轉週期，邁入除役階段，核能發電衍生之用過核子燃料必須妥適安全管理，以及進行最終處置。依據「高放射性廢棄物最終處置及其設施安全管理規則」，處置設施應採多重障壁設計，並且確保其輻射影響對設施外一般人所造成之個人年有效劑量不得超過 0.25 毫西弗；對設施外關鍵群體中個人所造成之個人年風險，不得超過一百萬分之一。

依前述法規對於未來處置設施的要求，核研所近年來持續在工程設計及安全評估等面向引進適宜的技術，並多方面與國際技術交流，以因應處置技術發展需求。近年來發展重心為處置設施概念設計及安全評估技術，各面向已有具體成果。

### 1. 概念設計發展

台灣及離島地區可做為潛在處置母岩者，大致為花崗岩、泥岩及中生代基盤岩三類。台電公司於 98 年提出評估結果，我國處置計畫發展以花崗岩為優先調查之處置母岩。

針對花崗岩為處置母岩的條件，核研所的技術發展策略為引進瑞典 KBS-3 處置概念，包含整體工程障壁系統設計及應具備的圍阻安全功能，包括地表設施與地下連通之豎井、斜坡道設施，以及處置區配置，例如處置容器（廢棄物罐）、緩衝材料、回填材料、處置隧道與處置孔、處置隧道封塞等概念設計理念的呈現，並配合台灣在地特性進行規劃研究。



處置設施示意圖

核研所引進瑞典 KBS-3 處置概念，做為現階段概念設計的依據，並且以花崗岩虛擬場址的參考案例，逐步發展深層地質處置的設計能力，並建立各項性能評估技術。目前各項重要設計所需的計算工具、數值模式、測試技術、評估方法均已建置。

## (D) Engineering design and safety assessment for the spent nuclear fuel deep geologic final disposal

Beginning in 2018, Taiwan's nuclear reactors have been entering into their 40 years of service. These reactors are reaching their decommissioning stage and the spent nuclear fuels used to produce nuclear power must be appropriately and safely managed. These spent fuels must be put in their final disposal. According to the Regulations on the Final Disposal of High Level Radioactive Waste and Safety Management of the Facilities, disposal facilities shall employ a multiple barrier design. It should also be ensured that a normal person outside of these facilities will not receive an annual effective dose of more than 0.25 mSv. The annual risk to an individual in a critical group outside these facilities shall not exceed one in a million.

Based on the disposal facility requirements stated in the aforementioned Regulations, INER has continued to introduce suitable technology for engineering design and safety assessment; as well as conducted international technology exchanges, to meet the development requirements of the disposal technology. In recent years, the development focus has been on disposal facility conceptual design and safety assessment technology, which has shown specific results.

### 1. Development in conceptual design

The potential host rocks of Taiwan and its offshore island areas that can be potentially used for disposal are mostly granite, mudstone, and Mesozoic basement. In 2009, TPC issued its assessment results, and Taiwan's disposal plan is giving priority to the use of granite as the potential host rock.

Regarding granite as the potential host rock, INER has introduced the Swedish KBS-3 disposal concept for the technology development strategy. This includes comprehensive engineered barrier system design and corresponding containment safety function, as well as vertical shafts that connect surface facility with underground facility, ramp facility, and disposal area layout. The design also takes into consideration the disposal container (canister), buffer material, backfilling material, disposal tunnel disposition hole, and the disposal tunnel seal etc. Planning and research have been conducted according to Taiwan's local characteristics.

INER has introduced the Swedish KBS-3 disposal concept and granite fictitious site as the basis for gradually developing deep geologic final disposal design capability and establishing various performance assessment technologies. Currently, the calculation tools, numerical models, testing technologies, and assessment methods required for the design have been established.

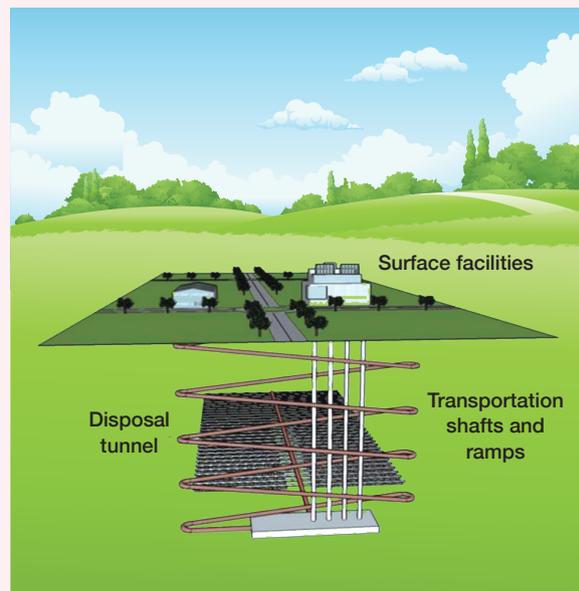


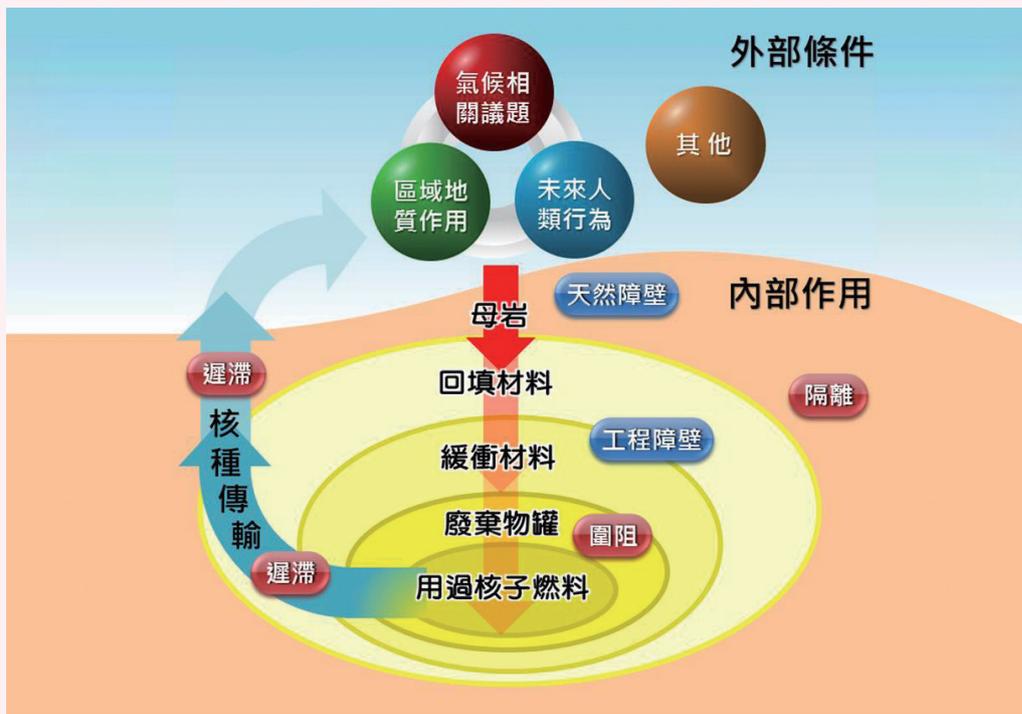
Illustration of disposal facility

## 2. 安全評估技術發展

依據處置設施的安全需求，處置系統須能達到圍阻與遲滯的功能，可將放射性物質長久隔離。

處置系統涵蓋工程障壁及天然障壁，安全評估已考慮外部條件的影響，例如氣候議題、區域地質作用、未來人類行為及其他，以及內部作用的影響。逐步進行特徵、事件、作用等影響因子資料庫 (FEPs) 之篩選建置，並建立處置系統各項功能安全指標。透過情節發展，分析腐蝕、剪力及圍壓失效等案例，完成量化計算，並且也進行極端全球暖化與地震頻率，及未來人類活動等干擾情節的案例分折。依據目前的方法論，已完成各項提出安全論證的完整論述。

核研所發展的處置設施設計、工程技術及安全評估核心技術，在我國處置計畫之技術研發中已展現技術能力。根據國際標準與經驗，我國處置技術研發能力，包括台電公司、工研院、核研所及相關學研機構等，所建構的技術能力與研究成果適合於即將到來的決策考量。核研所亦已規劃未來研發方向，並針對接續所要推展的安全論證，完成人力技術盤點與再出發，不僅將因應台灣在地化場址區域特性，也更健全技術團隊的發展。



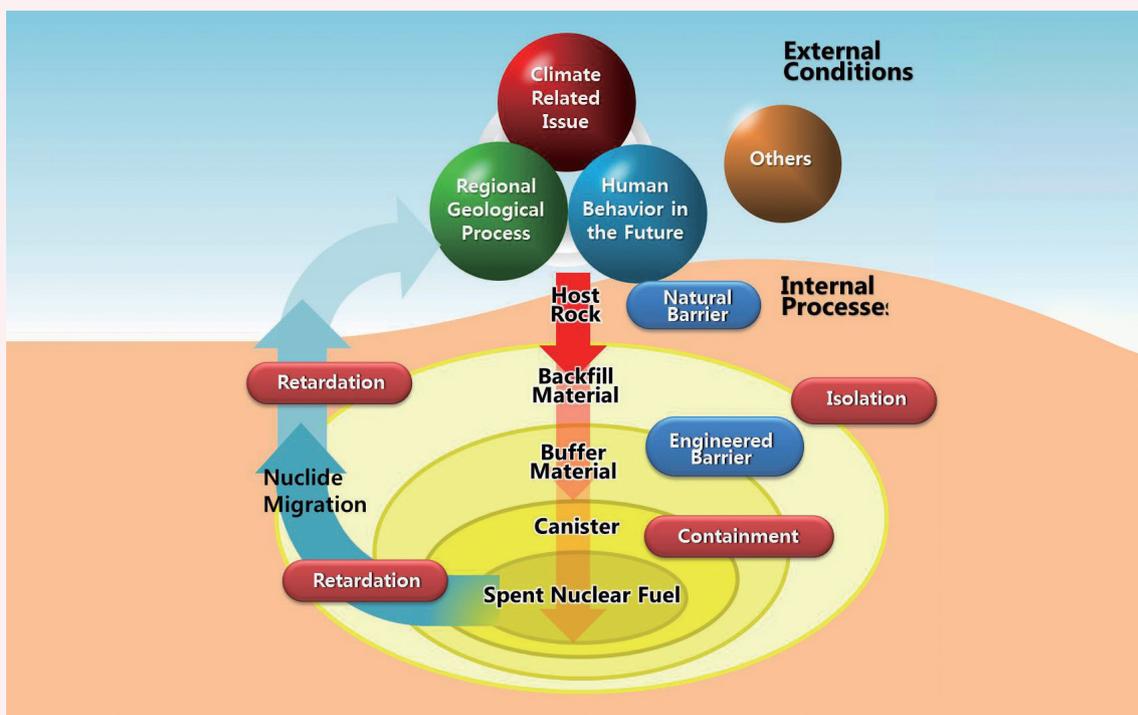
處置設施之安全評估

## 2. Development of safety assessment technology

According to disposal facility's safety requirements, the disposal facility system needs to have containment and retardation function to isolate radioactive materials in the long run.

The disposal facility system includes engineered and natural barriers. The safety assessment has already considered impacts from external effects, such as climate issues, regional geological processes, future human behavior, other factors, and impacts from internal effects. Features, events, and processes (FEPs) are screened gradually, and a FEPs database and the following safety function indicators are then established. Through scenario development, corrosion, shear force, and confining pressure failure cases are analyzed and used to complete the quantitative calculations. Cases like extreme global warming, earthquake frequencies, and interference from future human actions are also analyzed. According to current methodology, all arguments for establishing a safety case have been taken into account.

The disposal facility design, engineering technology, and core safety assessment technology developed by INER have demonstrated technical capability in Taiwan's final disposal plan. Based on international standards and experience, the research and development results of Taiwan's final disposal technology, including those from TPC, ITRI and INER, are suitable for the imminent decision consideration. INER has already planned its future development directions, completed manpower and technology inventory check, and has started to act for the safety case that is going to be proposed. This can not only respond to Taiwan's local site characteristics, but can also make the technical team's development more complete.



Disposal facility's safety assessment

## 七、落實放射性物料管理

### (一) 面對核廢 除役廢棄物管制前瞻準備

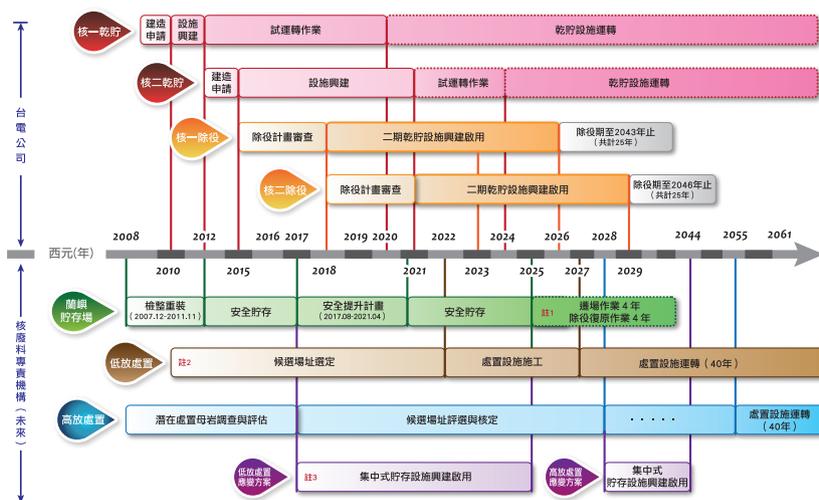
國內核電廠將陸續進入除役階段，原能會積極規劃執行除役廢棄物管制的前瞻準備作業。在管制法規方面，為提升放射性廢棄物設施除役作業品質，並有效執行放射性物料管理法中設施除役規定，已完成「放射性物料管理法施行細則」修訂，明訂提出除役計畫之時限，保留經營者充分時間規劃除役作業，並確保環境及民眾安全。施行細則同時納入解除除役管制之程序，供經營者進行除役後場址解除管制之依循。物管局亦完成「放射性廢棄物處理貯存及其設施安全管理規則」之修訂，明訂經營者執行貯存設施十年再評估之時點，使設施得在符合安全要求的前提下，達到鬆綁法規，簡政便民之目標。



核一廠廢棄物壕溝  
Chinshan NPP waste trench

在除役廢棄物的管制實務上，原能會已完成台電公司核一廠廢棄物壕溝清除作業計畫之審查，並每月派員執行稽查，確保該計畫執行過程之民眾與工作人員安全。核一廠廢棄物壕溝清除原址為該廠第二期用過核燃料室內乾式貯存設施之規劃用地，原能會督促該計畫之執行，以順遂銜接第二期乾式貯存設施之開發及核電廠除役計畫之推展。

### 放射性廢棄物安全管制要項時程規劃圖



註1：處置時程暫與處置設施及集中式貯存設施啟用連結，未來台電公司若規劃遷回核電廠貯存，則處置時程另計。

註2：依低放射性廢棄物最終處置計畫書(105年修訂三版)審查結論，自106年3月起5年內完成場址選定。

註3：依低放射性廢棄物最終處置計畫書(105年修訂三版)審查結論，自106年3月起9年內完成場址選定及土地取得作業，9年內設施完工啟用。

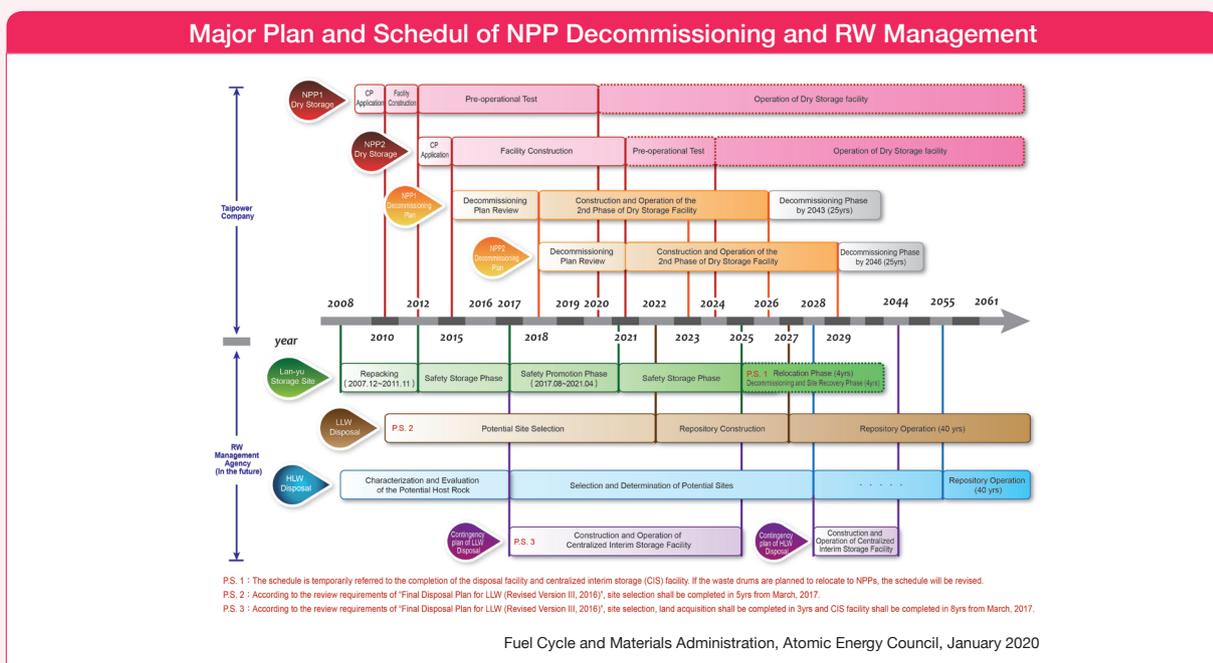
行政院原子能委員會放射性物料管理局 2020.01

## G. Implementing radioactive materials management

### (A) Prospective preparations for regulation of decommissioning radioactive waste

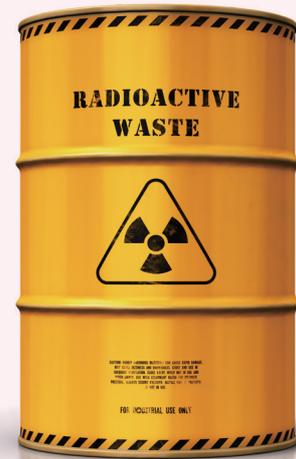
Nuclear power plants in Taiwan are gradually entering decommissioning stage; AEC actively makes prospective preparations for regulation of the decommissioning waste. The Enforcement Rules for the Nuclear Materials and Radioactive Waste Management Act has been revised to improve the quality of decommissioning work for radioactive waste facility and to effectively implement the rules related to facility decommissioning in the “Nuclear Materials and Radioactive Waste Management Act”. A deadline has been clearly established for the decommissioning plan so that operators have sufficient time to plan the decommissioning work and ensure safety of the public and environment. The enforcement rules also include procedures for removing decommissioning regulation, which operators can follow when releasing site after decommissioning. The Fuel Cycle and Materials Administration FCMA has also completed the revision of “Regulations on Treatment and Storage of Radioactive Waste and Safety Management of the Facilities”. The Regulations clearly stated deadline for reassessment of storage facilities every ten-year for the operators in order to loosen the regulations under the premises of safety requirements, simplify administration and make operations more convenient.

In regard to practice of decommissioning waste, AEC has completed the review of decommissioning plan for waste trench in Chinshan Nuclear Power Plant (NPP). AEC dispatches inspectors monthly to inspect and ensure safety of the public and workers during the plan implementation. The site where waste trench located in Chinshan NPP is the planned location for the second-phase indoor dry storage facility of spent fuel. AEC keeps supervising implementation of the plan in order to smoothly transit towards the development of the second-phase dry storage facility and advancement of the NPP decommissioning plan.



Schedule for safety regulation items of radioactive waste

核一廠已邁入除役階段，惟除役期間之核廢料仍有賴相關處理系統進行減容與減量，對於仍需運轉的系統，原能會要求台電公司應依十年再評估之精神，完成安全評估之查驗。此外原能會參考國際上除役電廠實務經驗，預先因應核電廠除役廢棄物新增之處理與貯存議題，108 年召開 2 次「除役放射性廢棄物管制技術議題討論會」，對除役期間增建之低放射性廢棄物焚化爐、超高壓壓縮機、低放射性廢棄物貯存庫及低放射性廢棄物容器開發等案件，及因應核電廠除役廢棄物特性，進行先期前瞻管制的探討，藉以提升除役廢棄物的安全管制。



## (二) 提升安全 監督蘭嶼低放貯存場遷場準備作業

政府相當重視蘭嶼核廢料相關議題，對於蘭嶼貯存場使用原住民保留地之損失補償，行政院已於 108 年 10 月 18 日核定生效「核廢料蘭嶼貯存場使用原住民保留地損失補償要點」，並由回溯補償金捐助成立損失補償基金會負責管理，專款專用於促進蘭嶼雅美(達悟)族人福祉事項；另有關蘭嶼低放貯存場遷場準備作業，原能會 108 年度持續依「總統府原住民族歷史正義與轉型正義委員會第 5 次委員會議」紀錄之決定，要求台電公司依 106 年 2 月原能會對「蘭嶼貯存場遷場規劃報告」之審定結果，積極辦理遷場事宜。原能會並於 108 年兩度召開「蘭嶼核廢料貯存場設置真相調查後續應辦有關遷場及補償事項討論會議」，會同經濟部及原住民族委員會，共同督促台電公司做好遷場工作，並要求台電公司儘速研議「放射性廢棄物中期暫時貯存設施」方案之具體規劃內容，並提報非核家園推動專案小組討論，以利蘭嶼核廢料遷場作業。

在核廢料未遷出蘭嶼之前，為進一步提升核廢料之貯存安全，原能會要求台電公司提報「提升蘭嶼貯存場營運安全實施計畫」，將現有壕溝內的 55 加侖廢棄物桶，全數以熱浸鍍鋅的 3×4 容器進行重裝，預先防範核廢料桶銹蝕問題，並作為遷場前的包裝準備作業。原能會另針對前次檢整作業要求台電公司進行檢討及經驗回饋，積極落實自主管理，加強重裝作業期間的蘭嶼環境輻射監測作業，並強化與蘭嶼地方政府及當地居民之溝通，使重裝作業順遂推展。

原能會於 108 年 10 月執行「提升蘭嶼貯存場營運安全實施計畫」整備專案檢查，確認台電公司已完成相關準備作業後，於 11 月 4 日同意台電公司啟動蘭嶼貯存場重裝作業，原能會亦執行駐場安全檢查。依核定之「提升蘭嶼貯存場營運安全實施計畫」，台電公司預定於 110 年 4 月完成全數核廢料桶重裝及回貯作業。

The Chinshan NPP has entered decommissioning stage. However, handling radioactive waste during the decommissioning period still relies on related treatment systems to implement volume reduction. AEC has requested Taipower to complete safety evaluation of the required operating systems based on the ten-year periodic reassessment. Referencing international NPP decommissioning experience, AEC held two meetings with Taipower in 2019 to discuss treatment and storage issues of NPP decommissioning waste. AEC conducted discussions on the prospective regulation of low-level radioactive waste (LLW) incinerators, ultra-high pressure compressor, and LLW storage facilities newly constructed in the decommissioning period, development of LLW containers, and characteristics of NPP decommissioning waste in order to improve the safety regulation of decommissioning waste.

### **(B) Improving safety – AEC keeps supervising the preparation for site relocation of LLW in Lanyu**

The government attaches great importance to the relative issues of radioactive waste in Lanyu; the Executive Yuan passed the “Guidelines for Compensating Indigenous Peoples for the Use of Reserved Lands as Lanyu Radioactive waste Storage Sites” on October 18, 2019. Retroactive compensation was used to found a compensation foundation to promote welfare for Yami (Tao) people in Lanyu. To prepare for the site relocation of LLW in Lanyu, AEC has followed the decision from “Fifth Meeting of the Presidential Office Indigenous Historical Justice and Transitional Justice Committee” in 2019 and requested Taipower to actively handle matters related to site relocation according to AEC’s review of “Site Relocation Plan of LLW in Lanyu” in February 2017. In 2019, AEC twice convened “Review Meetings for Site Relocation and Compensation Following the Truth Investigation on the Setup of the Lanyu Storage Site.” The Ministry of Economic Affairs (MOEA) and the Council of Indigenous Peoples were invited to co-supervise Taipower’s implementation of the site relocation work. Taipower has also been requested to plan specific contents for the “radioactive waste mid-term interim storage facility” and report to the “Nuclear-Free Homeland Promotion Task Force” for discussion, to facilitate the site relocation of LLW in Lanyu.

To further improve the safety of Lanyu storage site before the radioactive waste is moved out of Lanyu, AEC has requested Taipower to submit the “Implementation Plan for Enhancement of Operation Safety of Lanyu Storage Site.” Taipower’s plan is to re-pack 55-gallon waste drums in waste trench now with hot-dip galvanized 3×4 containers to prevent the rusting of radioactive waste drums and to prepare for site relocation. AEC also requested Taipower to conduct review and provide experience feedback based on the previous repacking work, actively fulfill self-management, improve environmental radiation monitoring in Lanyu during the repacking period, and strengthen communication with local government and residents in order to smoothly implement the repacking work.

In October 2019, AEC inspected the Taipower’s preparation for repacking work. After confirming that Taipower had completed the relevant preparation work, AEC agreed Taipower to initiate the repacking work on November 4, and then AEC implemented resident inspections for safety. Taipower is expected to complete the repacking of all the radioactive waste drums by April 2021.

在核廢料搬離蘭嶼前，原能會將持續監督核廢料桶重裝作業安全及蘭嶼環境輻射監測，確保現場工作人員與當地居民之輻射安全及環境品質。

### 蘭嶼貯存場安全提升計畫

#### 貯存場鳥瞰圖



- 105年8月審查同意台電公司「提升蘭嶼貯存場營運安全實施計畫」
- 將壕溝內現有55加侖廢棄物桶（35,867桶），放入3×4重裝容器，做好遷場前包裝作業

#### 提升營運安全實施計畫前



108年10月進行重裝，110年4月完成



#### 提升營運安全實施計畫後



提升蘭嶼貯存場營運安全實施計畫示意圖

### 原能會確保蘭嶼環境輻射安全

#### 全國環境輻射即時監測



#### 蘭嶼地區環境輻射監測



#### 蘭嶼環境輻射平行監測



- 原能會自100年起每年執行蘭嶼環境輻射平行監測活動，**建立當地民眾自主輻射監測能力**。
- 歷年環境試樣分析結果，**蘭嶼地區環境輻射監測結果正常**，均在背景輻射變動範圍內。
- 原能會將**持續嚴密安全管制及監測**，以確保蘭嶼民眾健康安全及環境品質。

蘭嶼地區環境輻射監測示意圖

Before removing the radioactive waste from Lanyu, AEC will continue to monitor the safety of radioactive waste drums repackaging work and environmental radiation in Lanyu to ensure radiation safety of workers, local residents, and the environment.

### Implementation Plan for Enhancement of Operation Safety of Lanyu Storage Site

#### Lanyu Storage Site



- TPC's "Implementation Plan for the Enhancement of the Operational Safety of Lanyu Storage Site" was approved in August 2016.
- It will repackag the existing 55 gallons of waste drums (35,867 drums) into 3x4 repackaging containers to ensure that the site relocation preparation is ready.

#### Before repackaging work





#### After repackaging work



Repacking work began in October 2019 and expect to be completed in April 2021.

Illustration of "Implementation Plan for Enhancement of Operation Safety of Lanyu Storage Site"

### AEC continue to monitor Lanyu's environmental radiation safety

#### Real-time monitoring of environmental radiation in Taiwan



<http://www.aec.gov.tw/gamadetec.html>

#### Real-time monitoring of environmental radiation in Lanyu Area



<http://lanyu.radmon.info/pub/lanyu.php>  
 頻次：五分鐘 單位：微西弗特(µSv/h)

#### Environmental Radiation Parallel Monitoring Activity in Lanyu Area




- ❖ Since 2011, AEC has implemented the Environmental Radiation Parallel Monitoring Activity in Lanyu Area each year to build the self-radiation monitoring ability of local residents.
- ❖ Historic environmental sample analysis results show that Lanyu's environmental radiation are within the variation range of background radiation.
- ❖ AEC will continue with strict safety control and monitoring to ensure that Lanyu residents are healthy and safe and have high environmental quality.

Illustration of environmental radiation monitoring in Lanyu

### (三) 尊重民意 用過核子燃料 乾式貯設施之安全管制

核電廠除役首要關鍵在移出核反應器與用過核燃料池之用過核燃料，方能進行後續除役拆廠作業，因此用過核燃料乾式貯存設施是核電廠除役的必要設施。原能會為順遂核電廠後續除役作業，於 108 年 7 月 5 日函請經濟部督促台電公司積極辦理核一、二廠乾式貯存設施興建計畫。

原能會持續督促台電公司加強與地方政府的溝通，並進行水土保持行政程序協商作業，以儘早取得水土保持完工證明及獲核定營建工地逕流廢水污染削減計畫。自 108 年 1 月起，原能會每月邀集台電公司召開乾式貯存計畫管制討論會議，定期追蹤管制台電公司推動乾式貯存計畫之執行進度，以確保用過核子燃料貯存安全。原能會於管制會議要求台電公司於核一廠乾貯設施熱測試作業前，每年至少應執行一次統合演練，並應持續強化人員、機具及設備等之整備工作，以維持作業人力及技術能量，確保未來熱測試作業安全。未來熱測試作業期間，台電公司應要求具熱測試實際經驗的美國技轉廠家，派遣專業技師參與，以強化作業安全及應變技術能量。

原能會為提升乾貯設施之審查技術能力與強化實務經驗，於 108 年 11 月邀請美國核管會 (NRC) 兩位專家及我國工業技術研究院 (ITRI) 兩位專家，舉辦「2019 核電廠用過核燃料乾式貯存安全管制研討會」。就美國乾貯相關管制法規與實務及國內外乾貯設施安全議題之研究成果，進行研討及資訊交流，以精進我國除役電廠用過核燃料乾式貯存之安全管制技術與管制量能。

為因應未來核電廠除役後之室內乾貯設施之管制需求，提升安全審查品質，強化乾貯設施安全，原能會已完成增、修訂乾式貯存設施安全分析報告導則及安全分析報告審查導則，並於 108 年 1 月發布施行，以完備台電公司室內乾貯設施建造執照申請案之安全審查作業。另 108 年度分別執行核一廠乾貯設施設備維護保養及統合演練作業專案檢查，嚴密查核乾貯設施各項設備組件及監測系統維護保養及演練作業執行成效，以確保未來乾貯設施營運安全。

台電公司核一廠第二期室內乾式貯存設施興建計畫投資可行性研究報告已於 108 年 8 月獲行政院核定；核二廠第二期室內乾貯設施部分則正由經濟部國營會審查中。原能會業透過月管制會議管控核一廠第二期室內乾貯設施興建計畫執行進度，並要求台電公司應以核一、二廠除設計畫停機過渡階段完工啟用為目標，積極推動辦理，俾利如期如質完成核一、二廠除役作業。



邀請美國核管會辦理乾貯技術研討會議

Inviting the U.S. NRC's experts to join the dry storage technology conference

### (C) Respecting public opinion – safety regulation for dry storage facilities of spent fuel

The first crucial task for NPP decommissioning is to remove the spent fuels in reactor and spent fuel pool, then the plant could be dismantled. Therefore, dry storage facilities for spent fuel is necessary for NPP decommissioning. To facilitate decommissioning work, AEC issued a letter to MOEA on July 5, 2019, requesting MOEA to supervise Taipower in promoting the plan for constructing dry storage facilities in Chinshan and Kuosheng NPP actively.

AEC keeps overseeing Taipower's communication and negotiation regarding soil and water conservation plan with local governments, so Taipower can obtain the soil and water conservation work completion certificate and approval of run-off wastewater reduction plan for the construction site as soon as possible. Since in January 2019, AEC have held the monthly meeting with Taipower to discuss the dry storage plan and regulation, as well as regularly tracked/oversaw Taipower's dry storage plan implementation progress, to ensure the safety of spent fuel storage. In the meetings, AEC requested Taipower to conduct at least one integrated drill per year prior to the hot testing of dry storage facility in Chinshan NPP. AEC also requested Taipower to continue improving preparation work for personnel, machinery, and equipment to maintain worker and technical capability, and ensure safety for hot testing in the future. During the hot testing, Taipower shall require U.S. technology transfer vendors with actual hot testing experience to assign professional experts to participate in the hot testing in order to improve work safety and response capability.

To improve regulation capability for dry storage facilities and increase practical experience, AEC invited two NRC and two ITRI experts to join the "2019 Nuclear Power Plant Spent Fuel Dry Storage Safety Control Forum" in November 2019. Discussion and information was exchanged based on related regulations and practice of dry storage in the U.S., and research achievements for safety issues of international/domestic dry storage facility safety.

In order to review the application for construction license of indoor dry storage facility, and to increase the safety of dry storage facility, the AEC has completed the addition and revision of the guidelines for safety analysis report of dry storage facility and guidelines of safety analysis report review, which were promulgated and implemented in January 2019 in preparation for construction license application of indoor dry storage facility. In 2019, AEC also implemented the project inspection for equipment maintenance and integrated drill of dry storage facility in Chinshan NPP, stringently inspected the maintenance of various equipment and monitoring systems for dry storage facility, as well as effectiveness of drill implementation, to ensure the operation safety of dry storage facility in the future.

The Investment Feasibility Report of Second-Phase Indoor Dry Storage Construction Plan in Chinshan NPP was approved by Executive Yuan in August 2019; Investment Feasibility Report of Second-Phase Indoor Dry Storage Facility in Kuosheng NPP is being reviewed by MOEA. AEC also regulates the implementation progress of Second-Phase Indoor Dry Storage Construction Plan in Chinshan NPP through monthly meetings. Furthermore, AEC requested Taipower to commence operation of dry storage facilities during the transition period of decommissioning in Chinshan and Kuosheng NPP to facilitate the completion of decommissioning and dismantling works as planned and quality controlled.



核一乾貯統合演練－混凝土護箱運送

Integrated drill of dry storage in Chinshan NPP –Vertical Concrete Cask transportation



## H. Strengthening environmental radiation monitoring

### (A) Setting up radiation monitoring posts in high mountains and outlying islands

To ensure environmental radiation safety, the Radiation Monitoring Center (RMC) has constructed the national environmental radiation monitoring network, it includes 57 environmental radiation monitoring posts in Taiwan and outlying islands till 2019, and could monitor the environmental radiation changes 24/7. The real-time monitoring data is updated every five minutes to the RMC and the Nuclear Safety Duty Center through the internet for environmental radiation safety.

To enhance environmental radiation monitoring capability, the RMC constructed six more real-time radiation monitoring posts on Ronghu (Kinmen), Dongyin (Matsu), Xiao Liuqiu, Lyudao, Cimei (Penghu), and Hehuan mountain in 2019, so that people can get more radiation information near them easily.

### (B) Survey of populations radiation dose

The environmental ionizing radiation includes natural and artificial radiation. In order to understand how much radiation dose people received regarding natural and artificial radiation, the RMC has started a four-year public radiation dose survey and assessment plan since 2019. The scope includes five categories as follows: (1) natural background radiation, (2) consumer products, (3) medical radiation, (4) radiation exposure resulting from industrial, safety inspection, medical, teaching, research and other activities, and (5) occupational exposure. It focused on the investigation and evaluation of medical radiation dose and radon in background radiation in 2019.

Medical radiation is recognized as the main reason for the source of greatly increased radiation dose from artificial radiation internationally. In order to investigate the domestic medical radiation dose, the RMC has got consent by the Institutional Review Board of Ministry of Health and Welfare and has begun collecting and analyzing data from the National Health Insurance database since 2019. In addition, the RMC also accomplished nuclear medicine drug radioactivity questionnaire and preliminary dose evaluation models of cardiac interventional fluoroscopy, non-cardiac interventional fluoroscopy, traditional fluoroscopy, and dental photography. The measurement of medical radiation dose and on site survey was also completed for two hospitals by the RMC research team.



醫院地下室空間氡氣量測 (紅色圈處)  
Measuring radon in hospital basements (red circle area)



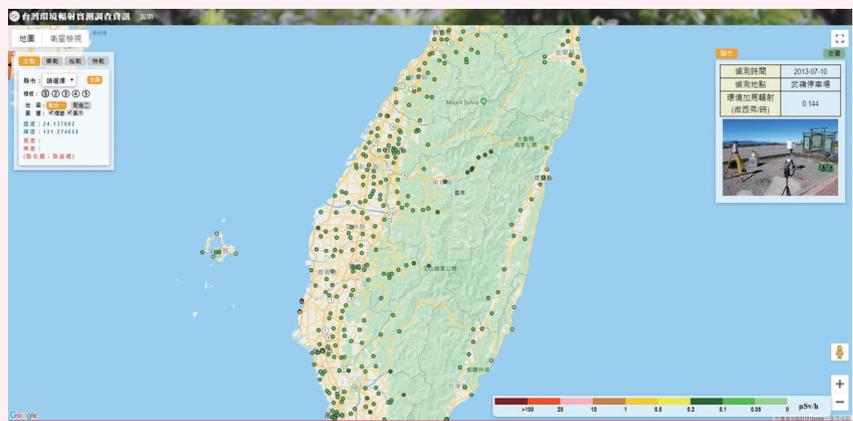
一般醫用X光機實地量測與參數紀錄

Measurement and parameter records for medical X-ray machine

在氫氣的天然背景輻射部分，過去幾年輻射偵測中心已完成 279 戶室內氫氣的輻射劑量初步調查；另因地下室容易累積較高氫氣濃度，108 年進一步執行蘭嶼地下屋、醫院地下室候診區或家屬等待處及地下停車場等共計 17 處地下使用空間的氫氣量測。在其他天然背景輻射部份，持續彙整歷年實測之環境輻射結果，目前已有 421 處戶外地表輻射、50 戶室內地表輻射、27 處中子宇宙射線及加馬宇宙射線之偵測結果；另外，在消費性產品部份，已針對稻米、麵粉、黃豆、高麗菜、地瓜、馬鈴薯、花椰菜、鳳梨、香蕉、柑橘、魚、豬肉、牛肉、雞肉、蛋及鮮奶等 16 類國人主要消費食品進行天然放射性核種含量分析，評估因攝食所造成年有效劑量，本年共分析 160 件樣品，獲得階段性結果。未來輻射偵測中心將會延續醫療輻射及天然背景輻射的調查，持續累積相關數據，完成後續評估。

### (三) 即時環境輻射資訊圖像化運用

輻射偵測中心於 108 年度建置完成「核子事故應變階段輻射數據圖像化整合系統」，並在 108 年 9 月核安第 25 號演習正式登場，除了納入即時監測站數據，更首次結合地圖展示，在核安演習中展示即時的車載偵測數據及機動輻射偵測站之環境輻射偵測結果，提供多元化且即時之核災環境輻射監測圖像資訊給相關應變與決策單位，落實核子事故時輻射數據的資訊共享。



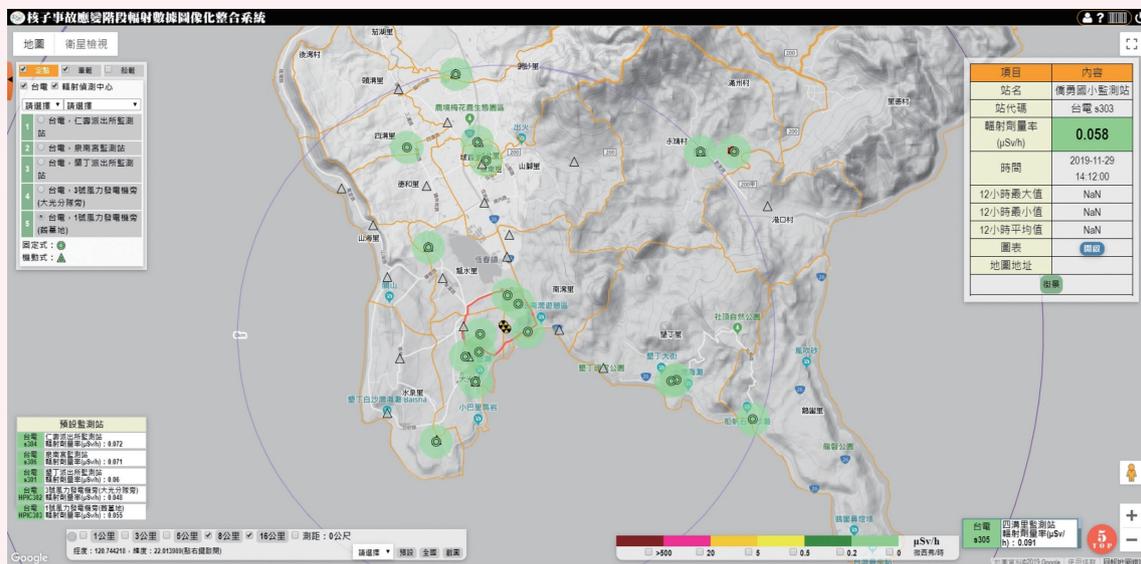
台灣環境背景輻射地圖

Map of Taiwan's environmental background radiation

For radon in background radiation, the RMC has completed indoor radon preliminary survey of 279 houses in the past few years. Besides, owing to the higher level of radon in the basement, the RMC had measured radon from 17 underground spaces, such as underground houses in Lanyu island, waiting areas in hospital basements, and underground parking lots, etc. Environmental radiation measured has been continuously compiled for other categories of natural background radiation within ten years, till now, there were results of 421 outdoor terrestrial radiation, 50 indoor radiation, 27 neutron cosmic rays and gamma cosmic rays. For consumer products, 16 categories of major consumer foods have been targeted for analyzing the radioactivity and evaluating the average effective dose caused by food intake, such as rice, flour, soybeans, cabbage, sweet potatoes, potatoes, broccoli, pineapples, bananas, citrus, fish, pork, beef, chicken, eggs, and fresh milk, there were 160 samples of major consumer foods already analyzed in 2019. The RMC will continue investigating medical radiation and natural background radiation, then collect relevant data and do subsequent evaluations.

### (C) Utilization of real-time environmental radiation information images

The RMC had established the “Nuclear Emergency Response Phase Radiation Data Visualization Integration System” in 2019, which officially debuted online during the 25<sup>th</sup> Nuclear Emergency Drill in September. The system included real-time data from the monitoring posts and detection vehicles, could provide diversified real-time environmental radiation monitoring image to relevant emergency response institution or decision-makers, and implement information sharing of radiation data during nuclear accident.



核子事故應變階段輻射數據圖像化整合系統  
Nuclear Emergency Response Phase Radiation Data

#### (四) 海域輻射調查

台灣四面環海，海岸線長且沿岸地區蘊藏非常豐富之生物資源，民眾活動及飲食與海洋有密切關係。100 年日本福島核電廠事故後，有關放射性物質洩漏流入海洋造成污染之事件屢傳，引起民眾恐慌。為掌握台灣鄰近海域輻射狀況，並評估日本福島核災事件及大陸沿海核電廠排放對台灣海域之輻射影響，原能會啟動海洋輻射調查計畫，透過跨部

會合作執行海水等環境樣品取樣及放射性核種分析，建立台灣海域放射性核種含量背景調查資料庫，以掌握台灣海域環境輻射現況。

輻射偵測中心自 106 年起開始執行「台灣海域輻射監測調查計畫」，採集樣品包含海水、海產物及沉積物（包含岸沙、河砂及海底沉積物）等，取樣範圍涵蓋台灣領海，包含台灣沿海、澎湖、金門、馬祖、蘭嶼、東沙及南沙等，海水及沉積物取樣頻率分為冬季、夏季各執行一次，海生物依當季優勢經濟魚種進行取樣，主要分析之放射性核種為鈾-137。

海域取樣作業因容易受海象、天候的影響，相對困難、複雜且昂貴，所需耗費的人力、物力及財力也相當的高，輻射偵測中心經由跨部會協調合作，委請行政院相關部會協助取樣，以達到行政資源整合的目的，合作的單位包含海洋委員會海巡署，協助於台灣沿岸及離島地區採取海水樣品及離島岸沙樣品；農業委員會漁業署，以計畫合作模式協助台灣海域海生物樣品的取樣作業；另外也以計畫委託方式請國立中山大學海洋研究機構使用海洋專業研究船執行深層海水及海底沉積物樣品的取樣作業。透過海洋調查計畫，原能會擔任起跨部會橫向協調工作，有效整合國家行政資源，除能替民眾把關海域輻射安全，也能讓各單位間互相熟悉業務，若有海洋輻射緊急事故發生，能讓各應變單位間迅速聯繫與合作。輻射偵測中心自 106 年起至 108 年底之放射性分析結果顯示，台灣鄰近海域並無輻射異常現象。



海巡署協助海水取樣作業

The Coast Guard Administration assisting with the seawater sampling task

## (D) Radiation monitoring and surveillance in Taiwan sea area

Surrounded by the ocean, Taiwan has long coastline and abundant marine resources, which are highly relevant to people's activities and dietary habit. After the Fukushima Daiichi Nuclear Power Plant disaster in 2011, there were some news about the leaking and discharging of radioactive materials into the ocean. To comprehend the radioactivity level around Taiwan's ocean and assess the impacts from the Fukushima Daiichi Nuclear Power Plant disaster and the nuclear power plant along China's coastline to Taiwan's marine, AEC conducted a plan "radiation monitoring and surveillance in Taiwan sea area", going on sampling and radionuclides analysis of environmental samples such as seawater, and establishing a database of environmental radioactivity background on radionuclides of Taiwan's sea area by cooperating with different institutions to monitor the current radiation level.

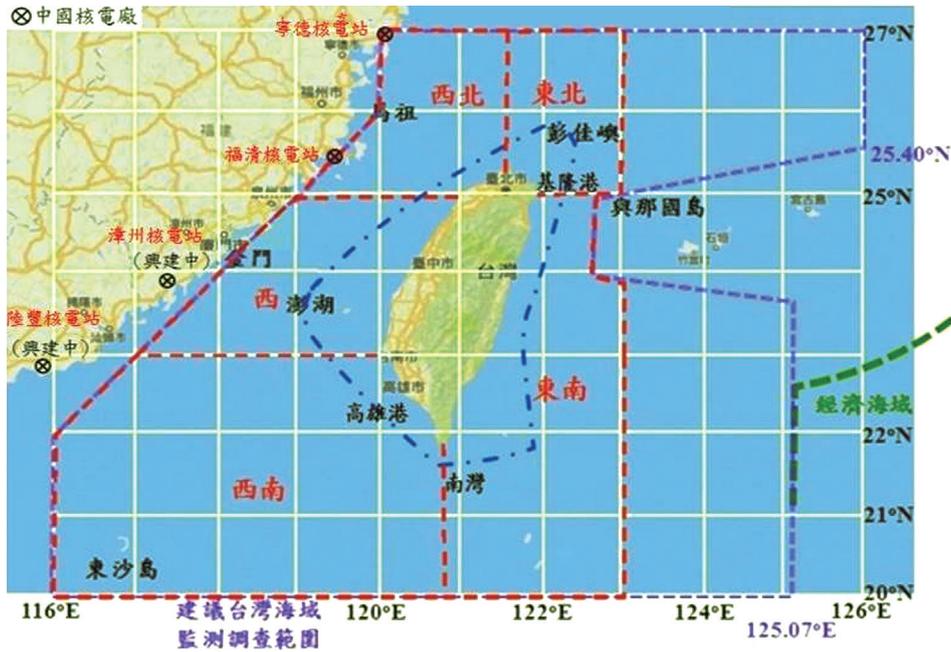
The RMC started the plan "radiation monitoring and surveillance in Taiwan sea area" since 2017, and processed sample collecting including seawater, seafood, and sediment (coastal sand, river sand, and ocean sediment) from Taiwan's coastline to outlying islands including Penghu, Kinmen, Matsu, Lanyu, Pratas Islands, and Spratly Islands etc. The seawater and sediment samples were collected twice a year during winter and summer. The marine organism samples were the seasonal migration fish species and the radioactivity analysis mainly focused on the cesium-137 radionuclide.

The sampling task is a difficult, complicated and expensive mission due to the wave and weather, in view of this, the RMC cooperated with different institutions of the Executive Yuan, for example, committed the task of seawater and sand sampling along Taiwan's coast and outlying areas to the Coast Guard Administration of the Ocean Affairs Council, and marine organism sampling to the Fisheries Agency of the Council of Agriculture; furthermore, the RMC appointed the mission of sampling deep ocean water and sediments to the College of Marine Science at NSYSU by the marine research ship.

The AEC plays a cross-departmental coordination role to effectively integrate Taiwan's administrative resources, not only for people's radiation safety, but for every unit becoming more familiar with government tasks. Once the radiation emergency radiation accident occurs in marine, each emergency response unit can rapidly cooperate with each other.

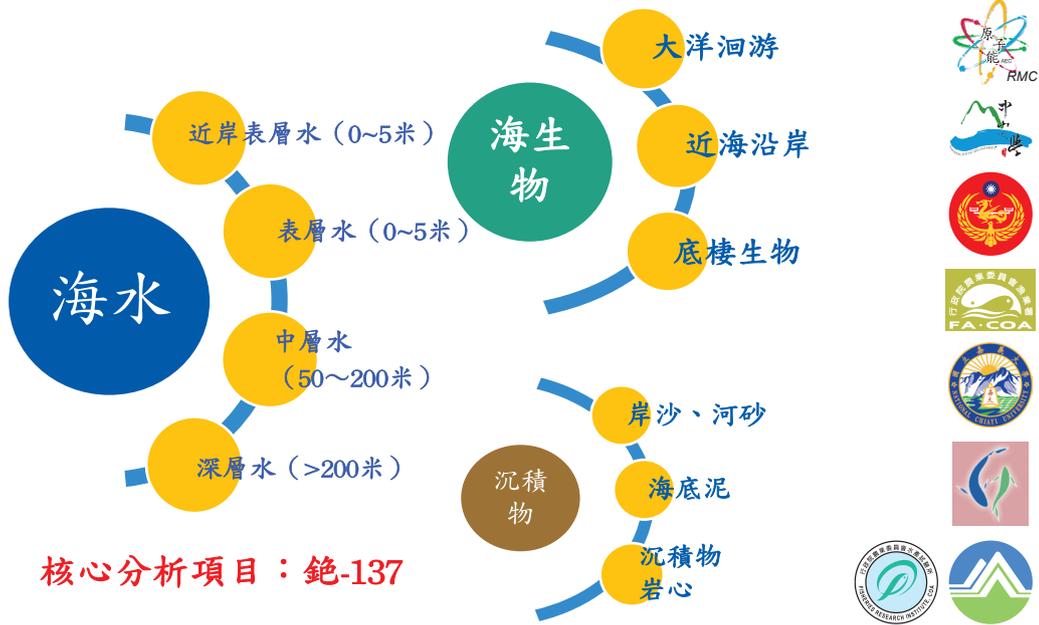
The radioactivity analysis results of Taiwan's ocean were all within regulatory limits from 2017 to 2019.

監測範圍－台灣海域



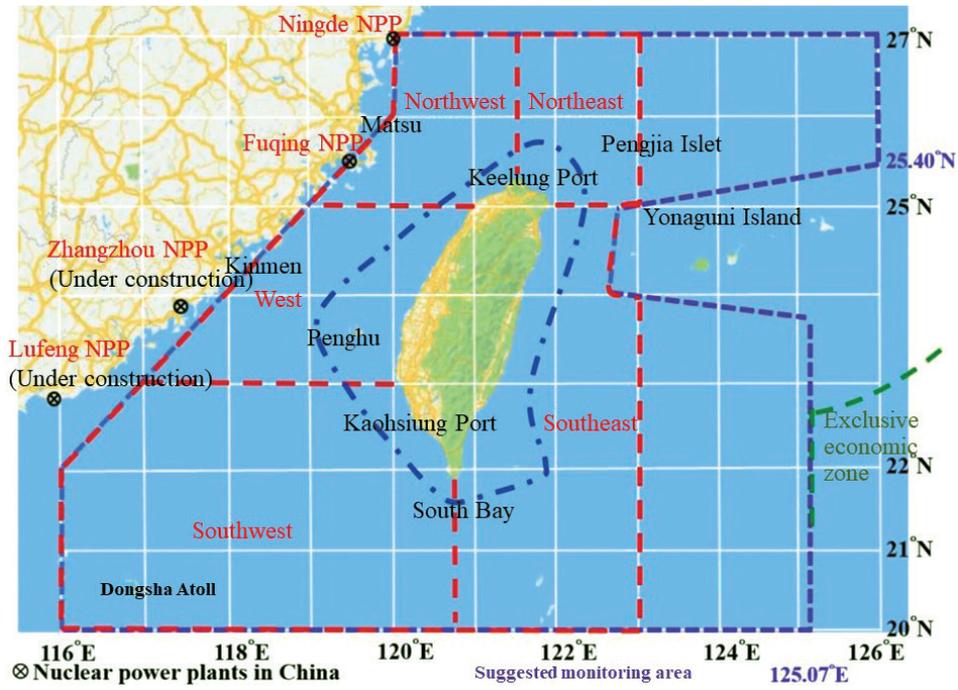
台灣海域分五大區域取樣示意圖

海域案監測項目



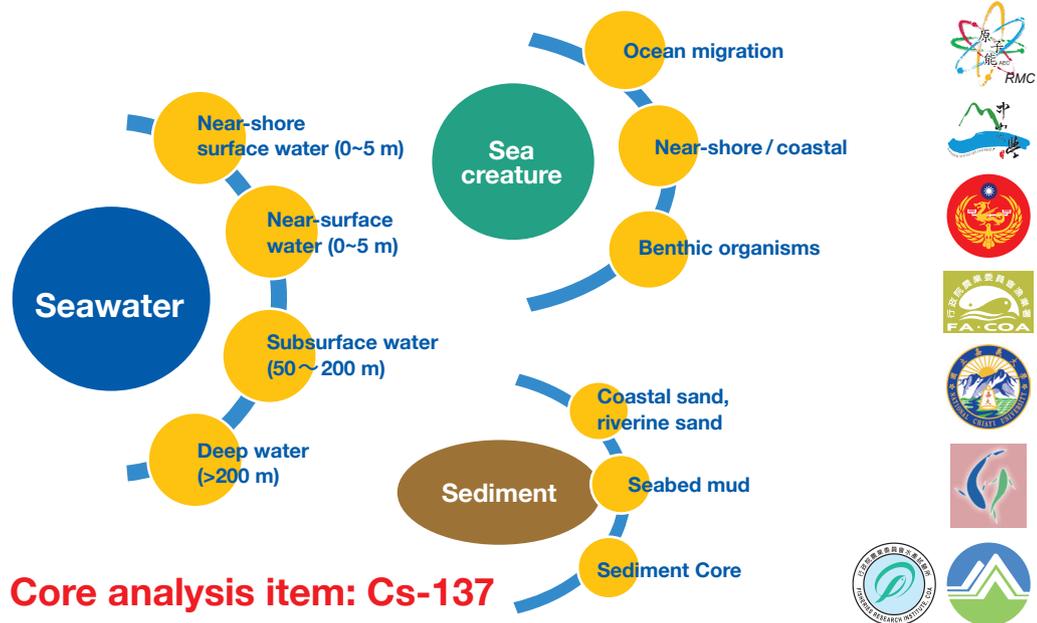
海域案監測項目

### Marine Monitoring Area in Taiwan



Sampling from Taiwan's five major marine areas

### Marine monitoring items



Maritime monitoring items

## 5

伍 Chronicle of  
Events  
大事紀



AEC

1

January

- 01.01 ● 開始辦理年劑量達 1 至 5 毫西弗之輻射屋居民健康檢查。  
AEC began implementing health examinations for residents of radioactively contaminated buildings with an annual dose of 1-5 mSv.
- 01.01 |  
01.16 ● 執行「核三廠 2 號機第 24 次大修作業視察」及同意再起動之申請。  
AEC conducted the 24<sup>th</sup> refueling outage inspection for the Maanshan nuclear power plant unit 2 and issued permission to re-start the unit.
- 01.03 ● 完成金門自來水廠榮湖淨水廠環境輻射監測站的設置並上線公開，全國監測站數達 52 座。  
The environmental radiation monitoring post in Ronghu Water Treatment Plant of Kinmen County Waterworks was set up and began operation; the number of monitoring posts in the country increased to 52.
- 07.11 ● 完成馬祖東引自來水廠環境輻射監測站的設置並上線公開，全國監測站數達 53 座。  
The environmental radiation monitoring post in Matsu's Dongyin Water Treatment Plant was set up and began operation; the number of monitoring posts in the country increased to 53.
- 08.20 ● 完成小琉球環境輻射監測站的設置並上線公開，全國監測站數達 54 座。  
The environmental radiation monitoring post in Xiao Liuqiu island was set up and began operation; the number of monitoring posts in the country increased to 54.
- 09.25 ● 完成綠島環境輻射監測站的設置並上線公開，全國監測站數達 55 座。  
The environmental radiation monitoring post in Lyudao was set up and began operation; the number of monitoring posts in the country increased to 55.
- 10.28 ● 完成澎湖七美淨水場環境輻射監測站的設置並上線公開，全國監測站數達 56 座。  
The environmental radiation monitoring post in Penghu's Cimei Water Treatment Plant was set up and began operation; the number of monitoring posts in the country increased to 56.
- 11.27 ● 完成合歡山環境輻射監測站的設置並上線公開，全國監測站數達 57 座。  
The environmental radiation monitoring post in Hehuan mountain was set up and began operation; the number of monitoring posts in the country increased to 57.
- 01.11 ● 發布「建材輻射劑量率量測與取樣及放射性核種分析基準」。  
The "Building Material Radiation Dose Measurement and Sampling and Radioactive Nuclide Analysis Standards" was promulgated.
- 01.15 ● 召開「核研所推動法人化進度討論會議」，商議「國家龍潭原子能科技研究院」設置條例三讀前應完成監督辦法及營運規章草案相關時程及分工。  
The "Meeting on the Incorporation Progress of the Institute of Nuclear Energy Research (INER)" was convened to discuss the schedule and division of labor for the oversight methods and the draft of the operation rules that should be completed before the three readings of the Regulations Governing the Establishment of the "National Longtan Institute of Atomic Energy Science and Technology."
- 01.18 ● 核發「核能電廠運轉期間監查機構認可證書」予財團法人工業技術研究院。  
AEC issued a certificate to the Industrial Technology Research Institute (ITRI) for the authorized inspection agency for operating nuclear reactor facilities.
- 01.18 ● 辦理「蘭嶼貯存場貯存設施十年再評估報告」審查作業。  
AEC started to review the "Lanyu Storage Site ten-year storage facility reassessment report."
- 01.18 ● 發布「申請設置用過核子燃料乾式貯存設施安全分析報告導則」及「用過核子燃料乾式貯存設施安全分析報告審查導則」。  
The "Guidelines for the Safety Analysis Report on the Application for Establishing the Spent Fuel Dry Storage Facility" and the "Review Guidelines for the Safety Analysis Report of Spent Fuel Dry Storage Facilities" were promulgated.

## 1

## January

- 01.22 ● 赴核一廠、核二廠、核三廠進行年初查訪。  
 01.23 AEC conducted annual dialogue with the TPC and inspections at the Chinshan, Kuosheng, and Maanshan nuclear power plants.  
 01.29
- 01.24 ● 辦理年終記者會，向外界說明原能會施政成果及未來業務主軸。  
 AEC held a year-end press conference, in which the achievements in administration were cited and key features of future operations were outlined.
- 01.31 ● 為加強民眾年節期間食品及飲用水輻射安全，派員至消費市場及年貨大街購買進口乾果、零食、果醬、香菇、木耳、昆布、乳製品、瓶裝礦泉水等共 57 件進行放射性含量檢測，檢測結果皆符合國家法規標準，相關結果於原能會網站發佈最新消息。  
 To assure radiation safety in food and drinking water for the public during the Chinese New Year, RMC dispatched staff to markets to purchase 57 items of imported foods and beverage (including dried fruits, snacks, jam, mushrooms, agaric, dried kelp, dairy products, and bottled water) for radioactivity analysis. All analytical results were within regulatory limits and the data were announced on the AEC website.
- 01-12 ● 執行全國 48 家放射線照相檢驗業者之輻射作業現場不預警安全稽查，強化輻射管制。  
 AEC implemented unannounced radiation work site inspection for 48 radiographic inspection operators across Taiwan to improve the quality of radiation protection regulation.

## 2

## February

- 02.14 ● 執行清華大學水池式反應器 (THOR) 年度視察。  
 AEC conducted annual inspection the Tsing-Hua Open-pool Reactor (THOR) at National Tsing-Hua University.
- 02.15 ● 辦理原子能科技科普展，以互動體驗、闖關遊戲、簡淺解說及社群直播等內容，傳播科普知識，三場次共吸引 15,040 參觀人次。  
 02.17 AEC organized three sessions of the atomic science exhibition and used interactive experiences, games, easy-to-understand explanations, and group streaming activities to distribute general science knowledge. The event attracted 15,040 visitors.  
 06.22 |  
 06.23  
 07.05 |  
 07.08
- 02.20 ● 與內政部消防署合作辦理「防災士訓練」。  
 02.21 AEC has cooperated with the National Fire Agency of the Ministry of the Interior in organizing the “Disaster Prevention Technician Training” for AEC staff.
- 02.21 ● 南、北部放射性分析備援實驗室分別取得衛生福利部食品檢驗機構認證。  
 07.26 Both the southern and northern radioactive analysis backup laboratories have obtained the certification of radiation test on food from the Ministry of Health and Welfare.
- 02.23 ● 辦理地方拜訪活動，拜訪新北市石門、萬里及金山區長，就核一廠除役作業現況及核二廠除役計畫審查作業進行意見交換。  
 AEC organized several dialogues with district chiefs of Shimen, Wanli, and Jinshan in New Taipei City and exchanged opinions on the decommissioning plan and current works at the Chinshan and Kuosheng nuclear power Plants.
- 10.15 拜訪石門區區長，就核一除役許可核發後安全管制與除役相關議題交換意見。  
 AEC’s representatives visited the Shimen District chief and exchange opinions on issues related to the safety regulation and decommissioning after issuing the Chinshan decommissioning permit.
- 12.13 拜訪金山區地方意見領袖，就除役安全相關議題交換意見。  
 AEC’s representatives visited local leaders of the Jinshan District to exchange opinions on safety issues of decommissioning nuclear power plants.
- 02.25 ● 德國國會友台小組主席 Klaus-Peter Willsch 議員率團訪會。  
 Mr. Klaus-Peter Willsch, Chair of the German-Taiwan Parliamentary Friendship Group, led a delegation to visit AEC.

## 3

## March

- 03.04  
03.29 ● 訂定之「行政院原子能委員會所管特定非公務機關資通安全管理作業辦法」及「原子能業務財團法人管理辦法」，並發布施行。  
The “Regulations of Cyber Security Management for Special Non-Official Agencies Supervised by the Atomic Energy Council, Executive Yuan” and the “Administrative Regulations for Atomic Energy Affairs Foundation” were enacted, promulgated and implemented.
- 03.06  
03.15  
03.22 ● 辦理「核二廠除役計畫第 1 次現場訪查活動、核二廠除役計畫審查作業現場勘查、核二廠除役計畫審查地方說明會」。  
AEC organized its first site visit to the Kuosheng nuclear power plant for the reviewers of Kuosheng decommissioning plan and a local forum near the Kuosheng nuclear power plant.
- 03.06  
|  
03.08 ● 國際原子能總署 (IAEA) 保防官員 4 人至核研所進行 2019 年核子保防例行檢查，檢查結果均無異常。  
Four IAEA safeguards officers conducted the regular 2019 nuclear safeguards inspection at the INER. The inspection showed no abnormalities.
- 03.14 ● 主任委員列席立法院第 9 屆第 7 會期教育及文化委員會第 5 次全體委員會議，並進行業務報告。  
The Chairman attended Legislative Yuan’s 5<sup>th</sup> (9<sup>th</sup> session, 7<sup>th</sup> period) Education and Culture Committee meeting and delivered a speech on AEC’s works.
- 03.15 ● 完成 107 年下半年「臺灣地區放射性落塵與食品調查半年報」。  
Accomplished the second semi-annual report of “Fallout and Foodstuff Radioactivity Surveillance” in 2018.
- 04.12 完成「臺灣地區核設施 107 年環境輻射監測年報」並於官網公開。  
Published the “2018 Annual Report on Environmental Radiation Monitoring in Taiwan” on the website.
- 08.27 完成 108 年上半年「臺灣地區放射性落塵與食品調查半年報」。  
Accomplished the first semi-annual report of “Fallout and Foodstuff Radioactivity Surveillance” in 2019.
- 03.15  
|  
05.17 ● 核研所滿載生產核醫檢查用藥「氯化亞鉈 (鉈-201) 注射劑」及「檸檬酸鎂 (鎂-67) 注射劑」，以因應國外藥廠因生產不及造成國內嚴重缺藥之問題，總計 2 個月期間提供約 18,000 位病患造影使用。  
INER went into full production for the nuclear medicine diagnostic drugs, “INER Thallous Chloride (Tl-201) Injection” and “Gallium Citrate Ga-67 Injection”, because overseas drug plants could not produce them fast enough, causing a shortage in Taiwan. In two months, INER produced enough injections for the imaging use of 18,000 patients.
- 03.21  
04.11  
04.16  
04.25 ● 協助新北市、新竹市、台南市 108 年民安 5 號演習，以及雲林縣 108 年災防演習，進行輻射災害應變項目演練。  
AEC assisted in conducting radiation disaster prevention and rescue drills in 2019 Ming An No. 5 Exercise (New Taipei City, Hsinchu City, and Tainan City) and 2019 disaster prevention exercise (Yunlin County).
- 03.26  
04.12  
04.13 ● 執行「108 年度第 1 次核二廠、核三廠及核一廠不預警視察」。  
AEC conducted its first unannounced inspection at the Kuosheng, Maanshan and Chinshan nuclear power plants.
- 03.29  
06.28  
09.27  
12.27 ● 辦理「第 15 屆核子反應器設施安全諮詢會」及核一廠現場訪查活動 (9 月 27 日)。  
AEC hold four meetings for the 15<sup>th</sup> Advisory Committee on Nuclear Safety and organized an on-site visit to the Chinshan Nuclear Power Plant on September 27<sup>th</sup>.
- 03.29  
11.14 ● 視察核一廠、核二廠緊急應變計畫演習。  
AEC has performed the inspection on the emergency response exercises in the Chinshan Nuclear Power Plant and the Kuosheng Nuclear Power Plant.

4

April

- 04.01 ● 辦理台灣研究用反應器 (TRR) 設施除役計畫 (108 年版) 及 107 年度執行報告審查。  
AEC organized the Taiwan Research Reactor (TRR) facility decommissioning plan (2019 version), and reviewed the 2018 implementation report.
- 04.10 | 04.11 ● 核研所派員參加日本東京舉辦之「第 15 屆臺日能源合作研討會」及提報「高效能重組產氫關鍵材料開發與系統建置」合作項目，並安排會見太陽日酸公司代表，就氫能相關技術交換意見。  
INER assigned personnel to Tokyo to participate in the “15<sup>th</sup> Japan-Taiwan Joint Seminar on Energy Cooperation” to report on cooperation items, such as the “development of key materials and system setup for high efficiency recombinant hydrogen production”, while arranging a meeting with representatives of the Taiyo Nippon Sanso Corporation to exchange opinions on hydrogen energy-related technology.
- 04.10 | 09.17 ● 召開「核二廠除役計畫第一回合綜合審查聯席會議、核二廠除役計畫審查委員現場訪查活動及召開第二回合綜合審查聯席會議」。  
AEC convened the first and second joint review meetings for the Kuosheng decommissioning plan and organized a site visit for the reviewers.
- 04.11 | 05.25 ● 執行「核二廠 2 號機第 25 次大修作業視察」及同意再起動之申請。  
AEC conducted the 25<sup>th</sup> refueling outage inspection for the Kuosheng nuclear power plant unit 2 and issued permission to re-start the unit.
- 04.19 ● 核研所開發本土化先進配電管理系統 (ADMS) 與地理圖資整合技術 (GIS)，並於台電雲林區處配電饋線調度中心 (FDCC) 進行初步功能測試，測試結果顯示有效提高含綠能配電饋線操作可靠度。  
INER developed an indigenous advanced distribution management system (ADMS) and geographic information system (GIS), and conducted initial testing at the TPC Yunlin Feeder Distribution Control Center (FDCC). The test results show that the ADMS and GIS effectively improved the operation reliability of green energy distribution feeders.
- 04.23 ● 召開第六屆第一次放射性物料安全諮詢會，討論放射性廢棄物設施意外事件管制作為及台電公司應變作業。  
The first meeting of the 6<sup>th</sup>-term Advisory Committee on Radioactive Waste Safety was convened to discuss radioactive waste facility accident regulatory measures and TPC response.
- 04.25 | 07.04 | 08.23 ● 執行「108 年度第 2 次核二廠、核三廠及核一廠不預警視察」。  
AEC conducted its second unannounced inspection at the Kuosheng, Maanshan and Chinshan nuclear power plants.
- 04.26 ● 召開第 16 屆第 4 次「游離輻射安全諮詢會」。  
The forth session of the 16<sup>th</sup> “Ionizing Radiation Safety Advisory Board” was convened.
- 04.27 ● 舉辦 108 年度第 1 次「輻射防護專業測驗及操作人員輻射安全證書測驗」。  
The 1<sup>st</sup> “Certification Examination for Radiation Protection Personnel and Radiation Operators on Radiation Safety” in 2019 was held.

5

May

- 05.02 | 05.03 ● 辦理 108 年低放處置計畫專案視察作業及用過核子燃料最終處置計畫專案視察作業。  
The 2019 inspection project on the disposal plan for low-level radioactive waste and the final disposal plan for spent nuclear fuel were carried out.
- 05.03 ● 完成 108 年第 1 季「臺灣地區自來水試樣放射性分析結果」共計 125 件水樣分析，分析結果皆符合規定，函送台灣自來水公司。  
A total of 125 tap water samples from Taiwan Water Corporation were analyzed during the first quarter in 2019, all analytical results were within regulatory limits.
- 06.13 ● 完成 108 年第 2 季台灣地區及金門、馬祖共 133 個淨水廠飲用水之放射性含量分析，分析結果皆符合規定，並發函告知各單位。  
A total of 133 drinking water samples from Taiwan Water Corporation, Kinmen County Waterworks and Lien Chiang County Water Plant were analyzed during the second quarter in 2019, all analytical results were within regulatory limits.
- 09.24 ● 完成 108 年第 3 季「臺灣地區自來水試樣放射性分析結果」共計 120 件水樣分析，分析結果皆符合規定，函送台灣自來水公司。  
A total of 120 tap water samples from Taiwan Water Corporation were analyzed during the third quarter in 2019, all analytical results were within regulatory limits.
- 12.18 ● 完成 108 年第 4 季「臺灣地區自來水試樣放射性分析結果」共計 107 件水樣分析，分析結果皆符合規定，函送台灣自來水公司。  
A total of 107 tap water samples from Taiwan Water Corporation were analyzed during the fourth quarter in 2019, all analytical results were within regulatory limits.
- 05.07 | 05.08 ● 辦理「108 年度蘭嶼地區環境輻射平行監測」活動，並邀請蘭嶼居民及團體共同參與。  
AEC held the “2019 Environmental Radiation Parallel Monitoring Activity in Lanyu Area”, and Lanyu residents and community representatives were invited to participate in it.
- 05.13 ● 「核子事故緊急應變法」第 31 條之 1 有關散布假消息罰則修正條文，經立法院第 9 屆第 7 會期教育及文化委員會第 14 次全體委員會議審查完竣。  
The penalization for spreading false rumors in Article 31-1 of the Nuclear Emergency Response Act was revised. The revisions were reviewed at the Legislative Yuan’s 14<sup>th</sup> (9<sup>th</sup> session, 7<sup>th</sup> period) Education and Culture Committee meeting.
- 05.13 ● 辦理「備援實驗室環境水樣阿伐 / 貝他計測分析實務操作訓練」，參加實驗室計有屏東科技大學、陽明大學及清華大學等單位。  
Conducting the training course of “Alpha and beta radiation analysis in environment water sample”; the participants included National Pingtung University of Science and Technology, National Yang-Ming University, and National Tsing Hua University.
- 05.23 | 05.24 ● 台南市政府衛生局派員至輻射偵測中心，由中心人員指導進行食品前處理及檢測作業，共檢測 20 件樣品，結果皆未檢出人工放射性核種。  
Conducting the training for the personnel from the Public Health Bureau of Tainan City Government to practice the procedures of pretreatment and radioactive analysis in food. A total of 20 items were analyzed and the results showed no artificial radioactive nuclides in each item.
- 08.27 | 08.28 ● 完成地方政府衛生局「純鍺半導體偵檢器加馬能譜分析系統實務訓練」，共 8 人參與。  
Conducting the workshop “Gamma spectroscopy analysis systems with a high purity germanium semiconductor detector” for the local government and there were 8 participants.

5

May

- 05.16 ● 辦理 107 年度「行政院原子能委員會委託研究計畫」成果發表會，邀請產、學、研界合作夥伴出席，參加人數計 331 人。  
AEC organized the 2018 Presentation of “Results from Research Projects Commissioned by the AEC.” Partners from industry, academia, and research institutes were invited to attend the event; there were 331 participants.
- 05.23 ● 邀請核一廠地方代表與公民團體辦理核一廠用過核子燃料乾式貯存設施訪查活動。  
Local representatives and civil groups around the Chinshan Nuclear Power Plant were invited to participate the observation for the dry storage facility.
- 05.23 ● 召開「龍門電廠地質再調查小組會議」。  
AEC convened the “Lungmen Nuclear Power Plant geology re-survey team meeting.”
- 07.30  
09.25  
11.07  
12.27
- 05.27 ● 邀請美國專家舉辦「2019 核子保安效能測試」訓練。  
US experts were invited to organize and to conduct the “Nuclear Security Performance Testing” training program in Taiwan.
- 05.27 |  
05.30 ● 國際原子能總署 (IAEA)、美國國家核安全管理局 (NNSA)、洛斯阿拉莫斯國家實驗室 (LANL) 及阿崗國家實驗室 (ANL) 專家共 5 人，至核研所檢查 WBR 燃料，及研商後續安定化作業程序等。  
Five experts from the IAEA, the U.S. National Nuclear Security Administration (NNSA), Los Alamos National Laboratory (LANL), and the Argonne National Laboratory (ANL) visited the INER to inspect the WBR fuel and discuss follow-up stabilization procedures.
- 05.29 ● 辦理 107 年度放射性廢棄物最終處置計畫執行成效評核會議。  
The 2018 appraisal meeting on the effectiveness of the execution of the final disposal plan for radioactive waste was held.
- 05.30 ● 修正及發布「輻射醫療曝露品質保證標準」。  
The “Radiation Medical Treatment Exposure Quality Standards” was revised and promulgated.
- 05.31 ● 正修科技大學師生 52 人參訪中心加馬分析室、貝他計測室、輻安預警監測系統監控室。  
52 participants of Cheng Shiu University visited the gamma radiation analysis room, the beta measuring room, and the radiation safety early warning monitoring system control room in RMC.
- 10.02 ● 樹人醫護管理專科學校師生 43 人參訪中心加馬分析室、貝他計測室、輻安預警監測系統監控室及體驗輻射偵檢器量測的操作。  
43 participants of Shu-Zen Junior College of Medicine and Management visited the gamma radiation analysis room, the beta measuring room, and the radiation safety early warning monitoring system control room, learned how to operate radiation detectors in RMC.
- 05 ● 於北、中、南區舉辦 6 場「108 年度放射線照相檢驗輻射安全防護管制說明會」。  
Six “2019 Promotion Conferences for Radiation Safety and Protection of the RT Industry” were conducted in Northern, Central and Southern Taiwan.

6

June

- 06.11 ● 於北、南、中、東區辦理「地方政府輻射災害防救講習」。
- 06.14 The courses for “Local Government Radiation Disaster Prevention and Rescue” were held in Northern, Southern, Central and Eastern Taiwan.
- 06.17
- 06.20
- 06.12 ● 辦理「107 年原子能科技學術合作研究計畫」成果發表會。
- AEC organized the Presentation of the “2018 Atomic Energy Technology Academic Cooperative Research Project Accomplishment Presentation”.
- 06.12 ● 辦理南部輻射監測中心進駐人員基礎訓練。
- RMC organized basic training for personnel posted in the Nuclear Emergency Southern Radiation Monitoring and Dose Assessment Center.
- 06.13
- 06.19 辦理空中偵測硬體操作與簡單維修訓練。
- 06.26 RMC organized aerial detection hardware operation and simple repair training.
- 06.20 辦理南部輻射監測中心應變人員再訓練。
- RMC organized re-training for response personnel in the Nuclear Emergency Southern Radiation Monitoring and Dose Assessment Center.
- 07.24 辦理空中偵測儀器操作飛行實作訓練。
- RMC organized aerial detector flying operation training.
- 06.14 ● 辦理 108 年放射性廢棄物處理設施運轉人員測驗。
- The 2019 Examination for Operators of Radioactive Waste Treatment Facilities was held.
- 06.17 ● 辦理與美國核管會之雙邊技術交流會議。
- AEC hold the Bilateral Technical Meeting with the U.S. Nuclear Regulatory Commission.
- 06.21
- 06.25 ● 修正發布放射性廢棄物處理貯存及其設施安全管理規則。
- The Safety Management Rules for the Radioactive Waste Treatment and Storage Facilities was revised and promulgated.
- 06.30 ● 發布我國「107 年度全國輻射工作人員劑量統計年報」。
- The “2018 Annual Statistical Report on Occupational Radiation Exposure in Taiwan, Republic of China” was published.

7

July

- 07.01 ● 國際原子能總署於該署網站公布 2018 年全球核子保防實施總結報告，宣告我國連續第 13 年為「所有核物料均用於核能和平用途」國家。
- The International Atomic Energy Agency (IAEA) published the Safeguards Statement for 2018 on its website, declaring Taiwan as a country where “all nuclear materials have been used in peaceful nuclear activities” for 13 consecutive years.
- 07.04 ● 邀集經濟部、原住民委員會、台電公司召開「蘭嶼核廢料貯存場設置真相調查後續應辦有關遷場及補償事項討論第三次會議」。
- AEC convened the “Third Meeting for Site Relocation and Compensation following the Truth Investigation on the Setup of the Lanyu Nuclear Waste Storage Site” of the Ministry of Economic Affairs, the Council of Indigenous Peoples, and TPC.
- 07.08 ● 核定屏東縣核子事故區域民眾防護應變計畫。
- AEC has approved Pingtung County’s “Public Protection Plan within the EPZ”.

7

July

- 07.09 | 07.12 ● 執行核三廠核子保安暨緊急應變整備年度視察。  
AEC has performed annual inspection on nuclear security and nuclear emergency response and preparedness at Maanshan Nuclear Power Plant.
- 07.12 ● 依核子反應器設施管制法規定於 7 月 12 日核發核一廠除役許可，自 7 月 16 日起生效。  
AEC issued the Chinshan nuclear power plant decommissioning permit according to the Nuclear Reactor Facilities Regulation Act on July 12th; the permit became effective on July 16<sup>th</sup>.
- 07.13 | 07.14 ● 受邀參與國立臺灣科學教育館辦理之「2019 科學玩意節」活動。  
AEC was invited to attend the “2019 Science Carnival” organized by the National Taiwan Science Education Center (NTSEC).
- 07.16 | 07.17 ● 出席於東京召開之第 5 屆台日核安管制資訊交流會議。  
AEC delegation attended the “5<sup>th</sup> AEC-NRA Nuclear Regulatory Information Exchange Meeting” held in Tokyo.
- 07.23 | 07.28 ● 受邀參與國立臺灣科學教育館及高雄市政府共同主辦之「第 59 屆中小學科展科學博覽會」。  
AEC was invited to take part in the “59<sup>th</sup> National Primary and High School Science Fair”, jointly organized by the NTSEC and Kaohsiung City Government.
- 07.24 | 07.26 ● 核研所協助辦理「第三屆台日核能專家會議」，日方來台代表團人數共計 26 名，參加研討會人員約達 100 人，會後並參訪核一廠及核研所。  
INER assisted in the organization of the “3<sup>rd</sup> Taiwan-Japan Nuclear Expert Conference.” The Japanese delegation included 26 members; approximately 100 people participated in the conference. After the conference, participants visited Chinshan Nuclear Power Plant and INER.
- 07 ● 於北、中、南、東區舉辦 5 場「輻防雲端再精進，便捷服務任遨遊—輻射源進出口簽審系統更新暨輻射防護管制實務宣導說明會」。  
Five “Seminars on Improving Radiation Prevention Cloud and Making Services More Convenient – the Updated Radiation Source Import/Export Customs Licensing System and Practical Radiation Protection Regulation” were held in Northern, Central, Southern, and Eastern Taiwan.

8

August

- 08.01 ● 輻射偵測中心與科技部南部科學工業園區管理局簽署「輻射災害防救支援協定書」，同意協助該園區有關輻災整備及應變相關事宜。  
RMC signed a “radiation disaster prevention and rescue support agreement” with Southern Taiwan Science Park Bureau of the Ministry of Science and Technology to assist the response of the radiological disaster.
- 08.02 ● 於屏東縣車城消防分隊，辦理 108 年核安第 25 號演習兵棋推演。  
AEC conducted the table top exercise of the 2019 National Nuclear Emergency Exercise in Checheng Pingtung County.
- 08.07 ● 核研所辦理「核設施除役技術國際研討會」，邀請台電公司、工程顧問公司、國外電廠除役公司及相關設備領域專家與會，以組成台灣核電廠未來除役工作所需之團隊為目標。  
INER organized the “International Conference on Nuclear Decommissioning” and invited TPC, engineering consulting firms, foreign power plant decommissioning companies, and related equipment field experts to participate. The goal is to form a team needed for Taiwan’s future nuclear power plant decommissioning.
- 08.11 ● 輻射偵測中心加馬劑量校正室通過財團法人全國認證基金會 TAF 展延認證評鑑，證書有效期至 111 年 9 月 19 日。  
The gamma dose calibration lab in RMC passed the TAF certification extension assessment. The certification is valid until September 19, 2022.
- 08.12 ● 原能會召開核一廠除役作業核安文化討論會。  
AEC convened the decommissioning nuclear safety culture forum of the Chinshan nuclear power plant.

## 8

## August

- 08.12 | 08.15 ● 邀請美國專家舉辦「核子保安桌上演練」訓練。  
US experts were invited to organize and to conduct the “Nuclear Security Tabletop Exercise” training program in Taiwan.
- 08.14 ● 修正發布核子反應器設施除役計畫導則及除設計畫審查導則。  
AEC issued the nuclear reactor facility decommissioning plan guidelines and the decommissioning plan review guidelines.
- 08.14 ● 召開第六屆第二次放射性物料安全諮詢會，議題為提升蘭嶼貯存場營運安全實施計畫安全管理作業及台電公司民眾溝通。  
The second meeting of the 6<sup>th</sup>-term Advisory Committee on Radioactive Waste Safety was convened. The topic of this meeting is the improvement of the Lanyu Storage Site’s operation safety implementation plan and safety regulatory work, as well as TPC’s public communication.
- 08.16 ● 訂定「行政院原子能委員會主管政府捐助之財團法人監督要點」，並發布施行。  
The “Guidelines for Foundations that Receive Government Assistance Under the Atomic Energy Council” was enacted, promulgated and implemented.
- 08.23 ● 召開第 16 屆第 5 次「游離輻射安全諮詢會」。  
The fifth session of the 16<sup>th</sup> “Ionizing Radiation Safety Advisory Board” was convened.
- 08.28 ● 核研所邀請日本保健物理學會會長甲斐倫明教授蒞所演講，並邀請立法委員吳焜裕博士、監察委員張武修博士等蒞臨指導，演講結束後相關貴賓並一同參訪核研所食品放射性檢測計測室。  
INER invited the President of the Japan Health Physics Society, Professor Michiaki Kai, to give a speech. Legislator Dr. Wu Kuen-Yuh and Control Yuan member Dr. Chang Wu-Shou were invited to provide guidance. After the speech ended, the VIPs visited the INER’s Food Radioactive Inspection and Measuring Laboratory.
- 08.29 | 11.07 ● 視察核一廠、核二廠核子保安及反恐演練。  
AEC has inspected the nuclear security and anti-terrorism exercises at Chinshan Nuclear Power Plant and Kuosheng Nuclear Power Plant.
- 08.31 ● 發布我國「107 年游離輻射應用與管理統計」年報。  
The “2018 Annual Statistical Report on Application and Management of Ionizing Radiation in Taiwan, Republic of China” was published.

9

September

- 09.02 ● 辦理「108 年核安演習下週於屏東地區登場」記者會，向媒體說明第 25 號演習實兵演練之地點、項目、動員人力及演習特點。  
AEC held a press conference on the “Launch of the 2019 Nuclear Emergency Exercise in Pingtung”, detailing the locations, list of activities, manpower to be mobilized and features of the hands-on drills of the No. 25 Exercise to the press and media.
- 09.04 ● 建置原能會備援網路核心交換器及備援網路，提高原能會網路之可用性。  
The AEC backup system for core switch and network were set up, whereby the usability of the AEC network is increased.
- 09.04 ● 核研所研發之放射性診斷用製劑「核研心交碘 -123 注射液劑」獲衛生福利部許可發證。  
INER Sodium Iodide (I-123) Oral Solution developed by INER used for radioactive diagnosis obtained the Ministry of Health and Welfare’s permit.
- 09.09 ● 視察核三廠緊急應變計畫演習（含核子保安及反恐演練）。  
AEC has inspected the emergency response exercises at Maanshan Nuclear Power Plant, including nuclear security and anti-terrorism exercises.
- 09.10
- 09.09 ● 於核三廠及鄰近地區，辦理 108 年核安第 25 號演習實兵演練。  
The fully participation drill of the 2019 National Nuclear Emergency Exercise was carried out in the Maanshan Nuclear Power Plant and its neighboring areas.
- 09.11
- 09.23 ● 主任委員列席立法院第 9 屆第 8 會期教育及文化委員會第 2 次全體委員會議，並進行業務報告。  
The Chairman attended the Legislative Yuan’s 2<sup>nd</sup> (9<sup>th</sup> session, 8<sup>th</sup> period) Education and Culture Committee meeting and delivered a speech on AEC’s works.
- 09.25 ● 辦理「用過核子燃料乾式貯存實務技術及安全管制研討會」。  
AEC held the “Workshop on Safety Control and technical practice of Spent Fuel Dry Storage.”
- 09.26 ● 邀請核一廠地方代表與公民團體辦理核一廠除役及乾式貯存訪查活動。  
Local representatives and civil groups around the Chinshan Nuclear Power Plant were invited to participate the observation for the decommissioning and the dry storage facility.
- 09.26 ● 核研所於「2019 台北創新技術博覽會」獲得 1 面鉑金、1 面金牌、1 面銀牌、2 面銅牌，共 5 個獎項。  
INER won five medals at the “2019 Taiwan Innotech Expo”, including a platinum, a gold, a silver, and two bronze medals.
- 09.28
- 09.28 ● 完成 2.0 版「全國輻射源進出口簽審通關資訊系統」啟用。  
AEC completed and began the use of the Radiation Source Import / Export Customs Licensing System V.2.

10

October

- 10.05 ● 執行「108 年度第 3 次核二廠、核一廠及核三廠不預警視察」。  
AEC conducted its third unannounced inspection at the Kuosheng, Maanshan and Chinshan nuclear power plants.
- 11.01
- 12.11
- 10.07 ● 執行屏東縣緊急應變計畫區家庭訪問作業。  
AEC has completed the Pingtung County’s EPZ family survey.
- 11.06
- 10.07 ● 執行「核三廠 1 號機第 25 次大修作業視察」、「臨界申請加強查核視察」以及審查機組再起動申請。  
AEC conducted the 25<sup>th</sup> refueling outage inspection and reinforced inspection before criticality for the Maanshan nuclear power plant unit 1 and issued permission to re-start the unit.
- 11.25

10

October

- 10.08 ● 輻射偵測中心於政府資料開放平臺上架之「全國環境輻射偵測」資料集榮獲行政院 108 年度政府「資料開放人氣獎」。
- The “National Environmental Radiation Monitoring Dataset” uploaded on Data.gov.tw by the RMC received the “Top 10 Open Data Resources Online” award, issued by the Executive Yuan in 2019.
- 10.14 ● 輻射偵測中心參與國際原子能總署「2019 年能力試驗」，提報項目皆通過。
- RMC participated in “2019 Intercomparison of Radioactivity Analysis in Environmental Samples” held by IAEA and all items were approved.
- 10.14 ● 與國際原子能總署假台北共同召開「2019 年核子保防業務協調會議」。
- AEC and IAEA co-hosted the “2019 Coordination Meeting on Nuclear Safeguards” in Taipei.
- 10.14 | 10.15
- 10.14 ● 執行核二廠核子保安暨緊急應變整備年度視察。
- AEC has performed annual inspection on nuclear security and nuclear emergency response and preparedness at Kuosheng Nuclear Power Plant.
- 10.14 | 10.17
- 10.21 ● 立法院審查及續審原能會主管 109 年度預算暨緊急應變基金。
- The Legislative Yuan reviewed the 2020 AEC budget and emergency response fund.
- 11.06
- 10.22 ● 完成原能會「資訊公開作業要點」部分規定。10 月 17 日函送刊登行政院公報編印中心及發布令稿，10 月 22 日修訂要點即日生效，並更新本會網頁及法規查詢系統。
- The revision of AEC’s “Information Disclosure Guidelines” was completed. On October 17<sup>th</sup>, the completed portion of the guidelines was delivered to the Executive Yuan Gazette Publishing Center for announcement. On October 22<sup>nd</sup>, the revised guidelines entered into effect; relevant information was updated on AEC website and Laws and Regulations Retrieving system.
- 10.26 ● 與台北市立聯合醫院仁愛院區共同舉辦「108 年度輻射屋居民聯歡會」。
- The “2019 Gathering of Residents of Radioactively Contaminated Buildings” was jointly held with Taipei City Hospital Renai Branch.”
- 10.26 ● 舉辦 108 年度第 2 次「輻射防護專業測驗及操作人員輻射安全證書測驗」。
- The 2<sup>nd</sup> “Certification Examination for Radiation Protection Personnel and Radiation Operators on Radiation Safety” in 2019 was held.
- 10.28 ● 澳洲眾議院環境能源常務委員會主席 Ted O’Brien 訪會。
- Mr. Ted O’Brien, Chair of the Standing Committee on the Environment and Energy of the Australian House of Representatives, visited AEC.
- 10.29 ● 辦理「台日除役技術交流研討會」。
- AEC held the “Taiwan-Japan Workshop on NPP Decommissioning Technology”.
- 10.30
- 10.29 ● 日本公益財團法人日本分析中心 (JCAC) 來台與輻射偵測中心舉辦第 31 屆比較實驗技術交流成果討論會，並簽訂 110 年合作備忘錄。
- Japan Chemical Analysis Center came to Taiwan for the 31<sup>st</sup> “Intercomparison Exercise Technology Exchange Seminar” with the RMC and signed “2021 Memorandum of Cooperation”.
- 11.01

11

November

- 11.04 ● 原能會資通安全管理制度 (ISMS) 通過第三方驗證單位之後續審查作業，ISO 27001 證書經覆核結果為持續有效。  
AEC has passed the follow-up verification of the information security management system (ISMS) by a third party; the validity of ISO 27001 certification is maintained.
- 11.04 ● 完成蘭嶼貯存場重裝作業整備專案檢查，同意台電公司開始執行重裝作業。  
AEC completed the inspection of the TPC's preparations for the Lanyu Storage Site's repacking work, and approved TPC to begin the repacking work.
- 11.05 | 11.06 ● 邀請日本國立研究開發法人產業技術綜合研究所地圖資源環境研究部門主任研究員保高徹生蒞臨，針對日本福島核電廠周圍持續執行環境水之輻射監測情形及未來技術精進等議題進行技術討論。  
RMC invited the Director Yasutaka Tetsuo from the Institute for Geo-Resources and Environment of National Institute of Advanced Industrial Science and Technology in Japan to conduct technical discussing on the topic "Current situation of the concentration and monitoring technology for radio cesium in the environmental water in Japan".
- 11.05 | 11.07 ● 辦理核電廠用過核燃料乾式貯存安全管制研討會。  
AEC held the "Workshop on Safety Regulation of Spent Fuel Dry Storage of Nuclear Power Plant."
- 11.08 ● 核研所完成台灣研究用反應器 (TRR) 燃料池鈾粉安定化相關作業，並將全部安定化產物 (12 組貯存外罐) 由熱室運送至暫貯護箱貯放。  
INER completed the fuel pool uranium powder stabilization work for the Taiwan Research Reactor (TRR). The entire stabilized product (12 sets of storage containers) were transported via the hot room to be placed in the temporarily storage box.
- 11.13 | 11.20 ● 同意備查台電公司「核一廠主變壓器至開關場間連絡鐵塔拆除作業方案」及現場視察。  
AEC approved the dismantling plan for the electricity transmitting towers between main transformers and the switchyard at the Chinshan nuclear power plant, and conducted on-site inspections.
- 11.14 | 11.15 ● 國際原子能總署來台與本會共同辦理「2019 年除役期間核子保防作為研討會」。  
AEC and IAEA co-organized the "2019 Conference on Actions Related to Nuclear Safeguards during the Decommissioning Period".
- 11.18 ● 舉辦「醫用迴旋加速器除役與輻射防護實務專題研討會」，邀請日本高能加速器研究機構暨綜合研究大學院 (KEK) 梶本和義 (Masumoto Kazuyoshi) 名譽教授講座。  
AEC organized the "Medical Cyclotron Decommissioning and Practical Radiation Protection Forum" and invited honorary Professor Masumoto Kazuyoshi from Japan's High Energy Accelerator Research Organization (KEK) to give a lecture.

## 11

## November

- 11.20 ● 核研所與國家實驗研究院國家太空中心簽署合作意願書 (MOU)，成為台灣發展太空計畫的合作夥伴之一。  
INER and the National Space Organization signed a memorandum of understanding (MOU) to become a partner in the development of Taiwan's space program.
- 11.21 ● 修正發布「放射性物料管理法施行細則」第十九條、第十九條之一。  
Amendment of articles 19 and 19-1 of the Enforcement Rules for the Nuclear Materials and Radioactive Waste Management Act was promulgated.
- 11.22 ● 美國能源部亞洲暨美洲事務副助理部長 Elizabeth Urbanas 訪會。  
Ms. Elizabeth Urbanas, Deputy Assistant Secretary for Asia and the Americas in the U.S. Department of Energy, visited AEC.
- 11.25 |  
11.28 ● 執行核一廠核子保安暨緊急應變整備年度視察。  
AEC has performed annual inspection on nuclear security and nuclear emergency response and preparedness at Chinshan Nuclear Power Plant.
- 11.27 ● 於台北榮民總醫院舉辦「心導管與血管攝影X光機醫療曝露品保作業納法試辦研究說明暨輻射防護績優單位頒獎活動」。  
AEC organized the "Pilot Study on the Inclusion of Cardiac Catheter and Angiography X-Ray Machine Medical Exposure Quality Assurance in Regulations and the Outstanding Radiation Protection Unit Award" at Taipei Veterans General Hospital.
- 11.27 |  
11.28 |  
12.04 |  
12.13 ● 於高雄、桃園、台中舉辦 4 場「108 年非破壞性檢測作業發包業者職業安全衛生承攬暨游離輻射防護管理宣導會」。  
AEC organized four "2019 Seminars on Occupational Safety and Health Contracts for Non-Destructive Testing Contractors and Ionizing Radiation Protection Management" in Kaohsiung, Taoyuan, and Taichung.
- 11.30 ● 執行 108 年度輻射污染建築物居民醫療服務諮詢及後續醫療照護計畫，完成 719 位輻射屋居民健康檢查。  
The "2019 Medical Consultation and Subsequent Medical Care Program for residents of radioactively contaminated buildings" was carried out, providing health examinations to 705 residents of radioactively contaminated buildings.
- 11.30 ● 完成 108 年台灣海域輻射調查計畫之樣品分析，本計畫另與中山大學、嘉義大學、農業委員會漁業署、海洋委員會海巡署等機構合作，全年取得台灣海域及沿岸海水 156 件、海產物 178 件、沉積物 87 件 (含岸沙 54 件、河沙 26 件、海底沉積物 6 件、海底岩心 1 件)，總計 421 件，均未測出放射性異常狀況。  
By cooperating with National Sun Yat-sen University, National Chiayi University, the Fisheries Agency of the Council of Agriculture, and the Coast Guard Administration of the Ocean Affairs Council etc., RMC analyzed 421 marine samples which included 156 seawater samples, 178 marine organism samples, 87 sedimentary samples (54 coastal sand samples, 26 riverine sand samples, 6 seabed mud samples and 1 sediment core sample) in 2019. All analytical results were within regulatory limits.

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December

- 12.03 ● 辦理 108 年度國內環境試樣放射性分析比較實驗討論會，國內具環境樣品放射性分析能力之實驗室計核研所、台電放射實驗室、核三工作隊、清華大學、屏東科技大學、陽明大學等共 7 個單位，比較評量分析結果皆符合評鑑標準。
- RMC conducted the workshop of “2019 Intercomparison of Radioactivity Analysis in Environmental Samples” among the 7 radioactivity analysis laboratories in Taiwan. The participants are Institute of Nuclear Energy Research Atomic Energy Council, Radiation Laboratory of Taiwan Power Company, Radiation Laboratory Maanshan nuclear power plant work team of Taiwan Power Company, National Tsing Hua University, National Pingtung University of Science and Technology, and National Yang-Ming University. All laboratories passed the qualification evaluation in radioanalysis of environmental samples.
- 12.03 | 12.05 ● 邀請美國專家舉辦「輻射彈應變訓練」。
- US experts were invited to organize and to conduct the “Counter-RDD training program” in Taiwan.
- 12.05 ● 於核一廠召開第六屆第三次放射性物料安全諮詢會，議題為核一乾貯熱測試前之強化管制作為台電公司整備作業情形。
- The 3<sup>rd</sup> meeting of the 6<sup>th</sup>-term Advisory Committee on Radioactive Waste Safety in Chinshan Nuclear Power Plant was convened. The topic was the improvements in regulation for the Chinshan Nuclear Power Plant’s dry storage hot test and TPC’s preparedness work.
- 12.06 ● 修正發布「放射性物料管制收費標準」第三條。
- Amendment of article 3 of the Fees for Regulatory Services under the Nuclear Materials and Radioactive Waste Act was promulgated.
- 12.06 ● 核研所於財團法人生技醫療科技政策研究中心主辦之第 16 屆國家新創獎中，榮獲 1 項「學研新創獎」及 3 項「2019 年度續獎」，並於台北南港展覽館接受頒獎。
- INER won a “research and innovation award” and three “2019 renewal awards” in the 16<sup>th</sup> National Innovation Award organized by the Research Center for Biotechnology and Medicine Policy. The awards were presented at the Taipei Nangang Exhibition Center.
- 12.10 ● 召開第 52 次核子設施類輻射防護管制會議。
- The 52<sup>nd</sup> Session on “Radiation Protection and Regulation for nuclear facilities” was convened.
- 12.13 ● 召開第 16 屆第 6 次「游離輻射安全諮詢會」。
- The sixth session of the 16<sup>th</sup> “Ionizing Radiation Safety Advisory Board” was convened.
- 12.17 | 12.18 ● 舉行 2019 年台美民用核能合作年會。
- The 2019 “TECRO - AIT Joint Standing Committee” Meeting on Civil Nuclear Cooperation was held.
- 12.19 ● 舉辦「108 年度原子能安全績優獎暨放射性物料研究發展傑出貢獻及安全營運績優獎」頒獎典禮。
- AEC organized the award ceremony for the “2019 Atomic Energy Safety Merit Award and Outstanding Radioactive Material Development Contribution and Safe Operation Award.”
- 12.20 ● 完成「108 年國民醫療輻射劑量調查研究計畫」。
- RMC initiated a four-years “Medical Radiation Dose Survey Research Plan” and completed the first year research.

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廣告





# AEC

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