Mailiao Industrial Harbor

Environmental Report

2025

CONTENTS

WORK TEAM

| Mailiao Harbor Administration Corporation |

Chi-Chang Chiang, Chien-Hsing Chen, Chi-Jen Lo, Sheng-Wen Hsiao, Winnie Tseng, Che-Lang Hu, Chich-Yang Chen

| Formosa Petrochemical Corporation |

Jason Yang, Cheng-hsien Shen, Ke-Chi Tang, Joyce Shih

| Safety Health & Environment Center, Formosa Plastics Group |

Cheng-Han Wu

| Mailiao Administration Division, Formosa Plastics Corporation |

Chun-Chieh Huang

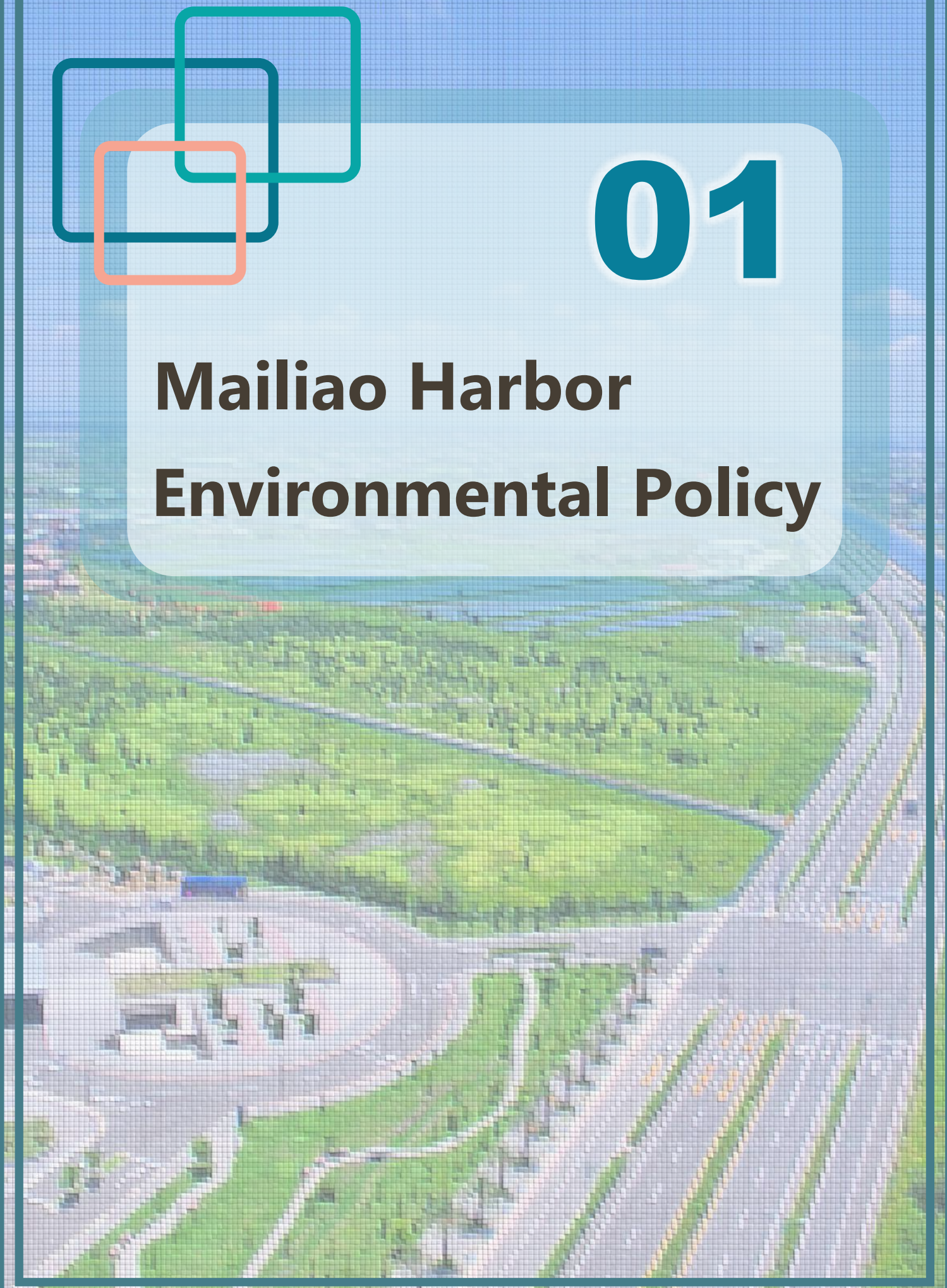
| Sinotech Engineering Services, Ltd. |

Kuo-An Sung, Ming-Da Chen, Yu-Tzu Wang

- **Chief Editor** | Chi-Chang Chiang
- **Executive Editor** | Chien-Hsing Chen
- **Layout Design** | Ming-Da Chen, Yu-Tzu Wang
- **Examine & Revise** | Chi-Jen Lo, Sheng-Wen Hsiao, Winnie Tseng, Che-Lang Hu, Chich-Yang Chen, Jason Yang, Cheng-hsien Shen, Ke-Chi Tang, Joyce Shih, Cheng-Han Wu, Chun-Chieh Huang

01

Mailiao Harbor Environmental Policy



Mailiao Harbor Environmental Policies

Mailiao Harbor Administration Corporation firmly believes that environmental protection is as important as economic development of the harbor. As the administrative entity of the Mailiao Harbor, we take on the responsibility of protecting the environment and the safety of our employees. We strive to achieve our environmental goals by providing sufficient training and assuring the compliance of relevant regulations by all stakeholders.

The following principles are promoted to ensure the conformity of our environmental performance and government policies.

Comply with Environmental Regulations, Dedicate to Eco-Friendly Actions.

Proceed with Environmental Monitoring, Maintain Cleanness of the Harbor.

Environmental Education and Training, Heighten Environmental Awareness.

Safety and Environment Management, Achieve Sustainable Development.

The following objectives have been established to tackle the top 10 major harbor environmental issues. The environmental policies need to be reviewed annually to improve our actions and fulfill our commitment to environmental protection. In addition, all staffs working in the harbor, ship companies and local residents should be informed of these environmental policies. At the same time, the environmental policies are announced on our official website.

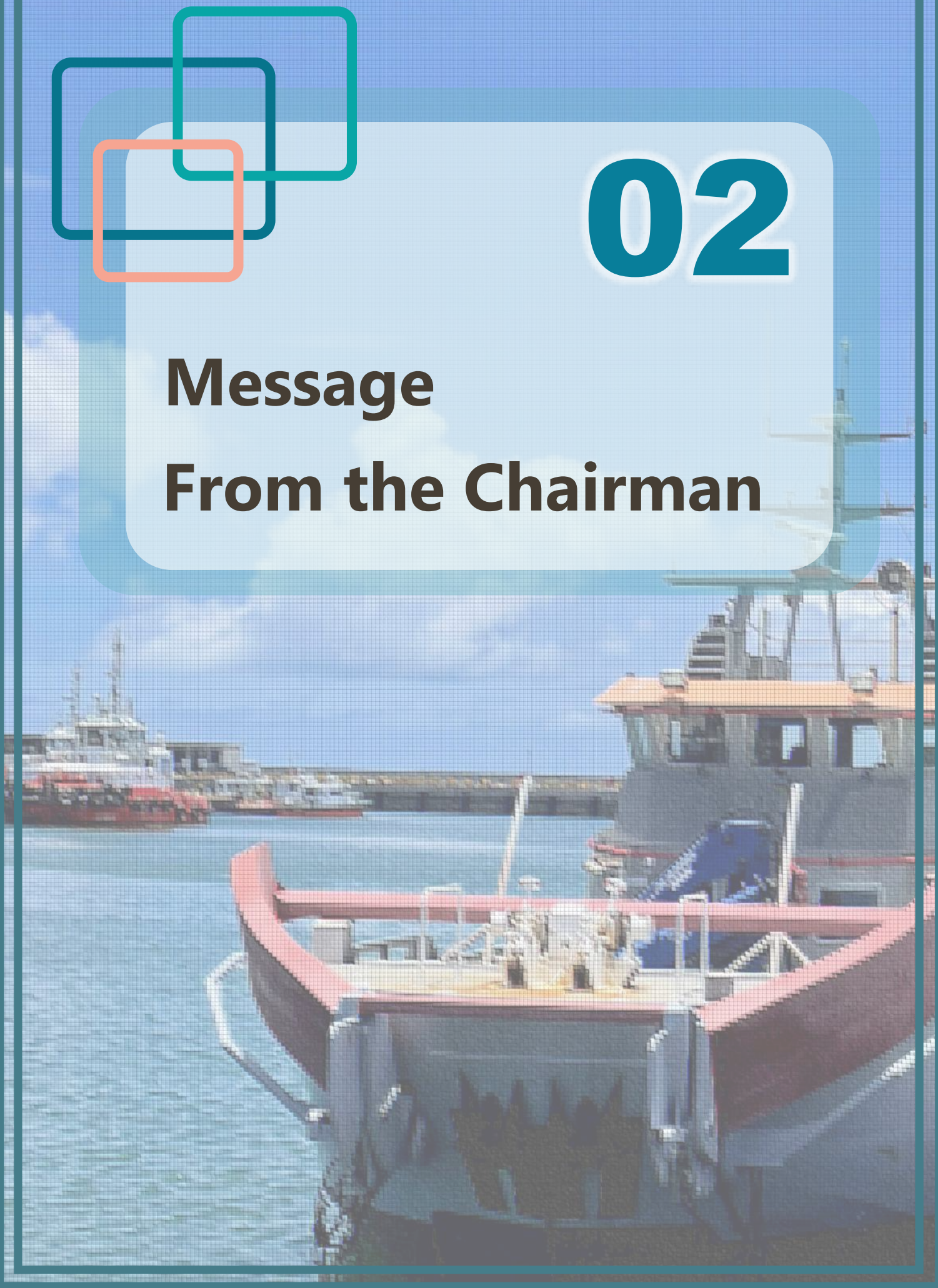
1. **Climate Change Adaptation and Mitigation**
   Establishing wave observation systems to enhance potential risk detection and reduce the impact on the port. Periodic inventory of greenhouse gases to grasp the carbon emissions status of Mailiao Harbor and promote carbon reductions.
2. **Improve Air Quality in Harbor.**
   Supply Alternative Maritime Power. Only low-sulfur fuel is allowed in harbor. Enforcing boats to travel at a lower velocity. Promoting green transportation. Setting up gas recycling system. Reduction of Air pollutant emission.
3. **Transforming Green Energy Efficiency**
   Creating a green office environment (including replacing energy-efficient lighting and creating a paperless office environment) and implementing green energy policies (including promoting solar energy green power supply and implementing rainwater harvesting projects).
4. **Maintaining Water Quality.**
   Develop ocean pollution prevention and emergency plan. Regular water quality monitoring. Improve marine pollution identification and reporting mechanism.
5. **Strengthen Dredging and Dumping Management:**
   Make the dredging and dumping plan according to EIA promise. Monitoring the water quality during dredging and dumping process.
6. **Waste Management.**
   Enforce recycling on docked ships and office buildings. Encourage waste reduction and recycling.
7. **Wastewater Discharge Prohibition.**
   Prohibit wastewater discharge from all vessels in port. Launching wastewater collection services. Integrate harbor inspection with law enforcement units.
8. **Relationship with local community**
   Support National Ocean Day initiatives, collaborate with local communities on fish fry release and beach cleanup efforts, and promote a variety of interactive marine environmental education programs.
9. **Strict Management of Dangerous Cargo.**
   Establish the regulations governing dangerous goods loading and unloading at Mailiao Harbor administration. Deploying oil boom to prevent leaking oil from spreading. Setting up alarm and detection systems. Employing GasFindIR and professional decontamination vessels. Reinforce emergency drills.
10. **Careful Attention to Ship Refueling Procedures.**
    Introduction of vessel refueling operation procedures to protect both the environment and workers' safety.

Chairman of Mailiao Harbor Administration Corporation Mihn Tsao

Date July 8 2025

02

Message From the Chairman



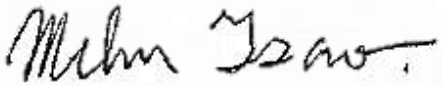
A Word from the Chairman of the Board

Amidst continual development of the global shipping industry, port operations will have a devastating effect on the environment if relevant protection measures are disregarded. In recent years, the concept of "EcoPorts" has received the attention of major international ports, including those in Europe and North America. The Mailiao Harbor in Taiwan has also focused on this concept since its opening, upholding equal emphasis on environment preservation and industrial development, to ensure sustainable development.

The Mailiao Harbor is Taiwan's largest industrial port and a pioneer in promoting environmental protection, where the harbor leads by example. The harbor possesses complete environment management policies, monitors all of its operations via strict management and control, and implements environmentally friendly and ecological protection-oriented measures, maintaining clean water surrounding the harbor and a wealth of terrain and marine ecological resources.

Regardless of various focuses on transportation development for port operations, green transportation has undoubtedly become the basic foundation in response to the development trend of global shipping industry. The Mailiao Harbor operates in a cautious and conscientious manner, complies with applicable environmental policies strictly, and engages in environmentally friendly endeavors. In addition, it implements relevant plans, performs reviews persistently, and refines and improves its plans to ensure the adequate execution of its policies and goals. In the future, the harbor will continue to elevate its operating performance and port service quality as well as apply for the European Union EcoPorts Certification to facilitate international exchanges and learning, transforming into a green port that saves energy, reduces carbon, emits minimal pollution, and practices environmental protection.

Chairman of Mailiao Harbor Administration Corporation



03

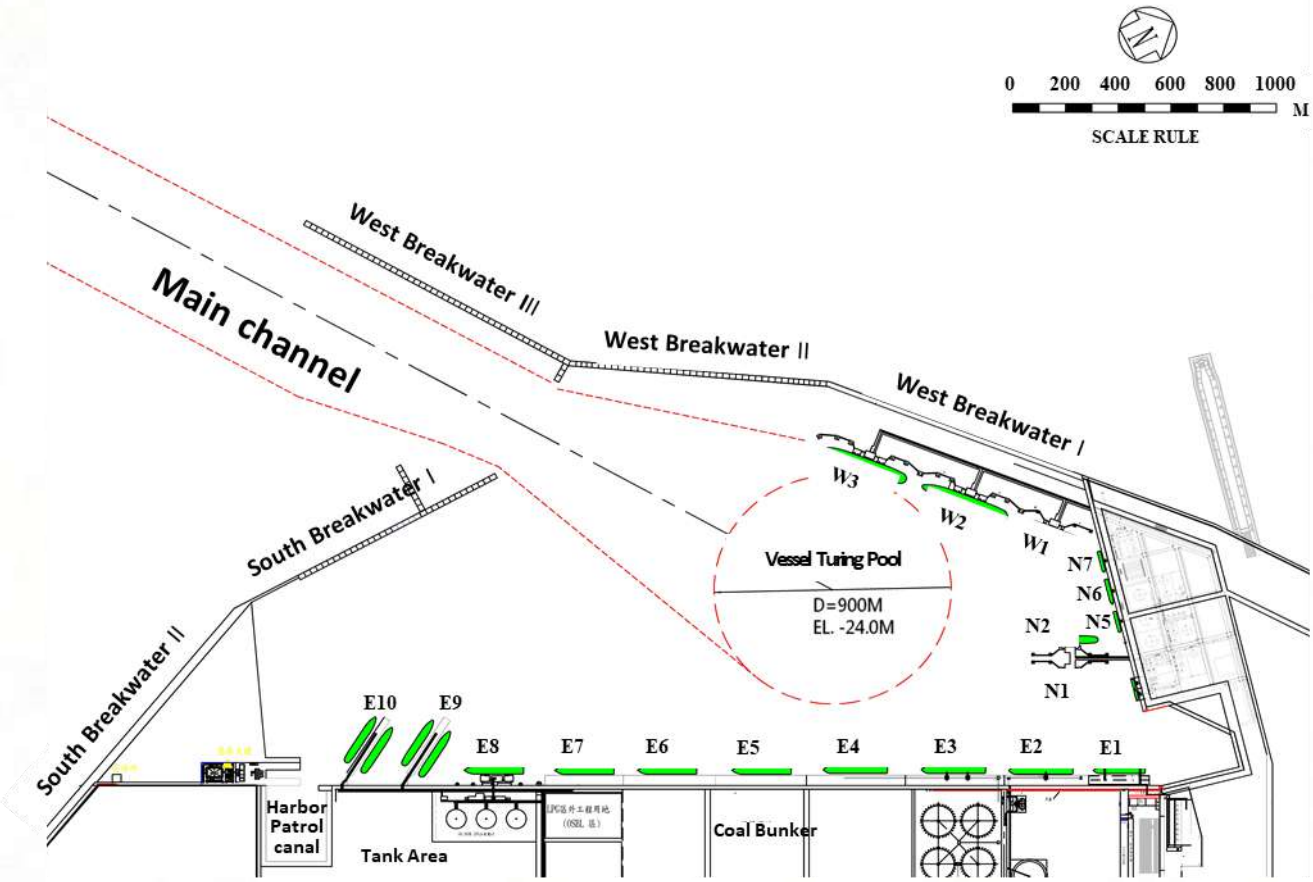
Background and Introduction

Introduction

Mailiao Industrial Harbor (hereinafter referred to as Mailiao Harbor) is located in the Mailiao area of the Yunlin Offshore Industrial Zone, Taiwan. The Yunlin Offshore Industrial Zone was developed by the Ministry of Economic Affairs to enhance basic industries in our country. Yunlin Offshore Industrial Zone is planned to provide the land needed for the expansion project of Mailiao Industrial Park; it is expected to meet current and future needs of the petrochemical industry for plant construction and relocation. The plan included extracting sand from the sea areas near Yunlin County for landfilling, to create land for the development of the Yunlin Offshore Industrial Zone. The industrial zone was divided into the Mailiao, Hsin Hsing, Taixi, and Sihu zones; the land area of the petrochemical industrial zone in the Mailiao zone was created by the Formosa Plastics Group by landfilling; and the appropriated berths in the Mailiao Harbor were built for the use of the Mailiao Industrial Zone. The Executive Yuan approved the construction of Mailiao Harbor on July 7, 1993. The harbor officially began operations on March 1, 2001.

Mailiao Harbor is located at the central point of Taiwan's west coast (120°08.9' E, 23°46.9' N). Situated in the Yunlin Offshore Industrial Zone, Mailiao Harbor is the first international harbor in Taiwan funded and built by nongovernmental corporates. To the north lies the south bank of the Zhuoshui River Estuary; to the south lies the Hsinhuwei River Estuary; and to the west is the Penghu Channel. The Port of Taichung and the Port of Keelung is approximately 40 and 150 nautical miles north of the harbor, respectively; and the Port of Kaohsiung is about 80 nautical miles south of the harbor. The harbor entry faces west with a 34° angle to the south (between west-south-west and south-west), and the waterway at mid-tide is 24 m deep. It is the deepest harbor in Taiwan, capable to accommodate a 300,000-ton vessel.

Location of the Appropriated Berths in the Mailiao Harbor



Status of Mailiao Harbor

Item	Information
Harbor	Faces west with a 34° angle to the south; water depth EL-24 m; width 390 m
Entering/exiting channels	Channel length approximately 2,500 m; water depth 24 m at mid-tide
Vessel turning pool	Diameter 900 m
Berth	Supporting 20 appropriated berths
Harbor patrol canal	For mooring, water refilling, and refueling of harbor craft boats
Factory and repairing slipway	For repair, inspection, and maintenance of harbor craft boats
Harbor area	A total area of 1599.15 ha; interior harbor area 476 ha; terrestrial area 179.15 ha; exterior harbor water area 944 ha
Breakwater	West breakwater 3,243 m; south breakwater 2,227 m

Primary Commercial Activities

Operations statistics of Mailiao Harbor in 2023 and 2024

Item		2023 (a)	2024 (b)	Annual business comparison (b-a)	
				Actual number	%
Incoming and outgoing vessels	No. of incoming vessels (vessel)	1,916	1,852	-64	-3.34%
	Gross tonnage of import (ton)	48,329,127	46,233,367	-2,095,760	-4.34%
	No. of outgoing vessels (vessel)	1,915	1,856	-59	-3.08%
	Gross tonnage of export (ton)	48,266,241	46,408,745	-1,857,496	-3.85%
Cargo throughput	Tonnage of imports (metric ton)	43,139,417	41,973,280	-1,166,137	-2.70%
	Tonnage of exports (metric ton)	18,190,678	17,376,777	-813,901	-4.47%
	Tonnage of imports and exports (metric ton)	61,330,095	59,350,057	-1,980,038	-3.23%
Loading/ unloading volume	Total (metric ton)	61,174,086	59,615,704	-1,558,382	-2.55%

Main Cargo

Incoming and outgoing goods at Mailiao Harbor are primarily oil-based products, followed by chemicals, ores, and dry bulk cargo of related industrial goods.

Primary goods in Mailiao Harbor

Petroleum
Crude oil
LPG (Liquefied petroleum gas)
Refined oil
Pyrites minerals/Ores
Coal
Sulphur
Chemicals
Sodium hydroxide
Ethylene Glycol
Dry bulk
Coke
Industrial salt

Recent Key Initiatives

Mailiao Harbor is committed to port sustainability and environmental protection, with a strong focus on advancing green services to shipping in recent years.

Key Projects	Execution Focus
High-Voltage Onshore Power Supply (HV OPS) Facilities	• In May 2023, the High-Voltage Onshore Power Supply (HV OPS) facility at Wharf E3 was officially commissioned. Designed with a capacity of 6.6 kV/1,800 kW, the system serves 200,000-DWT bulk carriers and coal vessels, supported by incentive programs for vessels utilizing shore power while at berth. • As of the end of 2024, the system had accumulated 533 hours of usage. Compared to conventional heavy fuel oil consumption, this initiative successfully reduced fuel consumption by 92.34 kL and CO_2e emissions by 78 tons. This achievement represents a triple-win for greenhouse gas reduction, energy transition, and the advancement of green services to shipping.
Underwater Ecological Surveys and Biodiversity Achievements	• Following the 2016 baseline, the second phase of the marine ecological survey was conducted to monitor long-term changes in the harbor's aquatic ecosystem. This survey identified 249 new species, dominated by mollusks (gastropods) and sea slugs. To date, a cumulative total of 397 species across 11 phyla and 161 families have been recorded. • The discovery of new taxa, including ctenophores, sponges, and bryozoans, indicates that harbor structures have effectively functioned as artificial reefs. Coupled with stable water quality, the original sandy shore environment has successfully transitioned into a diverse and stable "coral-reef-like ecosystem."
Development of LNG Receiving Terminal and Infrastructure	• In 2023, environmental impact assessment approval was granted for the construction of an LNG receiving terminal and regasification station. The project officially broke ground in December 2025 and is scheduled for completion and commissioning by 2029. • The 45-hectare LNG terminal at South Public Wharf is designed to accommodate 260,000 m^3 carriers. It features four 160,000–180,000 kl storage tanks and regasification facilities, ensuring a stable and secure natural gas supply.
Enhancing Community Outreach and Engagement	• **Prioritizing Port Environmental and Social Issues：** 1. In response to National Ocean Day, Mailiao Harbor promoted marine eco-education activities, enhancing public awareness of port sustainability and environmental protection through guided tours, visits, and interactive learning. 2. In collaboration with local communities, the harbor maintains marine balance via long-term restoration and regular beach cleaning, mitigating pollution risks. 3. Dedicated communication platforms and "good neighbor" initiatives foster deep-rooted trust by actively addressing local needs. 4. Hosting renowned troupes like Ming Hwa Yuan creates family-friendly platforms that deepen ties with residents and promote cultural heritage.

04

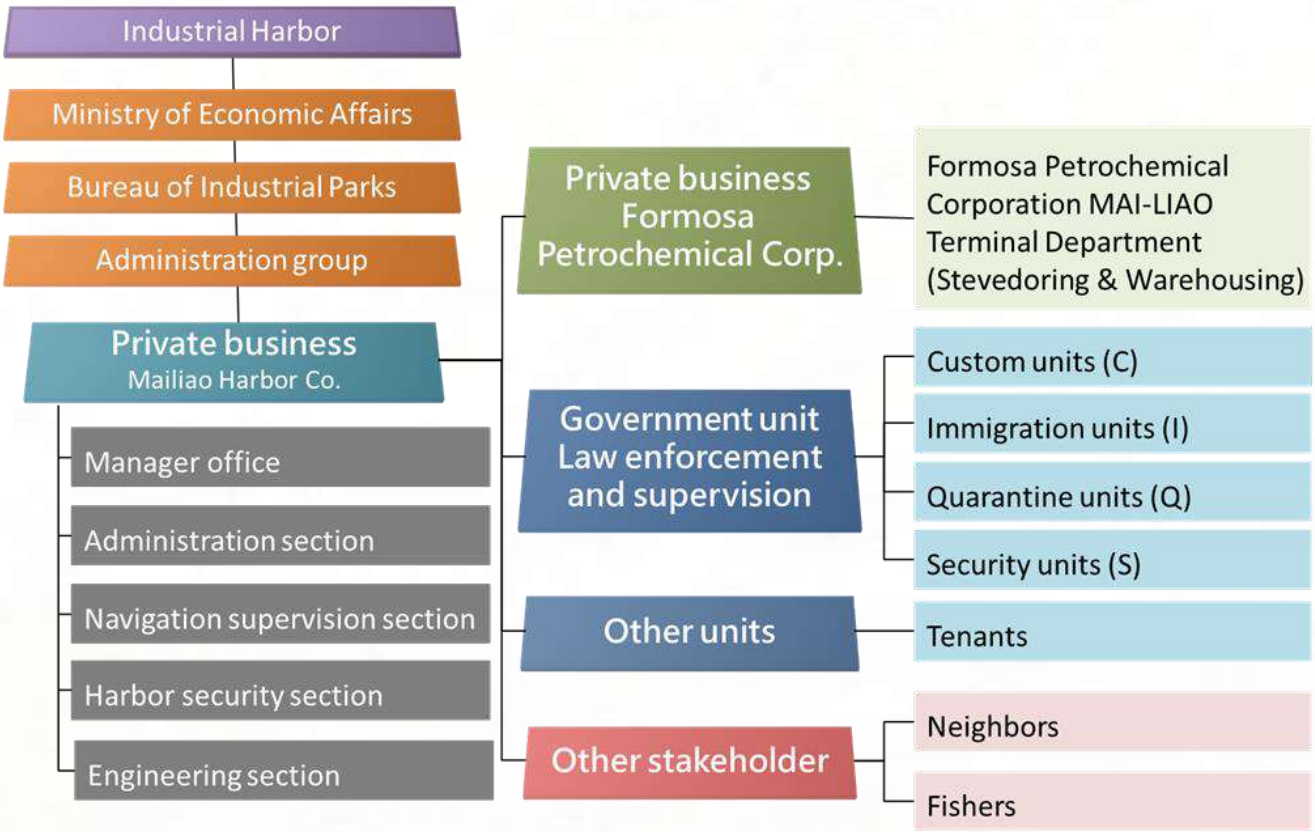
Environmental Management

Organizational Structure and Explanations

The environmental preservation of Mailiao Harbor is the responsibility of the Mailiao Harbor Administration Corporation (hereinafter referred to as the "MHAC"), primary stakeholders, secondary stakeholders, and other stakeholders. The primary stakeholder in this case is the Formosa Petrochemical Corporation MAI-LIAO Terminal Department. Secondary stakeholders can be divided into government units and other units. Government units are customs units (e.g., the Customs Administration, Ministry of Finance, Taichung Customs Business Group 2, Mailiao Business Division), immigration units (e.g., Mailiao Branch, Taichung Port Brigade, Border Affairs Corps, National Immigration Agency, Ministry of the Interior), quarantine units (e.g., the Mailiao Harbor Office, Southern Region Control Center, Taiwan Centers for Disease Control), and security units (e.g., Mailiao Industry Harbor Security Office, Fourth Coastal Guard, Central Branch, Coast Guard Administration, and Ocean Affairs Council). Other units are harbor tenants. Other stakeholders are fishers and neighbors.

The MHAC operates and manages Mailiao Harbor, whereas the management team exercises governmental authority. The customs unit, immigration unit, quarantine unit, security unit, and tenants cooperate with administrative management personnel.

Organizational Structure of Mailiao Harbor Operations



The MHAC is committed to environmental management in Mailiao Harbor. In order to smoothly carry out various management operations, the MHAC evaluates the stakeholders based on the implemented management actions and orientations, and truly understands their needs and expectations. This forms the basis for considering the promotion of port environmental management. In addition, the MHAC also establishes effective communication bridges with stakeholders through regular coordination meetings, communication groups, harbor visiting , advocacy activities, publication of green port promotion achievements, publication of environmental report, and responding to feedback in the official email.

The needs and expectations of the stakeholders of Mailiao Harbor

Stakeholders	Needs and Expectations	engagement of stakeholders with the environmental port activities
[Primary stakeholder]		
1. Private business Formosa Petrochemical Corp.	• Reduce or contain the environmental impact at the harbor ✓ Energy and resource consumption ✓ General waste recycling rate	• The regular meeting of the industrial safety and the environmental protection every month • Harbor visiting for the employee and their family • The coordination meeting for Eco-ports every quarter
[Secondary stakeholder]		
2. Custom units	• Government unit Law enforcement and supervision	• Stay connected via instant messaging (Line) • The regular meeting and activity: ✓ Stakeholder consultative meeting ✓ Training ✓ Advocacy
3. Immigration units		
4. Quarantine units		
5. Security units		
6. Tenants	• Good reputation, risk prevention	• The regular meeting with contractors every month
[Non-stakeholder]		
7. fishers and neighbors	• Environmental and Ecological Conservation ✓ Air quality ✓ Habitat/(marine) ecosystem	• Publications on Official Websites: environmental policy and the environmental report • Official email (jeff huang@fpcc.com.tw) • Contribute to the society: ✓ Call for large-scale beach cleaning ✓ Measures of fry releasing ✓ Conferences to promote Eco-ports ✓ Invitation to visit the harbor

The Mailiao Harbor Co. was jointly founded by industrialists within the industrial zone. On May 2, 1995, the Industrial Development Bureau of the Ministry of Economic Affairs approved the funding, construction, and operation of Mailiao Industrial Harbor by the Mailiao Harbor Co.

The operational goal of the Mailiao Harbor Co. was to provide prompt and convenient port functions to reduce the freight and warehousing costs for businesses, enhance industrial competitiveness, and stimulate the economy. Thus, simplicity and efficiency are the foremost considerations of the organization. The internal organizations of the Mailiao Harbor Co. include the port engineering, port security, port traffic control, and administration sections. The stevedoring operations at the wharves are managed by the Formosa Petrochemical Terminal Department. The responsibilities of the various organizational units are as follows.

Administration section

- Manage and implement business operations, and collect harbor fees.

Port traffic control section

- Monitor vessels entering and exiting the harbor, allocate berths, and dispatch boats for harbor patrol.

Port security section

- Maintain security in the harbor area and maintain environmental cleanliness.

Port engineering section

- Manage harbor area constructions and maintain harbor facilities.

Formosa Petrochemical Corporation MAI-LIAO Terminal Department

- Perform stevedoring of incoming and outgoing cargo at the wharves.

Regulations Governing Environmental Protection

The MHAC follows relevant international regulations and conventions, including the International Convention for the Prevention of Pollution From Ships (MARPOL 73/78), the London Convention (Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter), the Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships, the International Convention on the Control of Harmful Anti-fouling Systems on Ships (AFS Convention), and the International Convention for the Control and Management of Ships' Ballast Water and Sediments.

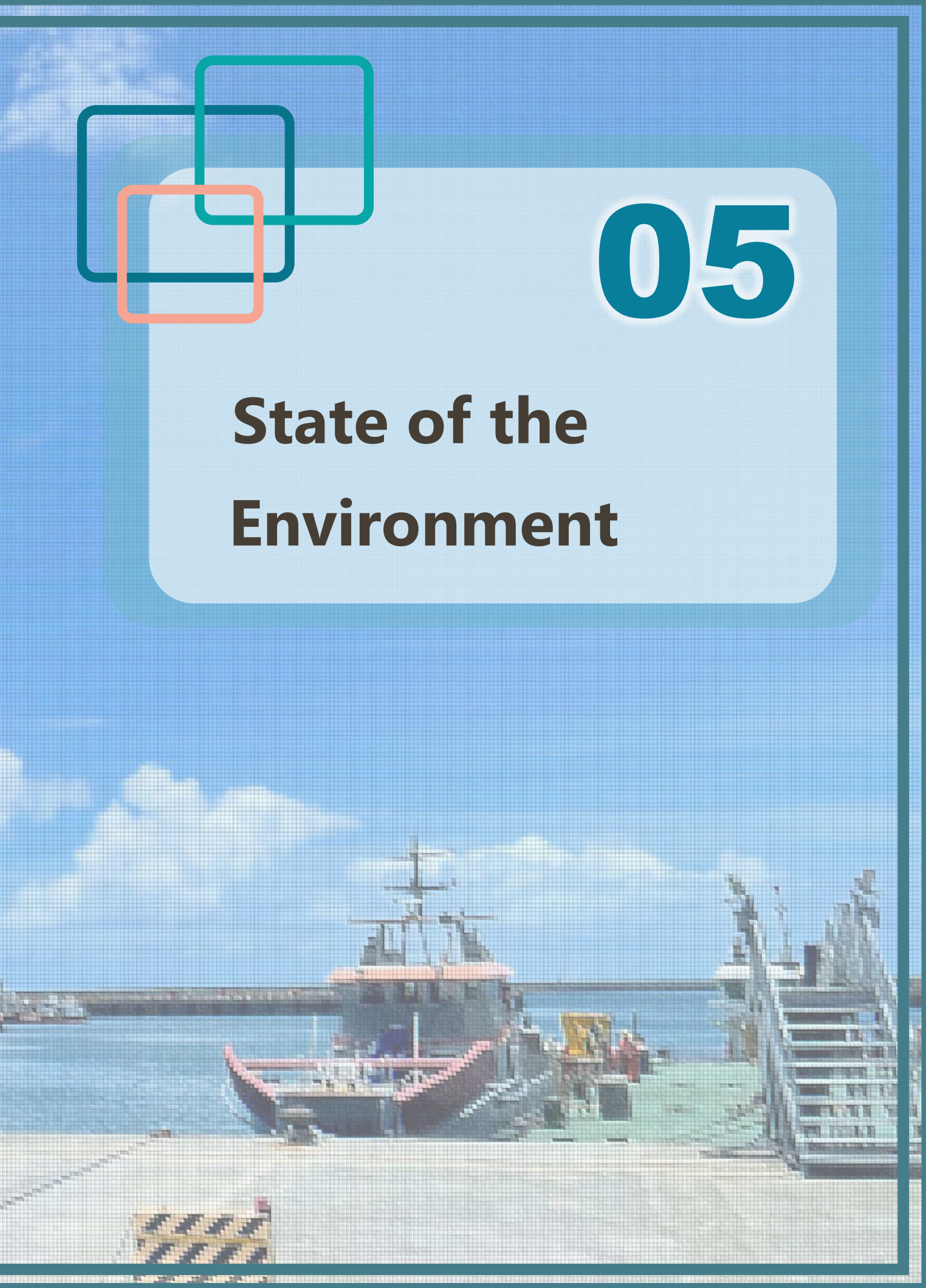
The MHAC follows relevant national regulations and environmental management practices, which are as follows:

National environmental regulations governing Mailiao Harbor

Type of laws	Regulation name/s	Central authority	Local authority
Laws related to harbor construction	Statute for Industrial Innovation	Industrial Development Administration Ministry of Economic Affairs	Yunlin County Government
	Regulations Governing Administration of Reuse of Enterprise Waste		Environmental Protection Bureau, Yunlin County
Laws governing transportation departments	The Law of Ships	Maritime Port Bureau, Ministry of Transportation and Communications	Mailiao Harbor Office
	The Commercial Port Law		
	Shipping Act		
Laws governing interior departments	Fire Services Act	National Fire Agency, Ministry of the Interior	Fire Department, Yunlin County
Laws governing agricultural departments	Wildlife Conservation Act	Council of Agriculture, Executive Yuan	Agriculture Bureau, Yunlin County
Laws governing environmental protection departments	Marine Pollution Control Act	Ocean Affairs Council	
	Marine Conservation Act		
	Basic Environment Act	Ministry of Environment	Environmental Protection Bureau, Yunlin County
	Air Pollution Control Act		
	Water Pollution Control Act		
	Waste Disposal Act		
	Resource Recycling Act		
	Environmental Impact Assessment Act		
	The Environmental Education Act		
	Noise Control Act		
	Indoor Air Quality Act		
	Toxic and Concerned Chemical Substances Control Act		
	Soil and Groundwater Pollution Remediation Act		
	Climate Change Response Act		
	Public Nuisance Dispute Mediation Act		Public Nuisance Arbitration Committee, Yunlin County
Laws related to cross-departments	Disaster Prevention and Protection Act	Ministry of the Interior	Yunlin County Government (The competent authority or local units differ based on disaster type)

05

State of the Environment

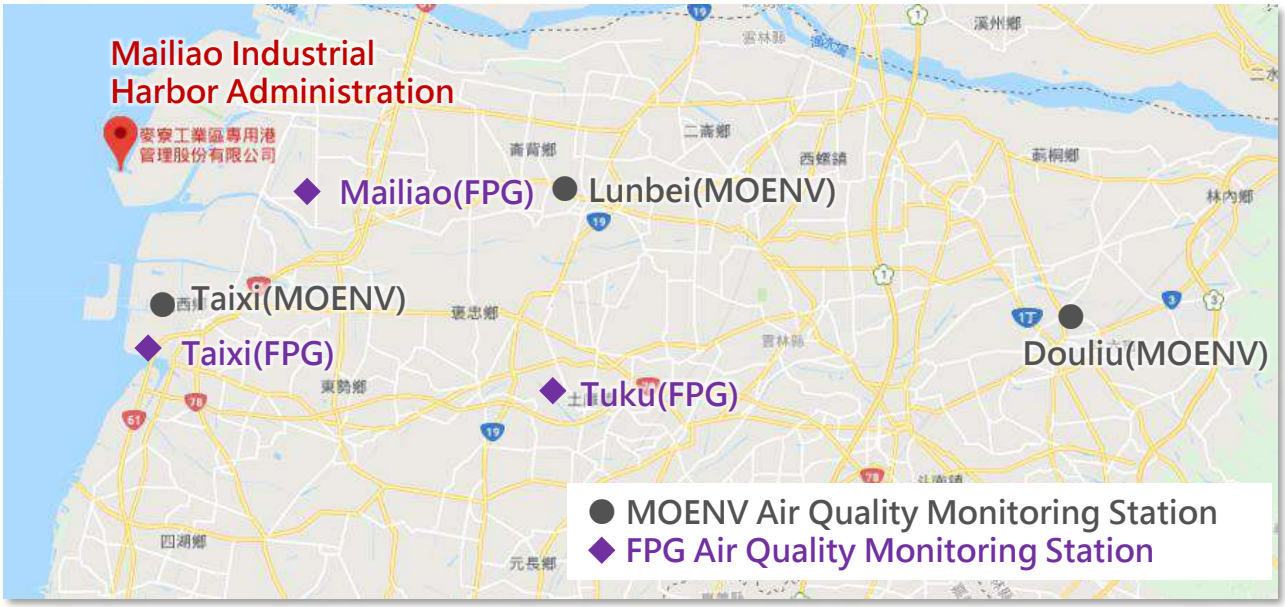


Air Quality

The primary function of Mailiao Harbor is to service the Yunlin Offshore Industrial Zone. It has spared no effort in protecting overall air quality. In the Formosa Plastics Group Sixth Naphtha Cracking Complex, the implementation of “Environmental Monitoring of Sixth Naphtha” was based on the environmental monitoring plans included in the “Environmental Impact Statement of the 6th Naphtha Expansion Project” and the “Environmental Impact Report of the 6th Naphtha Expansion Project.” The aforementioned Statement and Report were proposed by Formosa Plastics Group (hereinafter referred to as the “FPG”) and approved by the Ministry of Environment (hereinafter referred to as the “MOENV”)Each quarter, the monitoring results are sent to the 6th Naphtha Environmental Monitoring Committee for review; if the monitoring data are abnormal, the Formosa Plastics Group proposes response measures and keeps track of the situation. The monitoring and data analysis results of each quarter are compiled into a monitoring report and sent to the MOENV; the complete report is published on the MOENV website.

The air quality monitoring stations of Mailiao Harbor and Formosa Plastics Group are joint setups of Mailiao Industrial Zone. The air quality data monitored over the years from the three nearby air quality auto-monitoring stations at Taixi (Taixi Junior High School), Tuku (Honglun Elementary School), and Mailiao (Mailiao Junior High School) that were set up by the Formosa Plastics Group, along with the data from the three nearby air quality monitoring stations at Douliu, Lunbei, and Taixi in Yunlin County set up by the MOENV, were also compiled. The locations of these air quality monitoring stations are illustrated in the following figure, and the air quality monitoring data are presented and explained in the following table:

Location of air quality monitoring stations near Mailiao Harbor



Mailiao Harbor is in the vicinity of six air quality monitoring stations; they monitor the levels of sulfur dioxide (SO_2), carbon monoxide (CO), ozone (O_3), suspended particulates with a particle size of 10 microns or less (PM_{10}), nitrogen dioxide (NO_2), and nonmethane hydrocarbons (NMHC). Except for carbon monoxide (CO) and non-methane hydrocarbons (NMHC), the concentrations of the rest of the items are far below the regulated standards.

Air quality monitoring results over the years

Monitored item (unit)			SO_2	CO	$O_{3,\ max}$	$O_{3,\ 8hr}$	PM_{10}	NO_2	NMHC
Air quality standard (Applicable before 9/18/2020)			**30**	**-**	**120**	**-**	**65**	**50**	**-**
Air quality standard (Applicable starting 9/18/2020)			**20**	**-**	**120**	**60**	**50**	**30**	**-**
Type	Station	Year	ppb	ppm	ppb	ppb	μg／m^3	ppb	ppm
FPG monitoring stations	Mailiao	**2022**	2.23	0.33	53.10	46.69	39.18	7.64	0.04
	Taixi		2.07	0.32	52.52	46.51	31.06	7.25	0.03
	Tuku		2.30	0.35	53.51	45.55	35.22	8.34	0.05
	Mailiao	**2023**	1.81	0.30	54.13	47.84	43.78	7.55	0.04
	Taixi		1.68	0.30	54.64	48.52	40.75	7.56	0.04
	Tuku		1.84	0.32	54.04	46.60	39.79	8.20	0.05
	Mailiao	**2024**	1.71	0.30	52.31	45.90	35.11	7.42	0.04
	Taixi		1.58	0.30	49.35	43.88	34.47	7.75	0.04
	Tuku		1.66	0.30	51.41	44.85	36.40	7.83	0.05
MOENV monitoring stations	Lunbei	**2022**	1.50	0.24	50.46	42.89	35.50	6.51	-
	Taixi		1.57	0.22	52.06	45.75	30.10	5.34	0.03
	Douliu		1.62	0.28	59.49	47.87	35.80	8.33	-
	Lunbei	**2023**	1.38	0.24	51.98	44.50	42.00	6.38	0.04
	Taixi		1.42	0.22	53.19	45.75	36.30	5.80	0.03
	Douliu		1.59	0.28	60.69	50.33	40.90	8.05	0.06
	Lunbei	**2024**	1.25	0.24	51.66	44.21	40.40	6.36	0.04
	Taixi		1.35	0.21	52.38	46.05	24.50	5.45	0.03
	Douliu		1.45	0.27	60.72	49.71	35.80	7.85	0.05

- Note: "–" denotes no monitoring data or no air quality standar
- Data source: Environmental Impact Assessment supervision–Sixth Naphtha Environmental Monitoring data, MOENV, Executive Yuan (Environmental Monitoring Report for the "Offshore Industrial Zone Petrochemicals Industry Comprehensive Area Development Project," a subsidiary of FPG) https://www.moenv.gov.tw/

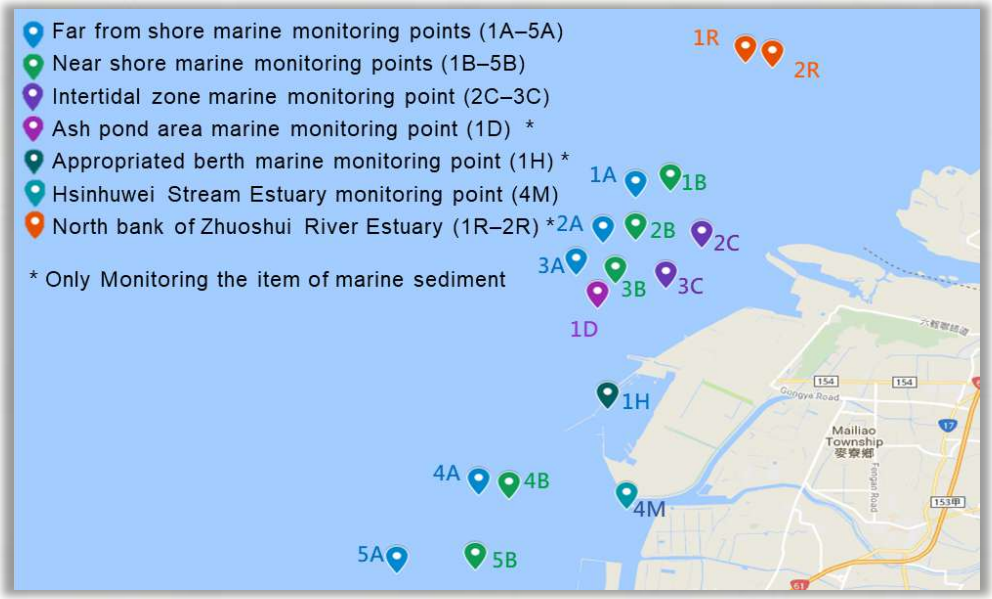
Marine Sediment and Water Quality

Water quality

Dredging operations

The marine sediment monitoring points near Mailiao Harbor are situated in the sea area near the Mailiao Industrial Zone. A total of 17 monitoring points exist, and they are classified into far from shore (1A–5A), near shore (1B–5B), intertidal zone (2C–3C), ash pond area (1D), appropriated berths (1H), Hsinhuwei Stream Estuary (4M), and north bank of Zhuoshui River Estuary (1R–2R).

Marine sediment and water quality monitoring stations



Sediment

The monitored items are the heavy metals Cd, Cr, Cu, Ni, Pb, Zn, As, and Hg. During 2023 to 2024, all pollutants were below the lower threshold and quality test qualification rate was 100%.

The monitoring of heavy metals in the sediment of Mailiao Harbor revealed that, except for some gauging stations with Ni and As concentrations exceeding the lower threshold of sediment quality. However, the concentration of heavy metals in sediment is affected by several factors, such as the marine sedimentary environment, the sediment source, particle size, the amount of organic carbon, geochemical functions, and whether contamination exists (Luoma, 1990). According to the sediment research related to the Taiwan Strait, the Ni concentration in the sediment of the southwest coast of Taiwan was 16.2–95.2 mg/kg, exceeding the upper limit (Lee et al., 1998a). The Ni concentration in the ocean sediment in Kaohsiung and Pingtung ranged from 25 to 64 mg/kg; all concentrations in this range are below the lower limit. The concentration of As was 11.2–15.7 mg/kg (Hung, 2004 and 2009); this range exceeded the lower limit, revealing that the high concentrations of Ni and As in the sediment in the southwest ocean of Taiwan were the result of geological characteristics rather than harbor activities.

Sediment monitoring indices

Unit: mg/kg		Cd	Cr	Cu	Ni	Pb	Zn	As	Hg
Sediment Quality Guidelines	Lower limit	0.65	76.0	50.0	24.0	48.0	140	11.0	0.23
	Upper limit	2.49	233	157	80.0	161	384	33.0	0.87
Sediment Biohazard Guidelines (NOAA, U.S.)	ERL	1.2	81	34	20.9	46.7	150	8.2	0.15
	ERM	9.6	370	270	51.6	218	410	70	0.71

Sediment heavy metal concentration range of monitoring stations at the Mailiao sea area

	Cd (mg/kg)			Cr (mg/kg)			Cu (mg/kg)			Ni (mg/kg)		
	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
2023Q1	0.019	0.087	0.052	13.22	32.85	17.91	2.46	17.7	5.33	10	22.7	14.8
2023Q2	0.019	0.087	0.052	11.77	27.79	16.28	2.5	19.9	4.8	9.9	16.6	12.7
2023Q3	0.011	0.074	0.029	10.76	20.78	13.93	1.6	17.1	5.2	10.2	18.1	13.4
2023Q4	0.012	0.047	0.026	10.89	27.99	16.53	2.1	11.4	4.5	9.5	21.4	15.5
2024Q1	0.007	0.067	0.029	15.80	65.39	26.83	2.5	12.5	4.77	15	24.7	18.6
2024Q2	0.013	0.11	0.029	11.43	40.80	21.97	3.67	33.79	7.2	13.8	29	17.2
2024Q3	N.D.	0.17	N.D.	18.40	61.32	28.20	9.8	34.2	13.8	15.8	36.3	20.1
2024Q4	0.012	0.047	0.026	19.79	96.04	33.95	2.1	11.4	4.5	9.5	21.4	15.5

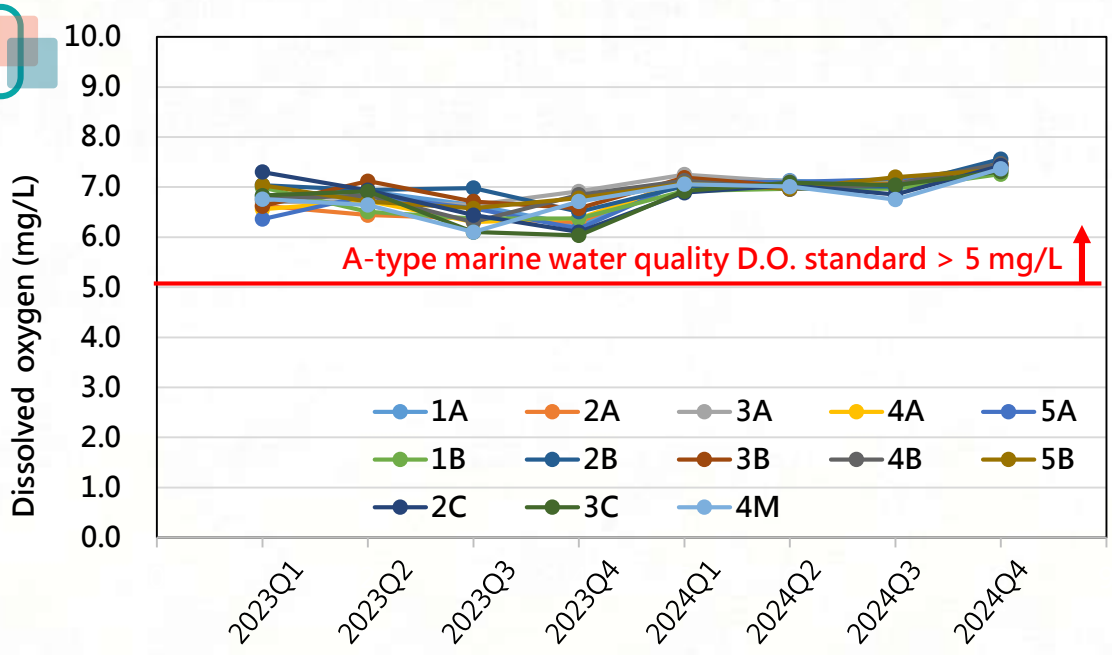
	Pb (mg/kg)			Zn (mg/kg)			As (mg/kg)			Hg (mg/kg)		
	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
2023Q1	10.2	28.5	14.7	24.3	71.4	38.4	5.3	9.6	7.3	0.011	0.065	0.027
2023Q2	7.2	21.3	14	26.5	73.6	41.8	5	9.3	7.2	0.015	0.056	0.034
2023Q3	3.5	19.4	10	17.6	45.6	28.4	5.2	9.8	6.9	0.015	0.071	0.04
2023Q4	5.9	12.7	8.2	18	38.9	26.3	4.7	9.9	6.3	0.022	0.067	0.042
2024Q1	11.1	28.9	13.7	36.3	63.3	46.4	8.1	11.9	9.6	N.D.	0.09	N.D.
2024Q2	11.1	27.8	14.1	33.2	128.5	47.7	6.9	11.2	8.8	-	N.D.	N.D.
2024Q3	10.2	27.4	12.9	47.1	121.2	61.9	8.8	15.2	10.9	-	N.D.	N.D.
2024Q4	5.9	12.7	8.2	18	38.9	26.3	4.7	9.9	6.3	0.022	0.067	0.042

Marine water quality

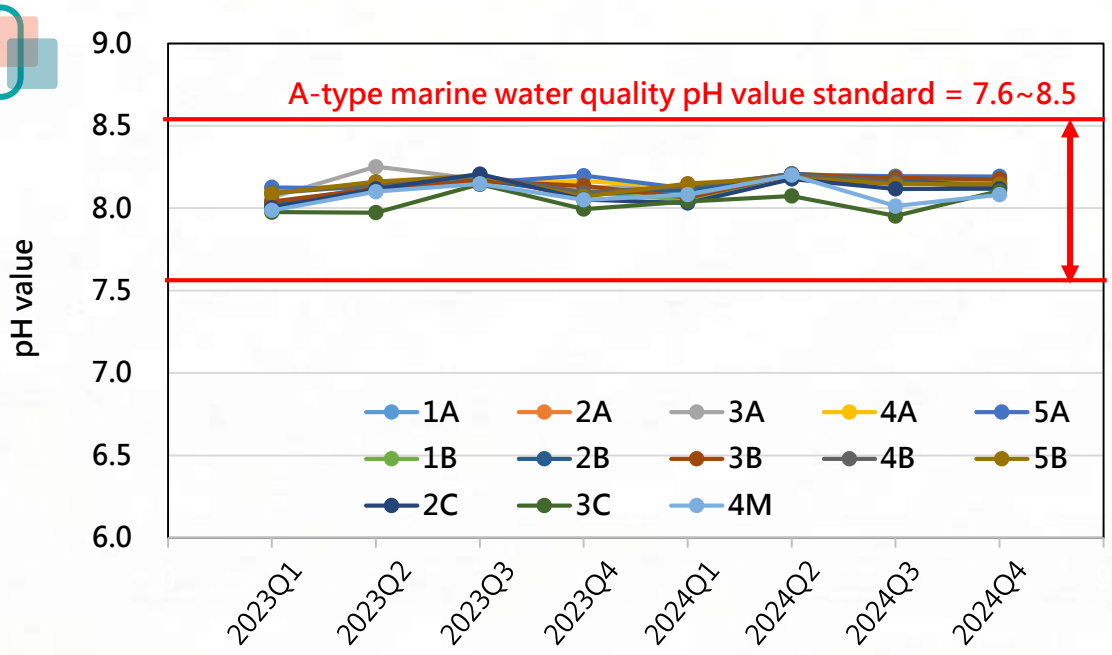
Marine water quality is subject to the influence of natural factors such as upstream scour and rising and ebbing tides that are cannot be controlled by the harbor. The marine water quality monitoring points are situated in the sea area near the Mailiao Industrial Zone. A total of 13 monitoring points are setting up to monitor 29 monitoring items such as temperature, salinity, dissolved oxygen, pH value, nitrate, E-coli, biochemical oxygen demand, chemical oxygen demand, ammonia nitrogen, total phosphorus, heavy metals, and volatile organics.

Marine water quality of Mailiao Harbor in 2023 and 2024

D.O.



pH

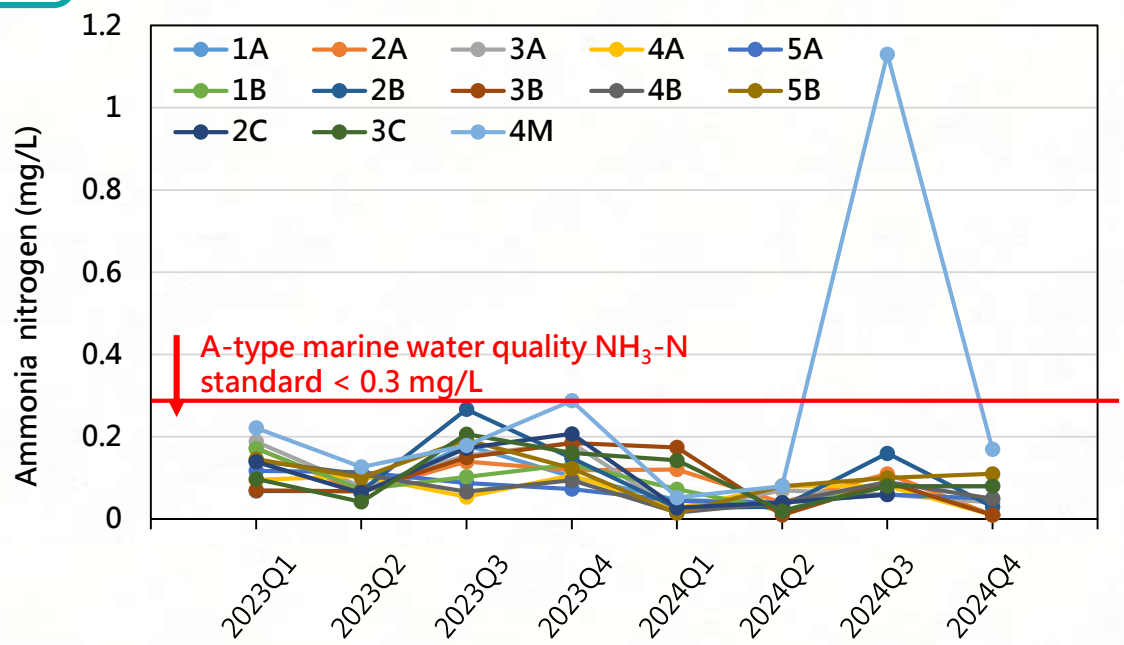


During 2023–2024, quarterly monitoring of DO, pH, NH_3-N, and Total Phosphorus achieved a 97.4% compliance rate with marine water quality standards (refer to Appendix I for details).

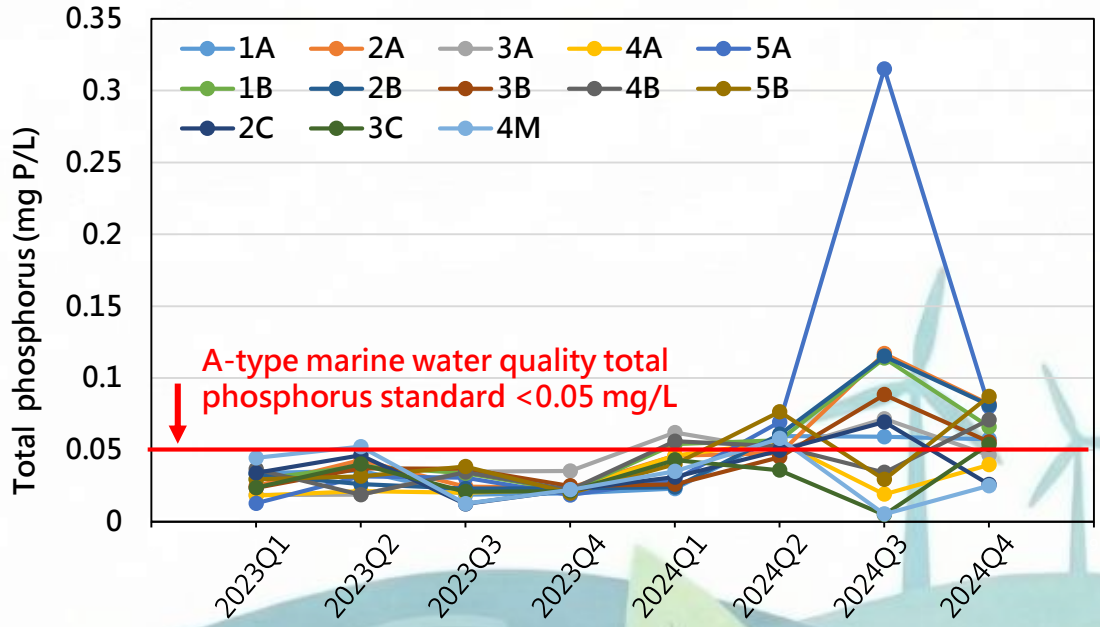
In the second half of 2024, typhoons Gaemi (July) and Krathon (September) brought heavy rainfall, increasing land-based nutrient runoff into the sea. Due to tidal and current dispersion, elevated concentrations of NH_3-N and Total Phosphorus were recorded at certain stations, occasionally exceeding environmental standards.

Marine water quality of Mailiao Harbor in 2023 and 2024

NH_3-N



Total Phosphorus



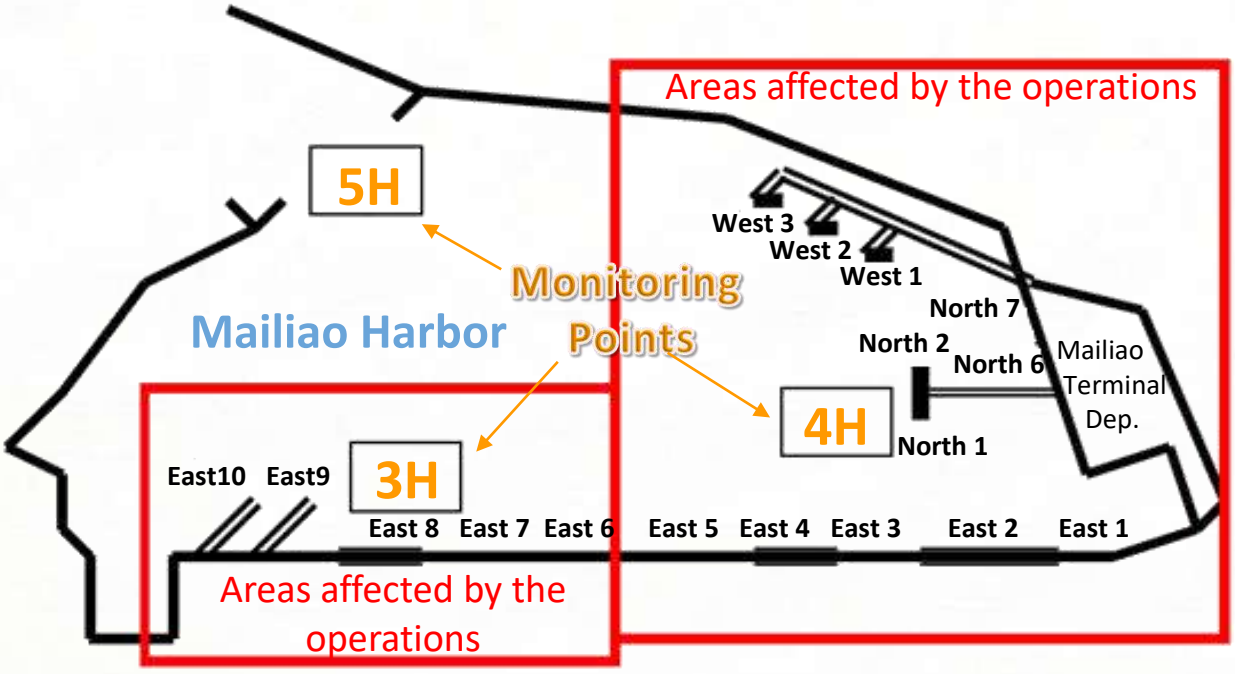
Harbor Area Water Quality

The incoming and outgoing cargoes at Mailiao Harbor are primarily industrial raw materials. To prevent chemical goods from polluting the sea when entering or exiting the harbor, a set of comprehensive guidelines has been formulated and implemented at Mailiao Harbor for water quality protection, including water quality assessment. Quarterly surveys are conducted at three stations (3H–5H) covering 32 parameters, including DO, pH, NH_3-N, nutrients, heavy metals, and VOCs.

Quarterly sampling results from 2023 to 2024 indicate that DO, pH, NH_3-N, and Total Phosphorus consistently met the Category A Marine Water Quality Standards (established under Article 8, Paragraph 1 of the Marine Pollution Control Act). The overall compliance rate reached 99.7%, as detailed in Appendix II.

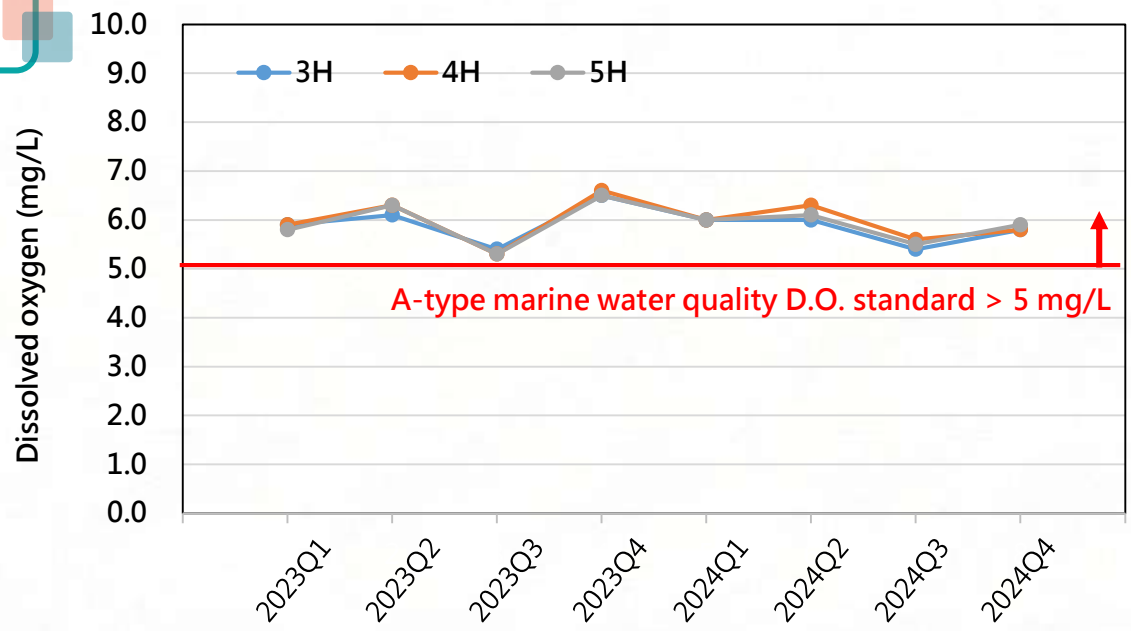
Although Total Phosphorus concentrations at monitoring stations 3H and 5H near the approach channel exceeded standards during the Q4 2024 survey, a thorough investigation confirmed that neither port operations nor neighboring industrial plants utilize or discharge phosphorus-containing chemicals, and no operational anomalies were detected during this period. Given that subsequent quarterly follow-up surveys returned to compliant levels, this elevation is identified as an isolated incident with no significant correlation to specific port activities or industrial sources; furthermore, natural environmental factors cannot be ruled out, particularly the passage of Typhoon Krathon in late September 2024, where torrential rainfall likely triggered an influx of land-based nutrients from river discharge into the sea, temporarily impacting harbor water quality.

Location of sea water quality monitoring points at Mailiao Harbor

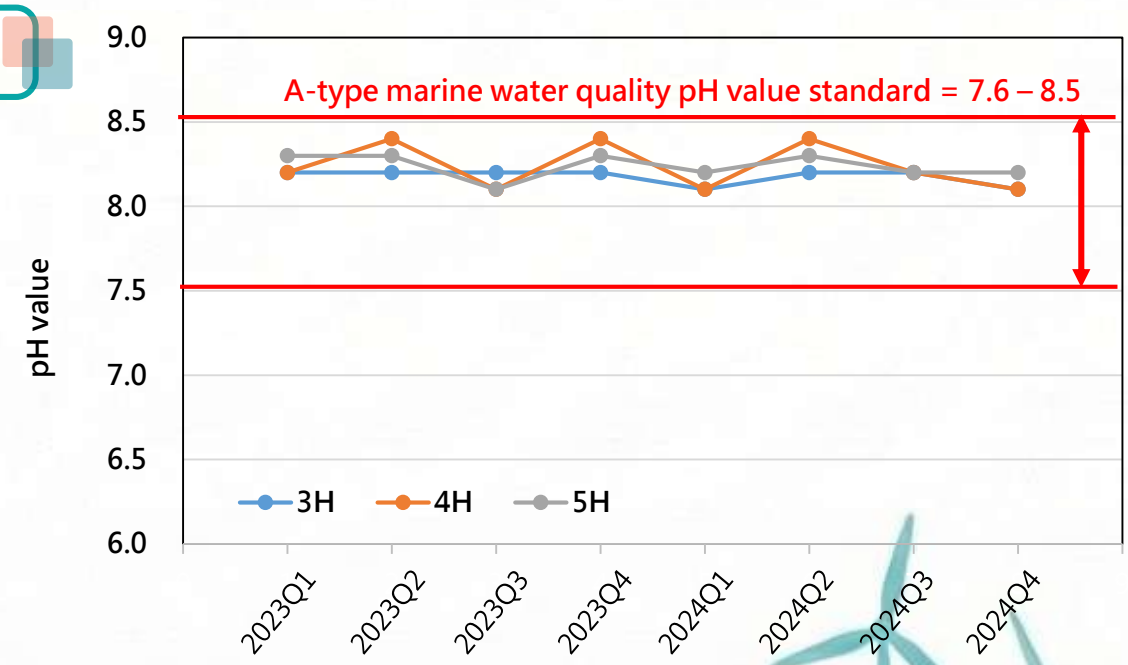


Harbor area water quality of Mailiao Harbor in 2023 and 2024

D.O.

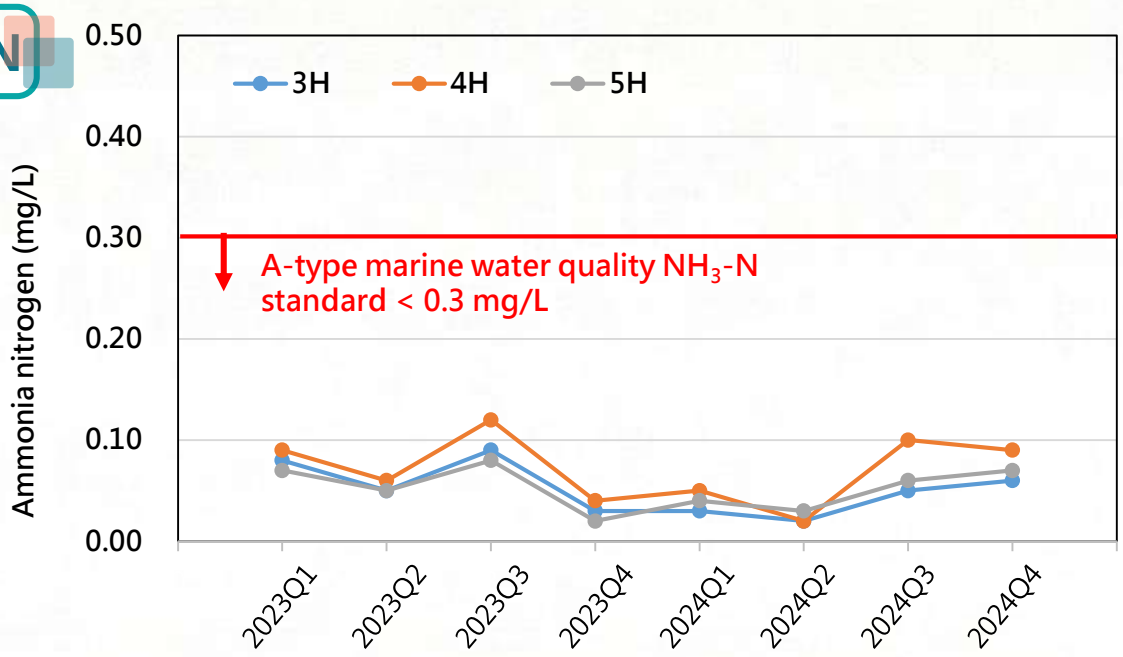


pH

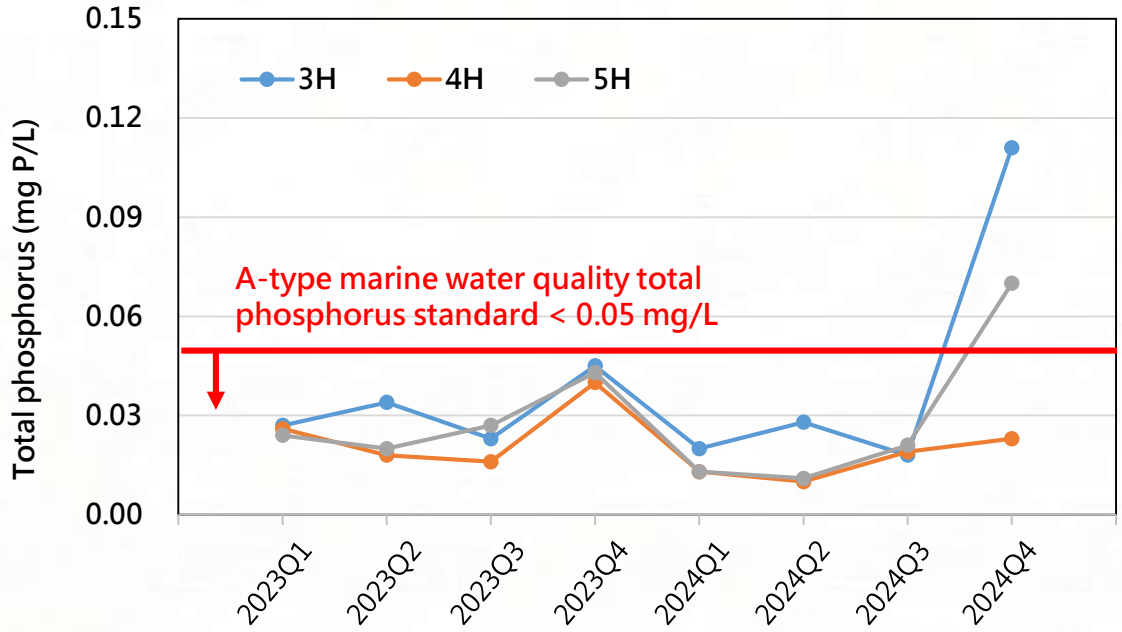


Harbor area water quality of Mailiao Harbor in 2023 and 2024

NH_3-N



Total Phosphorus



Ship Discharge and Bunkering

Additionally, Mailiao Harbor highly values the sea and implements several protection measures, such as requiring all cabin-washing water to be recycled as per the regulations; other requirements include leakage prevention measures and response measures in case of leakage, and they are explained as follows:

Regulations governing cabin prewashing operations

To fulfill the commitment included in the finalized Environmental Impact Statement of the 6th Naphtha Expansion Project and to meet the requirements of the Mailiao Harbor Marine Pollution Control Plan, the harbor has put in place controls for transportation of importing (incoming) chemical cargo vessels. To prevent randomly discharged toxic liquids from polluting the marine environment, the vessels must conduct cabin prewashing operations after unloading their cargo, and the water used must be treated and recycled as per the regulations. Hence, the harbor has clearly defined the scope and method for cabin prewashing. These control operations are clearly defined in the “computer-based tracking and control operations of cabin prewashing wastewater in Mailiao Harbor.” If the control operations are not conducted because the shipped goods are in a different category, then the “Mailiao Harbor cabin prewashing wastewater tracking and control system” is adopted instead to track the vessel to the next port and replace the operating results of Mailiao Harbor with those of the next port, thereby fulfilling management responsibilities.

Leakage prevention and response measures

To prevent marine pollution, two levels of regulations have been established. Level 1 regulations are to formulate appropriate regulations to prevent any possibility of leakage, which include regulations on refueling, standards in the stevedoring of dangerous goods, and unloading guidelines. Level 2 regulations are to formulate response measures to be taken during a leakage event, including immediate treatment and preventing leaks from spreading. Relevant guidelines include the mandatory use of an oil boom to surround the vessel during the stevedoring of oil-based products and chemicals, the installation of pollution prevention facilities and cleaning equipment at all connecting points of the refueling pipeline in the refueling ship during refueling, and the immediate termination of operations in case of oil leakage and any abnormalities. The aforementioned measures are clearly defined in the “Regulations Governing Vessel Refueling at Mailiao Industrial Harbor Administration” and the “Regulations Governing Dangerous Goods Loading and Unloading at Mailiao Industrial Harbor Administration.”

Management of dangerous Cargo

Because Mailiao Harbor is located near the Mailiao Industrial Zone, the possibility of harbor area soil being polluted cannot be ruled out. To prevent pollution of soil and groundwater, the MHAC has implemented pollution prevention measures in the storage tank area. These measures are complemented by the oil and terminal departments, and are explained as follows:

Pollution prevention measures for the storage tank area

To prevent leakage of oil or oil-based products and to reduce the environmental impact incurred by such incidents, the bottom of the storage tanks in the factory area and the surrounding areas are reinforced with barrier constructions, including waterproof material and spill dikes. Leakage test tubes and oil leakage monitors are installed parallel to the bottom and side of the storage tanks. Regular inspection or real-time monitoring is conducted to assess the potential of oil leakage on or near the storage tanks. Oil leakages are managed at various levels based on the leakage potential to achieve the ultimate goal of pollution prevention.

1. Leakage prevention measures

1) Before laying the floorboard of the storage tanks, check that the base has at least 95% compaction.
   Purpose: Floor compaction reduces soil permeability and prevents uneven sinking or tilting of storage tanks.
2) Remove rust and paint the tank floor, as well as apply an anti-corrosion layer and fiber-reinforced plastic (FRP) coating to the joint connecting the floor and exterior wall.
   Purpose: To prevent leakage caused by the corrosion of storage tank steel plates.

2. Barrier measures

1) Before laying the floorboard of the storage tanks, lay high density polyethylene (HDPE) waterproof material.
   Purpose: Prevent leaks from directly permeating the ground and causing groundwater and soil pollution.
2) Construct an interceptor ditch with a reinforced concrete (RC) base on the exterior of the storage tank base.
   Purpose: An RC interceptor ditch can stop leaked oil from flowing into the soil.
3) Construct a spill dike near the storage tank.
   Purpose: To prevent leaks from directly permeating the ground and causing groundwater and soil pollution.

3. Leak test measures

1) Bury horizontal tilt detection tubes at the base of the storage tank.
   Purpose: If leakages flow into the RC interceptor ditch through the tilt detection tubes, then the leak sensor inside the PIT sends an alert signal to staff.
2) Install fuel gas detector (for the oil-based product storage tank).
   Purpose: To send an alert signal to staff immediately when the storage tank leaks.
3) Install a groundwater monitoring well for long-term monitoring of water quality.
   Purpose: To determine whether the storage tank is leaking by understanding the water level and water quality changes in groundwater.
4) Monitor sinking of the storage tank.
   Purpose: To determine changes in elevation of the storage tank, and prevent uneven sinking and tilting of the storage tank.
5) Monitor sinking of the RC interceptor ditch of the storage tank (for storage tanks with an RC base).
   Purpose: To determine the base elevation and prevents the base from uneven sinking and tilting.

Oil tank leakage prevention and detection measures

1. Leakage prevention measures for storage tank floor
- 1.1 Compaction of storage tank base
- 1.2 Leak prevention layer on storage tank base
- 1.3 Drainage tube
- 1.4 Fuel gases detector tube
- 1.5 Horizontal inclinometer tube

2. Leakage prevention measures for the body floor
- 2.1 Anti-corrosion engineering for the floor
- 2.2 Oil leak detector
- 2.3 Monitors for body sinking

3. Breakage and leakage prevention measures for the tank body
- 3.1 RC base sinking monitor
- 3.2 Floor compaction
- 3.3 Gas detector
- 3.4 Rain and wastewater drainage
- 3.5 Spill dike
- 3.6 Groundwater monitoring well

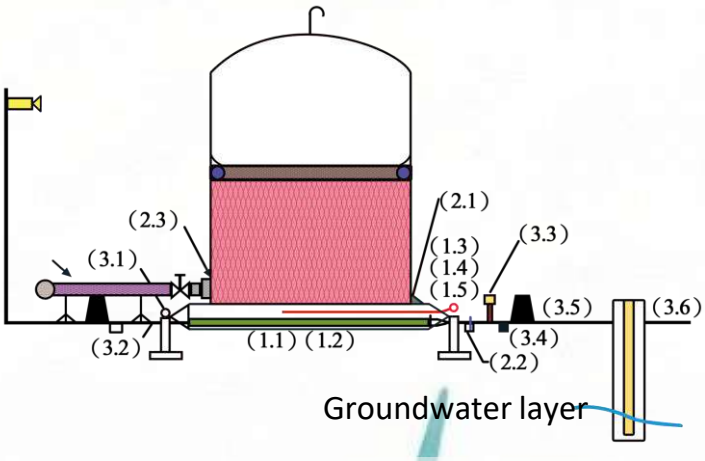


Diagram of leakage prevention measures for a 130,000 kiloliter crude oil storage tank

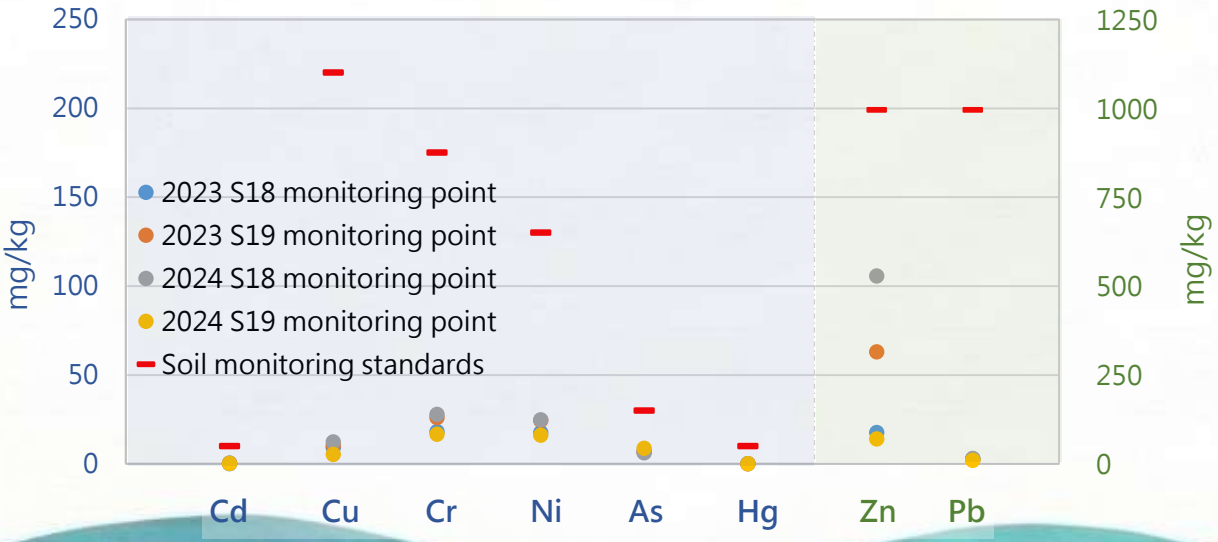
Soil and groundwater

Four soil monitoring points exist near the harbor. Points S18 and S19 monitor soil pH value, eight types of heavy metal element (i.e., cadmium [Cd], chromium [Cr], copper [Cu], nickel [Ni], lead [Pb], zinc [Zn], arsenic [As], and mercury [Hg]), 20 types of volatile organic substances (benzene, toluene, ethylbenzene, xylene, 1,3-dichlorobenzene, 1,2-dichlorobenzene, carbon tetrachloride, chloroform, 1,2-dichloroethane, cis-1,2-dichlorobenzene ethylene, trans-1,2-dichloroethylene, 1,2-dichloropropane, tetrachloroethylene, trichloroethylene, vinyl chloride, hexachlorobenzene, 3,3-dichlorobenzidine, 2,4,6- Trichlorophenol, 2,4,5-trichlorophenol, and pentachlorophenol), and total petroleum hydrocarbons. Points S31 and S32 monitor acrylonitrile.

Mailiao Harbor soil sampling locations map

According to the 2023 and 2024 soil monitoring data, the eight types of heavy metal monitored at stations S18 and S19 were within the limits of soil pollution monitoring standards. None of the 20 types of volatile organic substances were detected. The highest value for total petroleum hydrocarbons was 44.3 mg/kg, which was far lower than the regulatory standard of 1,000 mg/kg. Acrylonitrile, monitored at S31 and S32, was below the detection limit, showing that the soil near the harbor did not suffer any significant pollution.

Heavy metals concentration in soil at monitoring points near the harbor



Harbor waste

Garbage/ Port waste

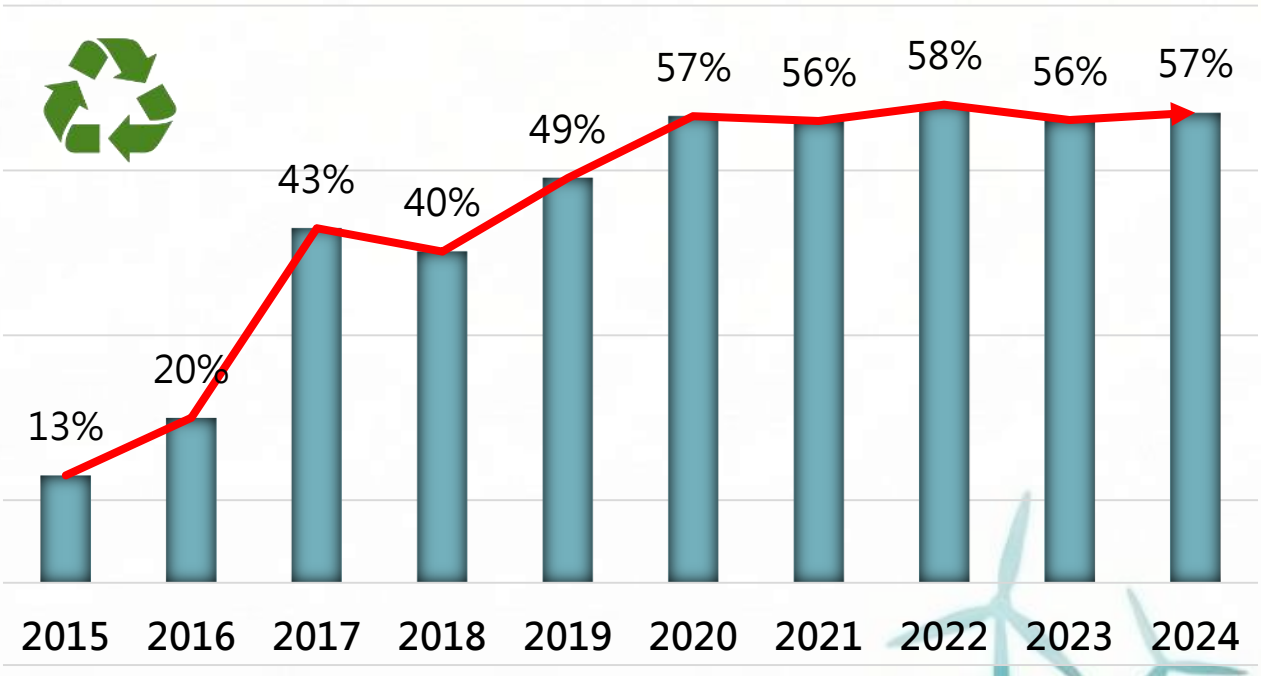
Mailiao Harbor greatly emphasizes a clean harbor environment. To maintain cleanliness at the harbor and ensure appropriate treatment of waste, the harbor commissioned qualified operators for waste disposal according to the Waste Disposal Act, and clearly defined waste disposal timings to be followed by relevant harbor personnel. Vessels moored at the harbor must comply with the “Notification Form of Garbage Removal from the Vessels Berthing at Mailiao Industrial Harbor” when sorting waste. The Mailiao Harbor Co. actively promotes the importance of sorting waste and has installed waste sorting bins at all offices to enhance the recycling rate of waste at the harbor.

General Waste

A review of general waste management from 2015 to 2024 demonstrates significant progress through active promotion and rigorous disposal protocols by the MHAC and the Formosa Petrochemical Corp. MAI-LIAO Terminal Department. Total waste removal dropped substantially from 4,528.21 tons in 2015 to 2,644.71 tons in 2024, with the MHAC’s specific volume decreasing from 285.8 tons to 116.3 tons. Alongside this reduction, the overall recycling rate soared from 13% in 2015 to 57% in 2024. These results highlight the MHAC 's success in advancing source reduction and resource circulation management.

Recycling status in 2015 to 2024

(MHAC and the Formosa Petrochemical Corp. MAI-LIAO Terminal Department)



The various operations are explained as follows.

1. Waste reduction at source

1) Garbage produced by vessels berthing at the harbor

- After a vessel berths at the wharf, the “Notification Form of Garbage Removal from the Vessels Berthing at Mailiao Industrial Harbor” is sent to the shipper, requesting the shipper to sort garbage according to the regulations.
- Garbage removal time is 13:00–15:00 daily.

2) Garbage produced by vessels offshore

- Promote garbage sorting to related workers and contractors during meetings.
- Set up waste sorting bins at offices.

2. Waste sorting

1) Garbage produced by vessels berthing at the harbor

- Collect the garbage produced by vessels berthing at the harbor every day, and ask the cleaning personnel to sort the garbage according to company regulations.

2) Garbage produced by vessels offshore

- Dispose and transport the garbage in the garbage sorting bins every day to the waste collection yard, and ask the cleaning personnel to re-sort the garbage according to company regulations.

3. Recycling

After sorting, the garbage at the harbor area (harbor vessel and offshore vessel garbage), are temporarily kept at the waste collection yard.

- According to the type of garbage, recycling firms collect the recyclable wastes, and transport them to various recycling plants for recycling and reuse.
- Garbage that cannot be recycled is transported to a subsidiary of the Formosa Petrochemical Corporation, the Nan Ya recycling plant, for incineration or landfill.

Industrial Waste

The following table details the types and amounts of industrial waste processed by the MHAC in 2023 and 2024. The MHAC processed industrial waste including valuable waste, recyclables, general industrial waste, and waste oil and sewage. The harbor maintains a comprehensive tracking system for industrial waste, encompassing balances, generation, and removal volumes across various categories. Key initiatives include the recovery of valuable recyclables, primarily scrap metal, with a total removal volume of approximately 2,796 tons, alongside other resource recycling materials such as waste rock wool, waste wood, and waste belts totaling approximately 284 tons. General industrial waste, comprising insulation materials, paint chips and sludge, oily sludge, sludge mixtures, and foam liquid concentrates, reached a total removal volume of approximately 3,241 tons, while the disposal of oily wastewater was recorded at approximately 776 tons.

Regarding industrial waste, the MHAC conducts regular, random inspections of manufacturers' construction site environment to ensure that waste is appropriately categorized and temporarily stored according to regulations.

MHAC industrial waste types and processing volume in 2023 and 2024

Type	Valuable	Resource recycling			General industrial waste					Waste oil Sewage
Item	Waste ferrous materials	Waste rock wool	Waste wood	Waste leather belts	Cold insulation	Paint waste	Waste oil	Sludge mix	Primary foaming liquid	
Balance	141	0	10	806	61	0	0	3,189	0	-
Output	3,390	63	211	0	27	0	0	3,189	0	-
Clearance	2,796	63	221	0	52	0	0	3,189	0	776

(unit: metric ton)

Recycling and Reuse Process of Waste Rock Wool

Centralized Collection for Recycling

Transportation to Specialized Facilities for Processing

Reuse of processed waste rock wool

Dredging management

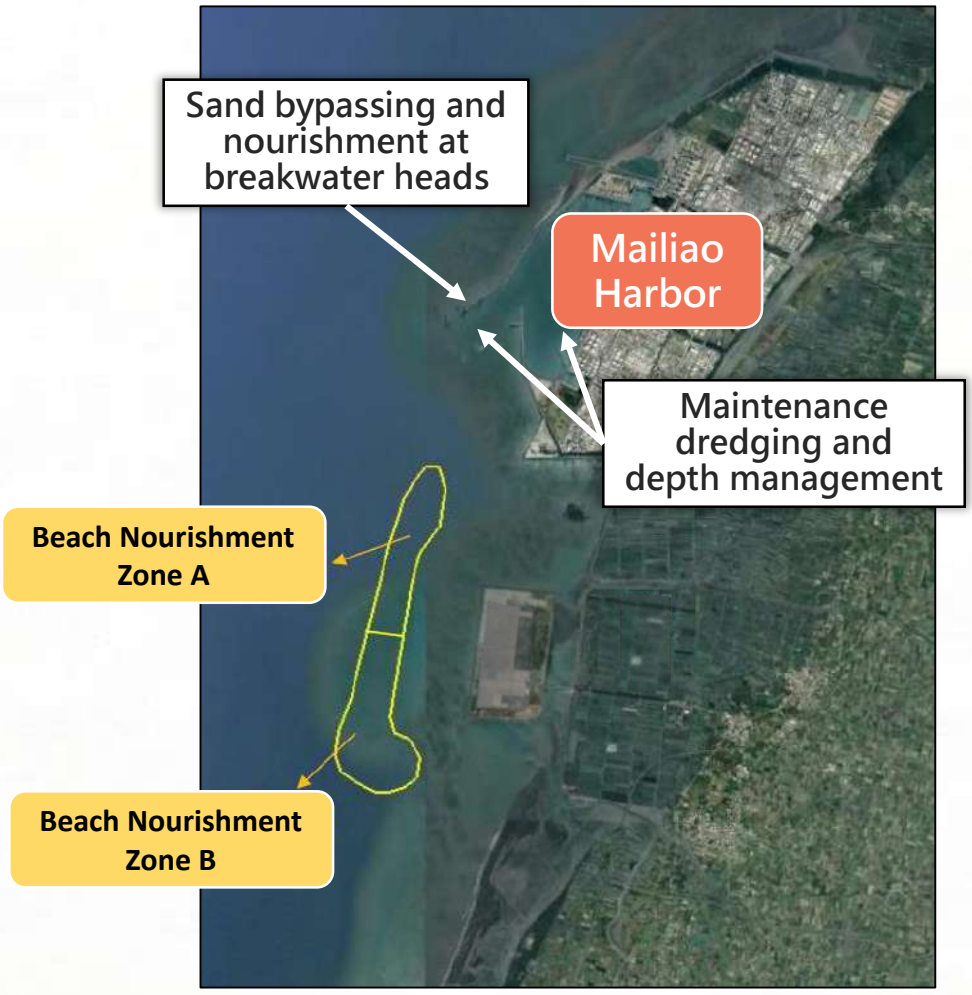
Dredging operations

To maintain the course and depth of the harbor, dredging and silting are mandatory. According to the review conclusions of the "Environmental Impact Statement of the Mailiao Harbor Transformation Plan in Yunlin Offshore Industrial Zone," Mailiao Harbor uses sediments of sound quality from external channel dredging excavation to cover erosion at the south bank caused by development of Mailiao Industrial Park. This landfill operation, which began in 2009, is ongoing.

The landfill volume is based on the numerical simulation results obtained by professional research institutes. The simulation results estimated that a throwing amount of 600,000 to 1,000,000 m^3 of sand could achieve sand transport balance.

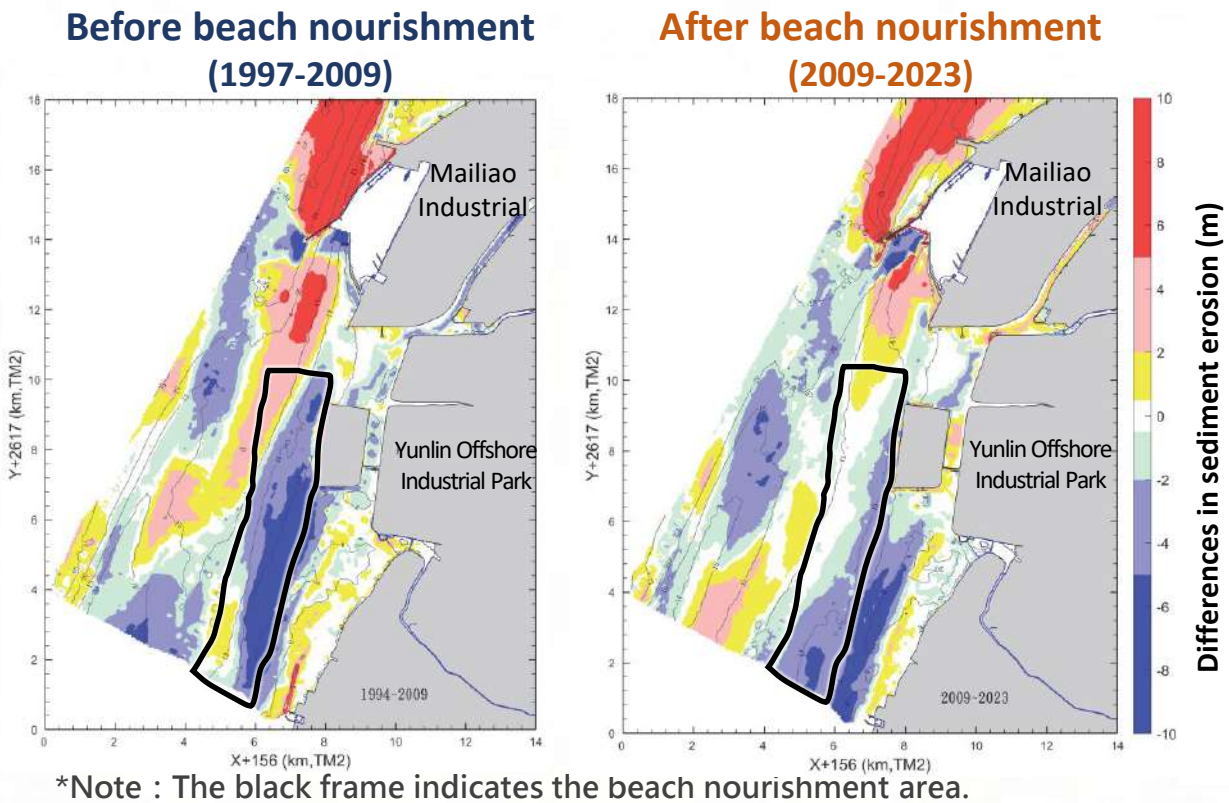
The landfill method used a sand dredger to dredge channel silt, and then the suspended sand in the upper layer of the cabin was eliminated using the overflow method; finally, superior-quality sand with larger particles that settled at the bottom of the cabin was transported and dumped at the landfill site. Landfilling is paused during oyster spawning, and water quality monitoring is conducted during landfilling to prevent the activity from affecting the marine ecology.

Layout Plan of Beach Nourishment



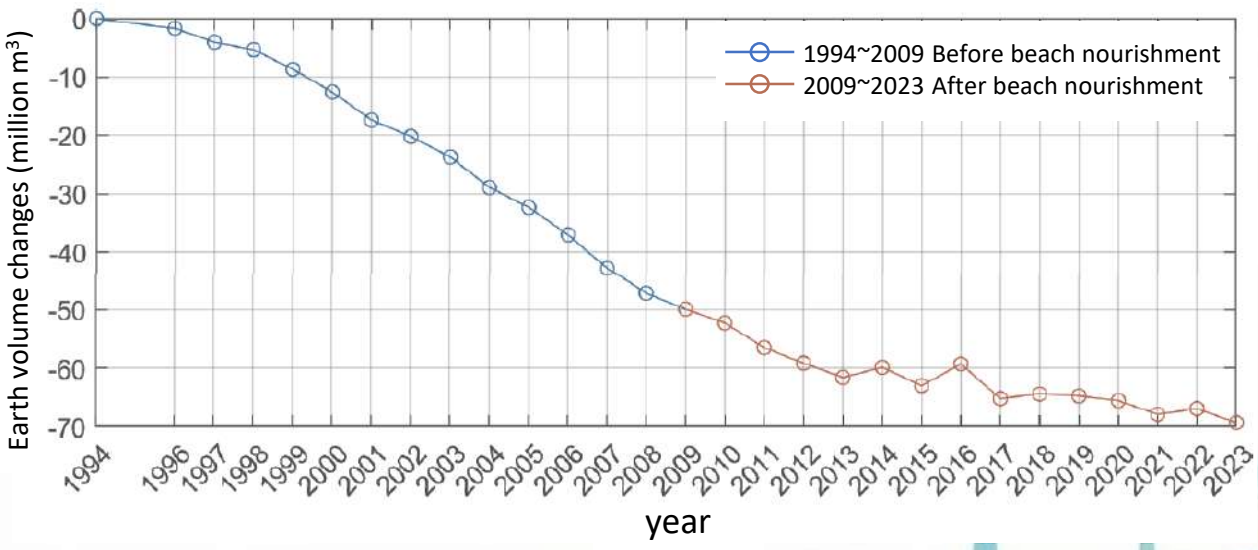
The survey results of water depth topography over the years have indicated that landfill and beach nourishment could make up for a part of the sand source of the eroded area, and help to reduce regional changes in plane siltation. For example, the south side of the Hsin Hsing Zone, which has a depth of 10–15 m, continues to show erosion. The water depth and topography will continue to be monitored, and the effectiveness of landfill and beach nourishment shall be reviewed periodically.

Comparison of Mailiao Harbor 14 years before beach nourishment and 14 years after beach nourishment



*Note：The black frame indicates the beach nourishment area.

Earth volume changes from 1999 to 2023 (the beach nourishment area)



(Date source: Bureau of industrial Parks, Ministry of Economic Affairs, 2024)

Climate Adaptation and Green Energy

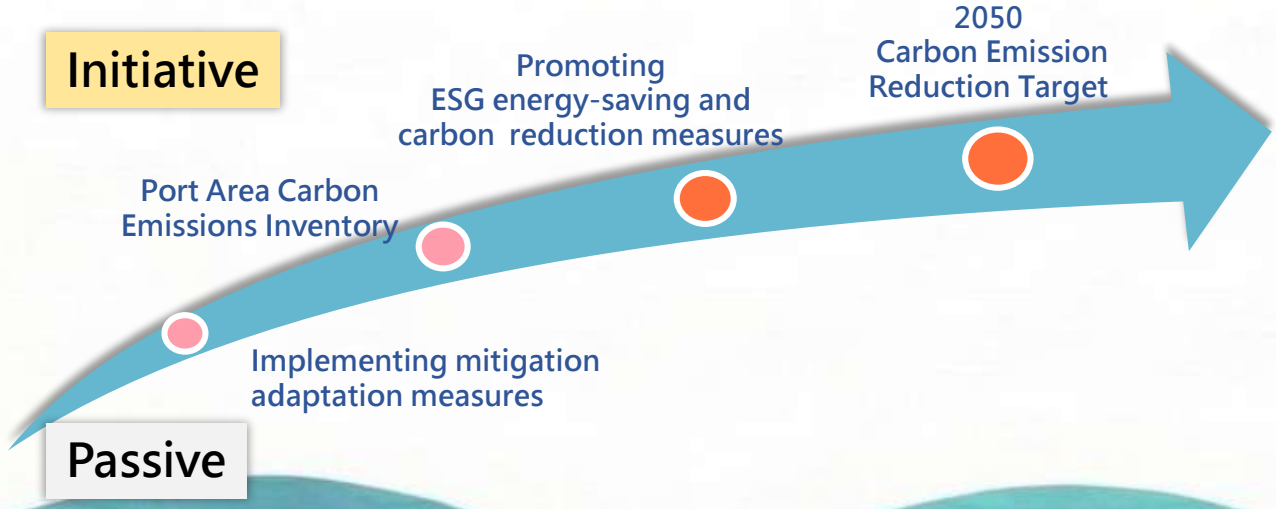
In response to global climate change and the need to implement necessary mitigation and adaptation strategies, our country takes the responsibility of environmental protection as a priority. On April 22, 2021, Earth Day, Taiwan declared its goal to achieve net-zero emissions by 2050 and amended the original “Greenhouse Gas Reduction and Management Act" to the "Climate Change Response Act" on February 15, 2023. The aim is to reach net-zero emissions goal by the policies for greenhouse gas (GHG) reduction and climate change adaptation.

In 2021, Formosa Plastics Group (FPG) hosted an environmental forum with multi-disciplinary experts and, witnessed by the Ministry of Environment and various stakeholders, signed the "Carbon Neutrality and Green Energy Technology for Sustainable Environment" declaration with Yunlin County Government. This initiative promotes energy-saving improvements, such as reducing energy consumption in production processes, to advance towards a "Zero-Waste Eco-Cycle Park.“

As of 2024, FPG's greenhouse gas (GHG) emissions have decreased to 45.33 million tonnes, representing a 26% reduction compared to 2007 levels. This achievement surpasses the short-term goal of a 20% reduction by 2025 ahead of schedule.

Port Area Climate Change Adaptation

Climate change has major impacts on port areas. Rising global temperatures cause sea ice to melt/expand, leading to higher sea levels and increased tidal fluctuations, storms, waves, and extreme weather. To ensure Mailiao Harbor's sustainability and safety, the port company has taken adaptation measures. This includes conducting a carbon emissions inventory, promoting energy-saving measures, and aiming to reduce carbon emissions by 2050.



Wave monitoring system

Mailiao Harbor has strengthened its assessment of potential impacts and risks from climate change on the port area by establishing a wave monitoring system. The port has commissioned professionals from National Kaohsiung University of Science and Technology to implement the "Mailiao Harbor Wave Monitoring Program." Real-time wave monitoring stations have been set up at North Piers 2 and 5, utilizing the Nortek Acoustic Wave and Current profiler (AWAC) to monitor wave conditions. The information is provided to ship operators and loading/unloading equipment personnel for reference, and data is statistically analyzed to establish appropriate wave alert values specifically for Mailiao Harbor's operations. This proactive approach aims to prevent and mitigate potential damages caused by adverse wave conditions.

Wave observation station site

Nortek AWAC

Wharf Revetment Elevation Works

With climate change becoming increasingly severe, rising sea levels accompanied by heavy rain, storm surges, and the impacts of typhoons, the Port area has historically been prone to sea water flooding on the dock roads during spring and neap tides or periods of elevated water levels due to low pressure, which affects the safety of vehicular and pedestrian traffic. Therefore, the MHAC commissioned CECI Engineering Consultants to conduct an assessment of raising the dock face panels and revetments on the southeast and northeast sides of the port's quay area. This assessment considered current design regulations and estimated the corrosion rate of steel piles up to a 50-year limit, ensuring the safety and integrity of the facility's structure. The revetment road elevation project, completed in 2019, successfully resolved the prior problem of dock flooding caused by monthly tidal cycles.

Wharf revetment road elevation improvement

Before improvement work

After improvement work

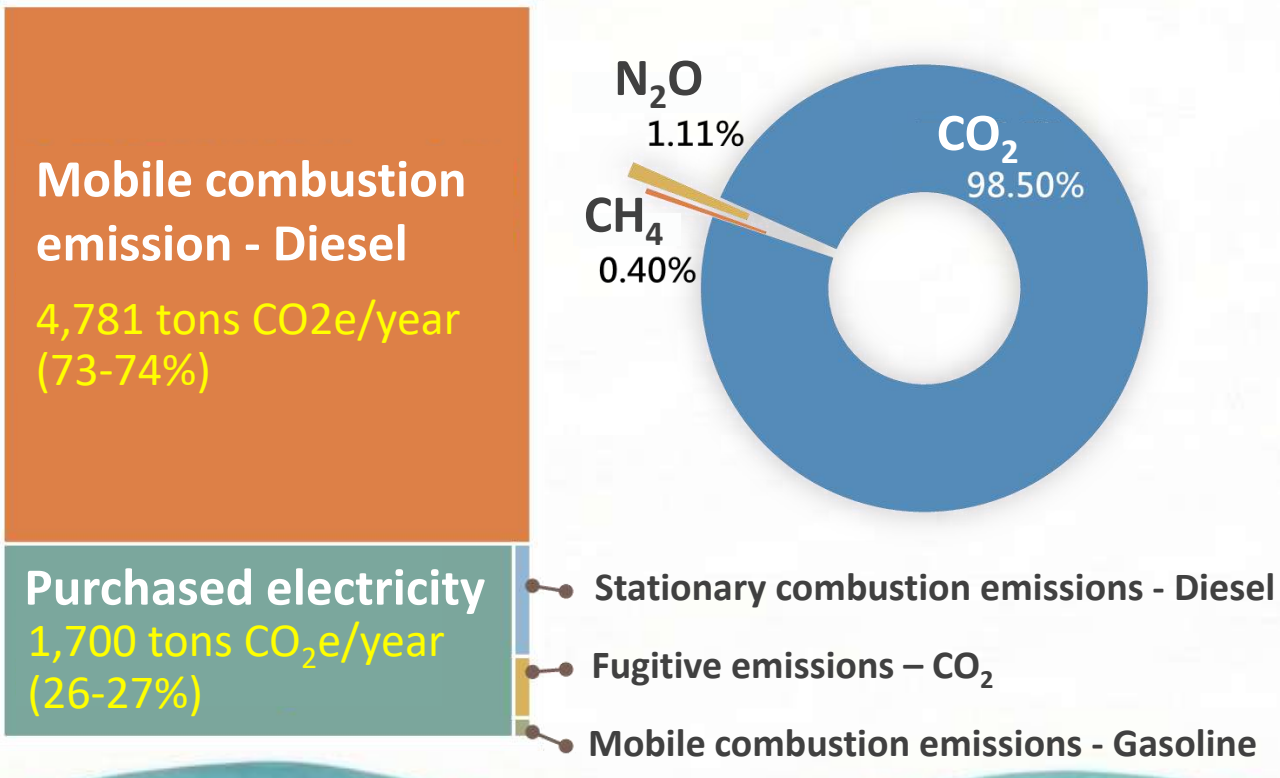
Regular GHG inventory

To monitor GHG emissions in the port area, the port company conducts regular GHG inventories of GHG emitted within the port area. This includes calculating emissions from direct GHG sources and indirect energy sources related to port operations, such as fixed combustion emissions (diesel), mobile combustion emissions (diesel, gasoline), fugitive emissions (from septic tanks), and purchased electricity. The emissions inventory covers six GHGs: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6).

In 2023 and 2024, GHG emissions at Mailiao Harbor were primarily from mobile sources using diesel fuel, accounting for 73-74% of the port area's GHG total emission, with an annual emission of approximately 4,781 metric tons of CO2e. The main operational activity contributing to these emissions is the use of diesel fuel in port tugboats. The second-largest source is purchased electricity consumption, accounting for 25-26% of emissions, with an annual emission of about 1,664 metric tons of CO2e. Other operational activities' emissions account for less than 1% of the total. Furthermore, the GHG emissions during 2023 and 2024 were mainly composed of carbon dioxide (CO_2) at 98.50%, followed by nitrous oxide (N_2O) at 1.11% and methane (CH_4) at 0.40%.

In alignment with Formosa Plastics Group's 2050 carbon emission reduction goal, Mailiao Harbor continues to advance its green shipping services. Using the 2007 carbon emission peak as the baseline, the harbor is committed to a 35% reduction by 2030. This mid-term goal is being driven by expanding Onshore Power Supply and upgrading energy equipment, demonstrating a firm commitment to environmental sustainability and proactive climate action.

GHG inventory results and emission percentages for 2023 to 2024

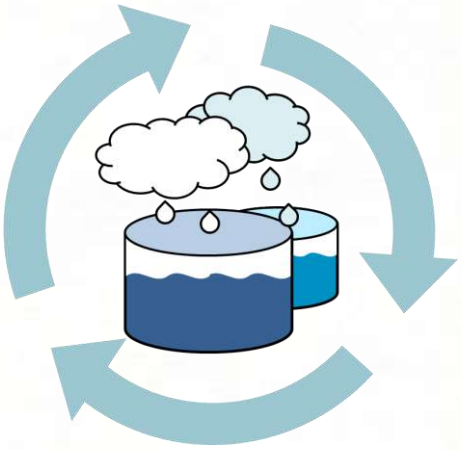


Green office environment practices

To implement green practices in the port area, the port company has developed a checklist of 35 measures for green office initiatives. These measures are categorized into five indicators: energy and resource conservation (such as reducing electricity, water, oil, and paper usage), waste reduction at the source (including sorting and recycling), green procurement, environmental beautification, and advocacy. The implementation includes actions like regulating office air conditioning temperatures, using energy-saving lighting and water-saving facilities, paperless office practices, promoting carpooling, enforcing waste recycling and sorting, organizing environmental knowledge training or lectures, and utilizing green lifestyle materials for promoting green living among the port company's employees through internal community and media resources.

Rainwater harvesting project

Promoting sustainable water resource utilization, Mailiao Harbor has installed three rainwater collection tanks with a capacity of 20 tons each at the port administration building. Through rainwater collection equipment, rainwater retention and reuse have been enhanced to achieve water-saving benefits. Additionally, spill-proof barriers are installed in the dock operation and unloading area to directly collect runoff rainwater. Rainwater from road surfaces is collected through dedicated discharge channels, and the design of catch basins effectively removes pollutants and solid waste particles.



From 2023 to 2024, the cumulative rainwater collection in the Mailiao Harbor area has been measured. The port administration building collected 603 metric tons of rainwater, while the tank area collected 617,296 metric tons. The rainwater reuse rate after collection reached 100%.

Low-Voltage Onshore Power Supply

The harbor actively promotes the comprehensive use of Low-Voltage Onshore Power Supply (LV-OPS) for harbor craft. Compared to traditional high-sulfur fuel, OPS significantly reduces air pollutant emissions and strengthens green shipping services.

Since its commissioning, the LV-OPS system has maintained a 100% utilization rate. From 2023 to 2024, the facility provided shore power for 17 harbor craft, totaling approximately 477 MWh (477,000 kWh) of electricity consumption and successfully reducing approximately 243 tons of CO_2e emissions.

Ecological conservation

In response to rapid changes to the environment, in addition to avoiding the pollution that could be caused by various types of human activities, Mailiao Harbor considers ecological conservation and regeneration urgent and critical. The harbor places great emphasis on the marine environment and the symbiotic system of the marine ecosystem, and actively participates in marine regeneration work, including conservation measures for the protection of the critically endangered white dolphin and regeneration of fishery resources. Thus, the Mailiao Harbor Company not only shows a responsible spirit for pollution prevention, but also is active in ecological conservation and regeneration. The white dolphin conservation measures and release of fry are detailed in the following paragraphs.

White dolphin conservation measures

The International Union for Conservation of Nature declared the Chinese white dolphin critically endangered (CR) in August 2008. However, since March 2008, Formosa Plastics Group has continually run a survey project, and the results obtained so far indicate that the Chinese white dolphin is mainly found in long and narrow sea area within 3 km offshore, in water less than 15 m in depth, and primarily moving in a north–south direction. The number of white dolphins along the Yunlin coast constitutes more than half of the species' number along Taiwan's west coast; this is also a vital nursery area. The white dolphin conservation measures implemented by Mailiao Harbor are explained as follows.

1. Regulation of incoming and outgoing vessel speed

Cargo carriers entering and exiting the harbor should be alert for white dolphins. If white dolphins are sighted ahead, then the vessel must reduce its speed to less than 6 knots provided it does not affect navigational safety; however, because of weather and sea conditions, some large vessels must maintain a speed of more than 7 knots. For instance, if the sea condition is a flat tide with no flow (within 0.5 hr before and after a high or low tide), and the visibility is more than 2,100 m with a wind speed of less than 3, then the signal station would inform the pilot, who would first consider the navigational safety before deciding whether to enter the harbor at under 6 knots.

2. Regulation of sand dredging and landfill vessels

Before dredging the channel for sand, the work boats should ensure that no white dolphins are in the harbor before performing sand extraction and landfill operations. The monitoring and regulation of sand extraction vessels are conducted by the Mailiao Harbor signal station, which is explained as follows:

1) Sand extraction vessels use radar and a global positioning system for vessel positioning and navigation.
2) The signal station uses radar and an automatic identification system on vessels to monitor their position, which it continues to record. Upon receiving a report of a white dolphin sighting, the signal station immediately informs the sand extraction vessel and nearby merchant vessels to reduce vessel speed and implement appropriate collision avoidance measures.
3) Originally, a plan existed to install monitoring recorder systems on sand extraction vessels to record operations. However, considering the low efficiency of the original sand extraction vessels, sand extraction operations were commissioned to foreign professional sand extraction vessels, enabling a reduction in the number of sailings as well as reducing the probability of affecting white dolphin activities.

3. The pH value of marine water quality near Yunlin

According to the monitoring results of water quality in nearby sea areas, the pH can be maintained between 7.5–8.5, and the pH value of discharged water by various factories can conform to the legal requirements of the MOENV. The pH value of seawater near Yunlin will be continuously monitored.

Fry releasing program

Habitat/Ecosystem loss (water)

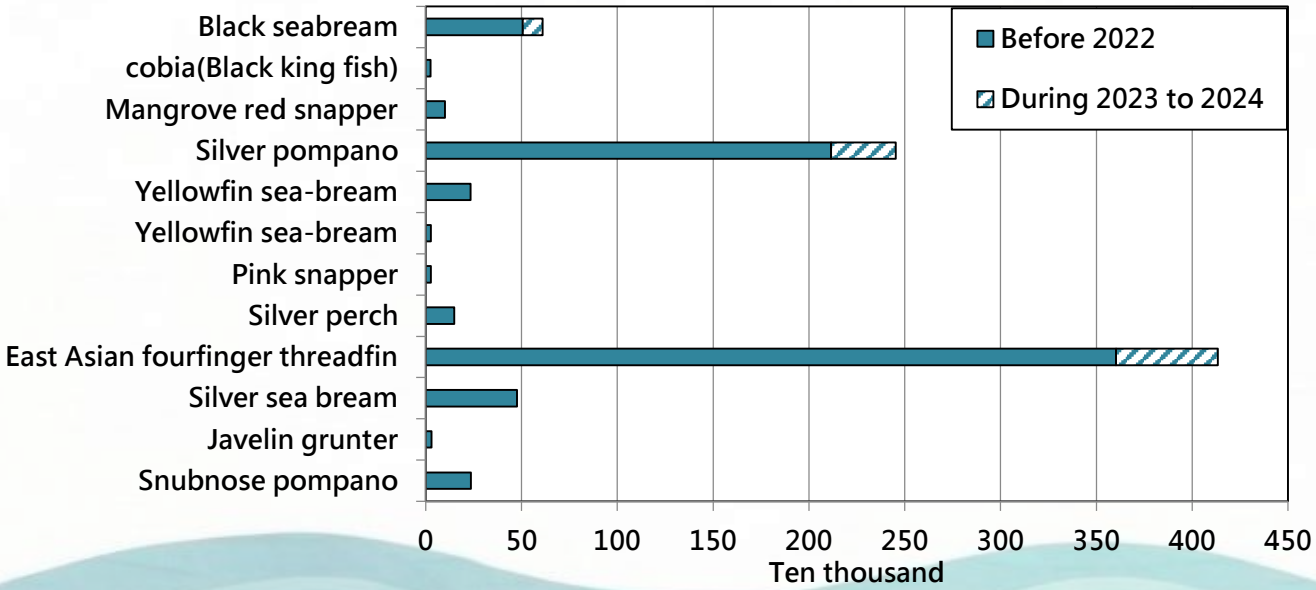
Relationship with local community

Because of the depletion of coastal resources in Taiwan, and in order to exhibit friendliness to local environment, Formosa Plastics Group has promoted the proliferation and release of fry for conservation purposes in the Yunlin Mailiao marine area for many years.

Aligning with government fishery regeneration goals, this 15-year initiative has released nearly 7 million fry since 2008, significantly enriching local stocks and catches. Additionally, to enhance the ecology conservation concept of the masses, conservation activities have actively been promoted; lecturers with a background in marine ecology conservation as well as knowledge of fisheries were hired to teach conservation lessons with the expectation that this regeneration strategy would be used to stimulate sustainable development of local fisheries. In 2014, Formosa Plastics Group was awarded the “Marine Oscar”, an award set by the Council of Agriculture, as the model for marine resources proliferation and fry release.

Collaborating with the Yunlin County Fishermen's Association and local schools, Formosa Plastics Group conducted fish fry release programs at Boziliao Fishing Port. Between 2023 and 2024, species such as Black Sea Bream, Pompano, and Fourfinger Threadfin were released. This long-term initiative has significantly increased local fish stocks and led to the reappearance of high-value species previously lost to overfishing, gaining strong support from the local fishing community.

Statistical diagram of the total amount of fry released during 2008~2024



Marine Ecology Photography project

Habitat/Ecosystem loss (water)

Located on the west coast of Yunlin County within the reclaimed Yunlin Offshore Industrial Park, Mailiao Harbor has conducted comprehensive underwater ecological surveys. To assess marine life both inside and outside the harbor, the Center for Coastal Water and Environment at National Kaohsiung University of Science and Technology was commissioned to perform ecological investigations and environmental underwater photography during two key periods: April 2016–September 2017 and April 2023–September 2024.

The underwater marine ecology in six main areas inside and outside Mailiao Harbor were photographed: (A)Harbor Patrol canal; (B)Bulk Cargo Terminal (East Berths 1-5); (c)Oil and Chemical Terminal (East Berths 6-10); (D)Northwest Pier Wharf; (E)South Breakwater; (F)West Breakwater. Also photographed were the marine environment monitoring operation process inside and outside the harbor, and harbor operations such as vessels entering and exiting the harbor, stevedoring operations at the wharves, and harbor health, safety, and environmental protection management operations. The green ecological environment in adjacent areas, such as the green and environmental construction of the Mailiao Industrial Zone, was also recorded.

Underwater surveys reveal a thriving ecosystem within Mailiao Harbor, identifying 397 species across 11 phyla. Recorded groups include Chordata, Arthropoda, Mollusca, Cnidaria, Echinodermata, Porifera (sponges), Annelida, Bryozoa, and Ctenophora, along with Rhodophyta (red algae) and Chlorophyta (green algae). Compared to the initial 2016 survey, the findings from April 2023 to September 2024 demonstrate a significant increase in biological diversity.

The six main underwater ecological areas of Mailiao Harbor

Phylum: *Chordata*
Scientific name:
Polycarpa aurata

Phylum: *Mollusca*
Scientific name:
Barbatia virescens

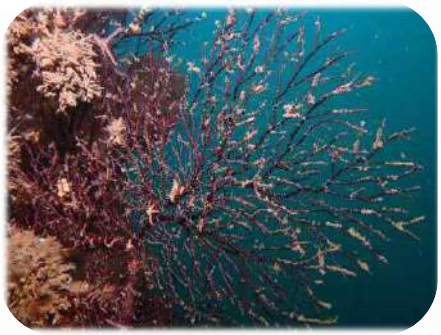
Phylum: *Annelida*
Scientific name:
Hydroides elegans

Phylum: *Echinodermata*
Scientific name:
Feather stars

Phylum: *Cnidaria*
Scientific name:
Paramuricea clavata

Phylum: *Arthropoda*
Scientific name:
Peppermint sp.

Phylum: *Cnidaria*
Scientific name:
Anthogorgia bocki
Aurivillius



Phylum: *Bryozoa*
Scientific name:
Biflustra perfragilis
MacGillivray

Phylum: *Mollusca*
Scientific name:
Cantharus
melanostomus

Environmental performance indices - Port authority

Issues		Index item	Calculation method	Index target	Index result	
					2023	2024
Climate change	1	Greenhouse Gas Management in Port Area	Annual Port Area Greenhouse Gas Inventory (Scope 1and 2)	≥1 time/year	1 time/year ■Greenhouse gas inventory: 6,510.7 tons CO2e	1 time/year ■Greenhouse gas inventory: 6,294.5 tons CO2e
			Continuously track the main sources of greenhouse gas emissions in the port area	≥1 time/month	1 time/month ■Primary Source Tracking; Mobile Combustion Emissions - Diesel	1 time/month ■Primary Source Tracking; Mobile Combustion Emissions - Diesel
Air quality	2	Ratio of harbor craft boats using low-emission fuel and the usage volume (super diesel; sulfur content <10 ppm):	•Number of harbor craft boats using low-emission fuel (super diesel) ÷ Total number of harbor craft boats × 100% •Volume of low-emission fuel used by harbor craft boats	100%	100% ■Harbor craft boats: 12; harbor craft boats using low-emission fuel: 12 ■Low-emission fuel used by harbor craft boats: 1,808.127 kL (The boats are replaced with new ones annually as needed.)	100% ■Harbor craft boats: 12; harbor craft boats using low-emission fuel: 12 ■Low-emission fuel used by harbor craft boats: 1,728.387 kL (The boats are replaced with new ones annually as needed.)
		Ratio of harbor craft boats using shore power	Number of harbor craft boats using shore power (vessel) ÷ Total number of harbor craft boats (vessel) × 100%	100%	100% ■Harbor craft boats: 12; boats using shore power: 12 (The boats are replaced with new ones annually as needed.)	100% ■Harbor craft boats: 12; boats using shore power: 12 (The boats are replaced with new ones annually as needed.)
		Emission standards for air pollution control equipment	Conduct flue detection for air pollutants (i.e., TSP, SO2, NOx, and VOCs) in waste gas at the rear of the incinerator.	TSP 100%	100%	100%
				SO_2 100%	100%	100%
				NOx 100%	100%	100%
				VOCs 100%	100%	100%
		Rate of appropriate volatile organic compound (VOC) leakage handling	Periodically use GasFind IR; once leakage is discovered, immediately repair or change the component.	100%	■Number of leaking components: 0 ■Number of appropriately handled components (including repaired or changed): 0	■Number of leaking components: 0 ■Number of appropriately handled components (including repaired or changed): 0

Environmental performance indices - Port authority

Issues		Index item	Calculation method	Index target		Index result	
						2023	2024
Energy Consumption	3	Rainwater harvesting	According to the rainwater harvesting project, the annual volume of rainwater harvested and usage rate at the harbor administration building and trough area are calculated. Water conservation measures: The harbor company installed three water harvesting troughs (20 tons ×3) for rainwater harvesting and reuse in the harbor operations administration area	Trough area	100%	100% ■rainwater harvesting volume: 256,676 tons	100% ■rainwater harvesting volume: 360,620 tons
				Harbor	100%	100% ■rainwater harvesting volume: 192 tons	100% ■rainwater harvesting volume: 411 tons (Abundant rainfall from typhoons increased rainwater harvesting, boosting water recycling and enabling more frequent landscaping irrigation.)
Water quality	4	Qualification rate of marine water quality	Ratio of the monitoring results from the marine water quality monitoring stations outside Mailiao Harbor conforming to the marine environment classification and ocean environment quality standard .	90% (Marine water quality qualification rate is not set to 100% because it is subject to the influence of natural factors such as upstream scour and rising and ebbing tides that are cannot be controlled by the harbor.)		99.96%	97.42%
		Harbor water quality qualification rate	Ratio of the monitoring results from the marine water quality monitoring stations inside Mailiao Harbor conforming to the marine environment classification and ocean environment quality standard.	100%		100%	99.65% (Heavy rainfall from Typhoon Krathon increased land-based nutrient runoff, which contributed to higher Total Phosphorus concentrations in Q4.)
Management of dredging	5	Qualification rate of water quality after beach nourishment	Test for water turbidity 1 hour after landfill and beach nourishment operations to determine whether the turbidity level falls below the level of Class A marine environment (i.e., 50 NTU), a level that does not affect the survival of oysters	100%		100%	100%
		Qualification rate of sediment quality (Ar, Cd, Cr, Cu, Hg, Ni, Pb, and Zn)	Sediment quality satisfying the upper limit of sediment quality indices in the “Regulations Governing the Classified Management of Sediment Quality and Usage Restrictions.”	100%		100%	100%

Environmental performance indices - Port authority

Issues		Index item	Calculation method	Index target		Index results 2023	Index results 2024
Harbor waste	6	Implementation rate of ship waste oil and sewage cleanup by qualified businesses	The number of ships commissioning qualified businesses to collect waste oil and sewage ÷ the number of ships whose waste oil and sewage are collected × 100%	100%		100% ■Number of ship cleaning operations conducted: 19	100% ■Number of ship cleaning operations conducted: 22
Vessel discharge (sewage)	7	Locking of vessel sewage valve	When conducting vessel safety and sanitation inspections, the port security section personnel check whether the external sewage valve has been closed and locked.	Sampling rate	15%	16.6%	15.2%
				locking of vessel sewage valve	100%	100%	100%
		Water quality test in trough area before and after sewage processing	Raw qualification rate of sewage collection = Raw number of qualification in sewage collection test/number of sampling tests Qualification rate of sewage discharge = Number of qualification in sewage discharge test/number of sampling tests	Raw qualification rate of sewage collection	100%	100% ■Number of sampling tests: 365	100% ■Number of sampling tests: 366
				Qualification rate of sewage discharge	100%	100% ■Number of sampling tests: 365	100% ■Number of sampling tests: 366
Hazardous goods (handling/ storage)	9	Total number of disasters		0 disaster		■Number of disasters: 0	■Number of disasters: 0
		Number of spill incidents		zero times		zero times	zero times
		Number of drills for emergency responses to spills		Within the harbor	≥2 times/year	2 times/year	2 times/year
				Outside the harbor	≥1 time/year	1 time/year	1 time/year
		Number of times the harbor area has been patrolled		≥5 times/day		5 times/day	5 times/day
		Frequency of joint supervision for harbor safety		≥5 times/year		5 times/year	5 times/year

Environmental performance indices - Port authority

Issues		Index item	Calculation method	Index target		Index results	
						2023	2024
Vessel refueling	10	Implementation rate of refueling operations	Ratio of refueling operations performed according to the “Regulations Governing Refueling Operations at Mailiao Harbor.	Onshore pipeline	100%	100% ■fuel refueling volume:51,029kL ■diesel refueling volume: 10,599kL	100% ■fuel refueling volume:53,459kL ■diesel refueling volume: 8,517kL
				Oil barge	100%	100% ■fuel refueling volume:81,838kL ■diesel refueling volume: 3,064kL	No Oil barge refueling operations
				Vehicle	100%	No vehicle refueling operations	No vehicle refueling operations
		Implementation rate of refueling operations using an oil boom	Before a refueling vessel is connected to the pipeline during onshore refueling operations, the ratio of harbor staff performing the loading and unloading of oil-based products in accordance with related regulations in the “Regulations Governing the Loading and Unloading of Dangerous Goods at Mailiao Industrial Harbor.”	100%		100%	100%
Habitat/ (marine) ecosystem	Others	White dolphin conservation measures (in accordance with the commitment made in the environmental impact assessment, under weather and sea conditions that are safe for navigation, vessels should reduce speed to below 6 knots; calculate the implementation rate of vessels complying with speed restriction guidelines)	Number of times sea conditions were confirmed ÷ number of flat tides × 100%	100%		100% ■Number of sea-state assessments:1,413	100% ■Number of sea-state assessments:1,415

Environmental performance indices - Primary stakeholder
(Formosa Petrochemical Corporation MAI-LIAO Terminal Department)

Issues		Index item	Calculation method	Index target	Index results	
					2023	2024
Energy Consumption	3	Exchange rate of lighting equipment	Total number of lamps changed ÷ Total number of lamps = Lamp exchange rate	100%	100% ■Replacement of 308 lamps	100% ■Replacement of 618 lamps
Harbor waste	6	General waste recycling rate	General waste recycling volume ÷ general waste volume removed × 100%	10%	58% ■General waste volume: 2,198.4 tons ■General waste removed: 3,792.6 tons	58% ■General waste volume: 1,165.6 tons ■General waste removed: 2,528.4 tons

Environmental performance indices - Secondary stakeholder
(Government units: customs units, immigration units, quarantine units, security units; Other units: harbor tenants)

Issues		Index item	Calculation method	Index target		Index results	
						2023	2024
Air quality	2	Qualification rate of air quality (393 items, including acetaldehyde, acetic acid, acetonitrile, and acetone in the air)	Two monitoring vehicles are used to strictly control the values of various common air pollution indices. They periodically move to appropriate areas for sampling, and the sampled data are checked according to the following regulations governing harbor air pollutant concentrations. ■ The appendix table of the standards for the emissions at peripheral boundaries, which is attached to the fixed pollution source air pollutants emission standards. ■ Permissible concentration of hazardous substances in the air in a working environment with workers. ■ “Odor threshold of odorous substances at offshore industrial zone,” (CTCI, 1990). ■ Maximum incremental reactivity scale.	Monitoring frequency	≥1 time/year	1 time/year	1 time/year
				Qualification rate	100%	100%	100%

Environmental performance indices - Secondary stakeholder

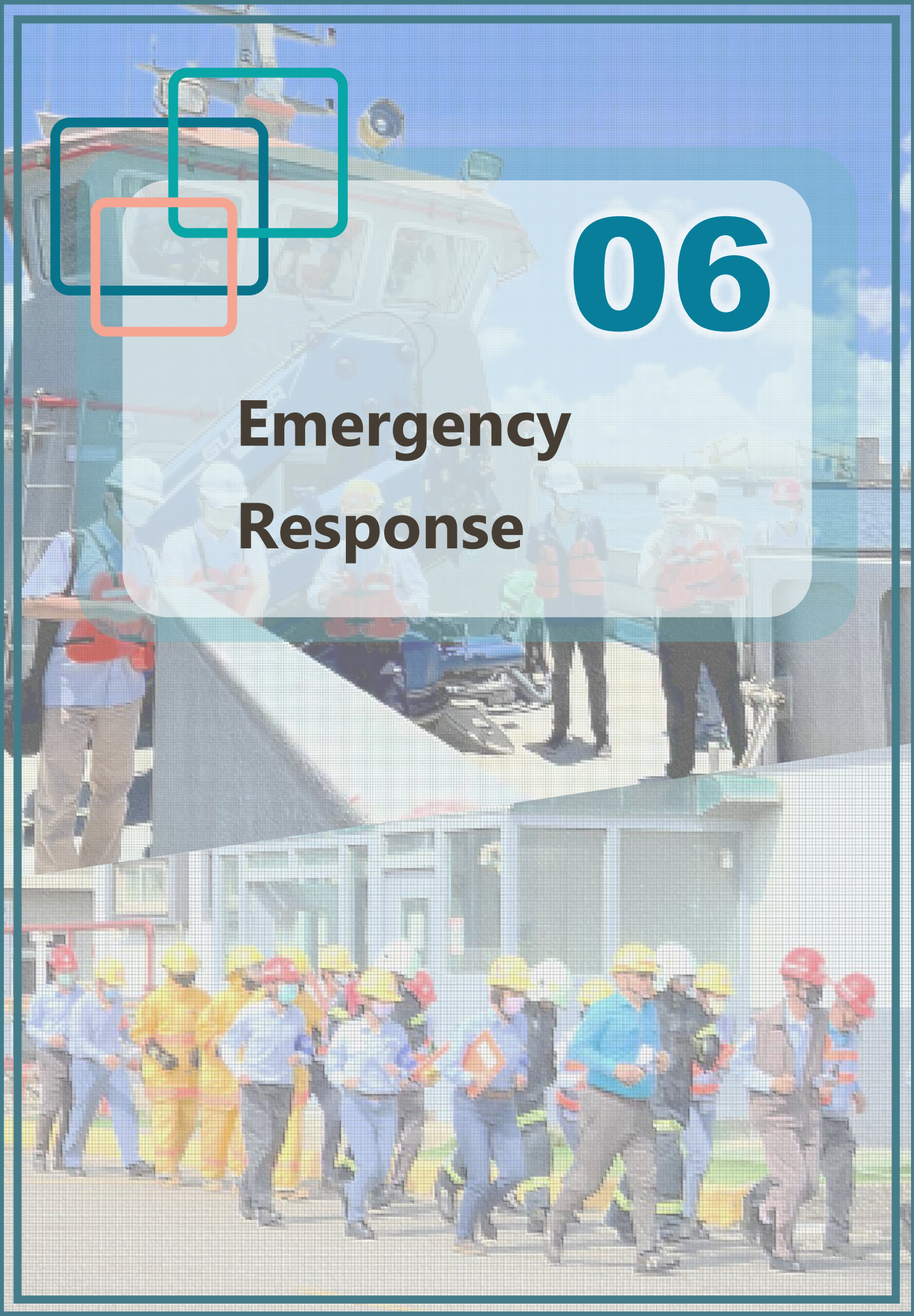
(Government units: customs units, immigration units, quarantine units, security units; Other units: harbor tenants)

Issues		Index item	Calculation method	Index target	Index results	
					2023	2024
Air quality	2	Proportion of inbound ships using low-sulfur fuel (sulfur concentration: ≤0.5%) (Mailiao Harbor is an air quality maintenance zone, and its competent authority autonomously established a green transportation project)	The number of inbound ships using low-sulfur fuel ÷ the total number of inbound ships × 100%	100%	100% ■inbound ships using low-sulfur fuel: 1,916	100% ■inbound ships using low-sulfur fuel: 1,852
		Proportion of large diesel-powered vehicles conforming to emission standards in Q1–Q3 (Mailiao Harbor is an air quality maintenance area, and its competent authority autonomously established a green transportation project)	The number of inbound diesel-powered vehicles conforming to emission standards ÷ the total number of inbound diesel-powered vehicles × 100%	100%	100%	100%

Environmental performance indices - Other stakeholders

(Neighbors and fishers)

Issues		Index item	Calculation method	Index target		Index results	
						2023	2024
community relations	8	Number of activities	Calculate the number of community feedback activities, or participation in seminars and promotional activities	National Oceans day	≥ 1 event/year	1 event/year ■ Booth Engagement: 102	1 event/year ■ Booth Engagement: 187
				Visiting	≥ 1 session/year	144 sessions/year ■Total visitors: 4,563	153 sessions/year ■Total visitors: 4,234
		Number of activities	Calculate the number of community feedback activities, or participation in seminars and promotional activities	Others	≥ 1 time/year	2 times/year ■Beach Cleanups: 1 ■River Cleanups: 1 (1,355 kg of waste removed)	2 times/year ■Conferences: 1 ■Beach Cleanups: 1 (340 kg of waste removed)
					Regular beach cleanups	2-3 times/week ■ 3-5 personnel per team (110,000 kg of waste removed)	2-3 times/week ■ 3-5 personnel per team (78,510 kg of waste removed
		Response rate to official website opinion letters	Number of reply letters ÷ number of submission letters × 100%	100%		100%	100%
Habitat/ (marine) ecosystem	Other	Regeneration of fishery resources (release of fry into adjacent sea areas)	Times of fry releasing	Release of fry : ≥ 1 time/year		1 time/year ■529,000 fry in total	1 time/year ■441,000 fry in total



06

Emergency Response

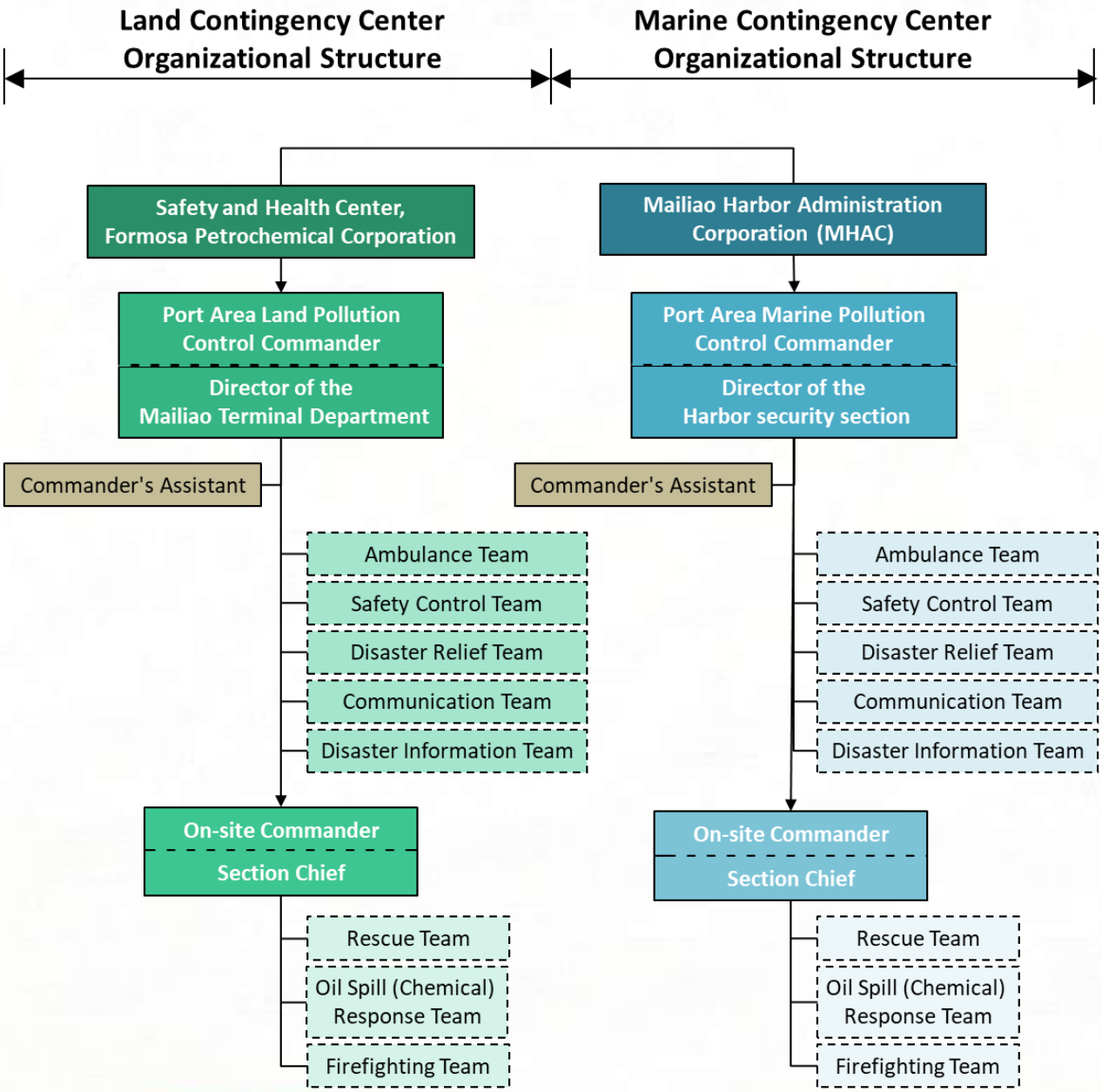
Harbor emergency response

Hazardous cargo (handling/storage) | Cargo Spillage (handling) | Water quality

To prevent and mitigate accidents, as well as reduce the harm caused by them, Mailiao Port conducts regular emergency response drills for various potential accidents and strengthens emergency response measures for marine pollution. A comprehensive emergency response organizational structure has been established, adopting a three-stage response approach to ensure timely and appropriate handling of emergencies.

Mailiao Harbor has established a comprehensive alarm and early warning system in the terminal area. This includes five key protective measures: gas detection, tank leak detection, CCTV surveillance, mechanical failure alarms, and a two-stage tank high-level alarm system, ensuring real-time monitoring of all operational conditions.

MHAC emergency response organization structure



Regular emergency response drills

To familiarize all staff members with emergency response operations during an accident, the harbor regularly implements simulation drills (every 6 months) according to the “Emergency Response Plan”.

The emergency response drill plan includes the drill process and drill manual; explanations for the complete emergency response organization structure, operations flowchart, and notification process; and recovery operations and accident investigations after an accident. During the drill, all participating personnel must wear protective gear; thus, they learn how to use the various types of protective gear, and determine any problems for review. The drills are practiced in the hope of controlling a disaster in the shortest time possible after its occurrence, to prevent the disaster from spreading, and to minimize damage and threats. The drills are also hoped to instill disaster awareness in all staff, achieve process safety management, ensure process safety, and prevent disasters. Moreover, the identified areas of problem will be continually reviewed and improved to prevent similar abnormal events from reoccurring.

Notify the 119 Fire Department

Assemble all response personnel

Activate the Emergency Command Center

Fire Brigade for firefighting operations

Emergency response for marine pollution

Cargo Spillage (handling)

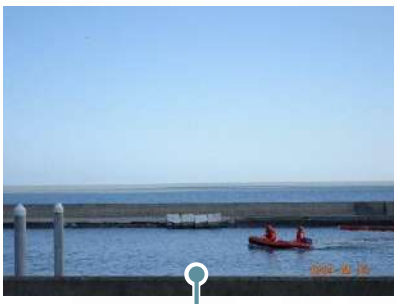
Water quality

To mitigate the impact of marine oil pollution on the ecosystem and public safety at Mailiao Harbor, immediate notification and response measures must be initiated upon any incident. By integrating resources from government and private sectors, the harbor ensures the rapid deployment of equipment and expertise for a coordinated and effective recovery operation.

To strengthen the accident response proficiency of harbor staff, Mailiao Harbor coordinates annually with various authorities to conduct diverse drills, including marine oil pollution and chemical disaster prevention. These exercises are designed to familiarize personnel with the emergency notification system and ensure its continuous improvement. Furthermore, the harbor integrates resources and response operations from government bodies and private enterprises to establish a robust joint defense system. These measures collectively enhance the harbor's emergency handling capabilities, effectively preventing marine accidents and minimizing damage to ensure the overall safety and resilience of the harbor area.

These response operations have significantly improved staff proficiency in notification processes and clarified responsibilities for rapid emergency response. They have established stronger communication and mutual support channels between authorities and private businesses, ensuring that labor and equipment are effectively integrated to enhance overall disaster resilience and minimize impacts on human health, ecology, and property. Furthermore, these initiatives have raised crisis awareness among personnel and the public through specialized workshops, training, and drills, ultimately resulting in a well-coordinated emergency response system with standardized procedures.

Vessel rescue mission



Oil recovery and pumping

Sampling and analysis

Oil Boom Deployment

Shoreline Waste Temporary Storage

Mailiao Ocean

Furthermore, to enhance the emergency response capacity of the harbor, Mailiao Harbor purchased Taiwan's first offshore pollution cleanup vessel, named "Mailiao Ocean" It was manufactured by Ecoceane (France), and delivered to Taiwan in November 2015. The entire vessel is made of aluminum alloy, and it is lighter than a steel vessel. It features spark-free performance in collision accidents, providing superior safety. In the place of traditional oil skimmers, the vessel uses patented water tunnel system technology to suck oil floating on the ocean surface into the vessel, and then uses a physical method to separate the oil from water directly. The vessel can be moved to any other sea areas in Taiwan on the demand of the Ocean Affairs Council to assist in treating marine pollution in such areas.

As of 2024, Mailiao Harbor has a proven record of emergency assistance, including the 2021 CPC Dalin hose leak and the 2023 sinking of the Palau-flagged vessel ANGEL off Kaohsiung. The harbor remains on standby for rapid response to maritime incidents.

Drill of oil spill collection by the vacuum drainage system of Mailiao Ocean

Passage planning in the pilot cabin

Marine communication system

Control room in Mailiao Ocean (1)

Control room in Mailiao Ocean (2)

Oil collection operation

07

Examples of Environmental Practice

Underwater Ecological Surveys and Biodiversity Achievements

From April 2023 to September 2024, Mailiao Harbor commissioned the Coastal Water and Environment Center at National Kaohsiung University of Science and Technology to conduct the Phase II Marine Ecological Survey. This comprehensive assessment spanned six key zones: the Service Vessel Basin, East Piers 1-5, East Piers 6-10, Northwest Pier, West Breakwater, and South Breakwater.

The biological diversity within Mailiao Harbor is remarkably rich. Comparing the 2016 baseline with the current Phase II survey, identified species span across the animal kingdom (including Chordata, Arthropoda, Mollusca, Cnidaria, Echinodermata, Porifera, Annelida, Bryozoa, and Ctenophora) and the plant kingdom (Rhodophyta and Chlorophyta). This latest assessment identified 249 newly recorded species, primarily Mollusks (Gastropods and Sea Slugs). To date, the cumulative findings across both surveys total 397 species, encompassing 2 kingdoms, 11 phyla, 161 families, and 244 genera.

Species Statistics of Marine Ecological Surveys in Mailiao Harbor

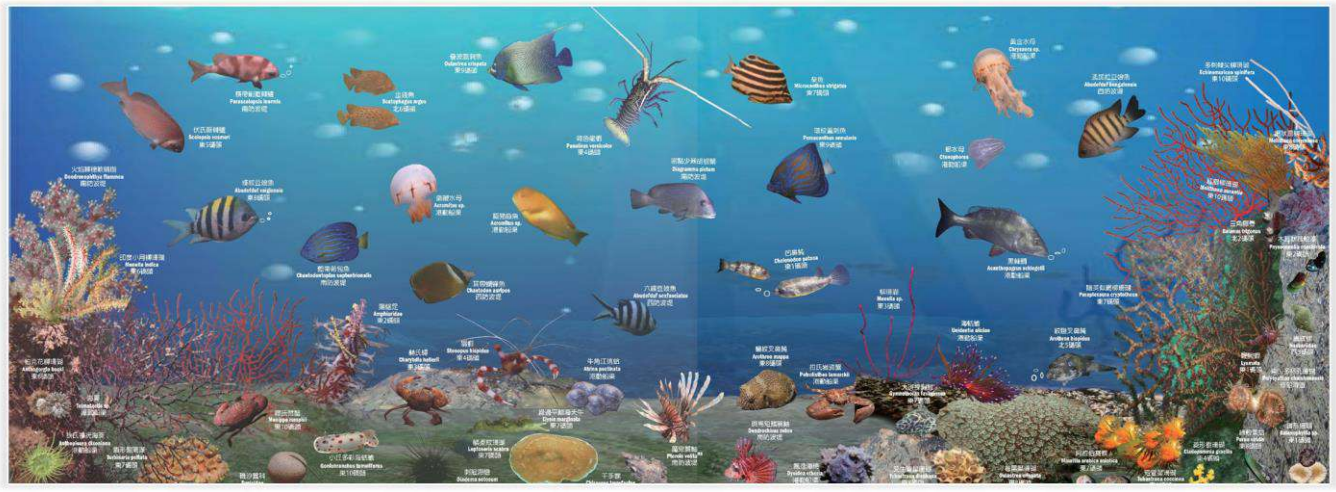
(Unit: species)

Item	Phase I	Phase II	Cumulative Total
Mollusca (Gastropods & Bivalves)	20	69	89
Chordata (Fishes)	92	63	155
Cnidaria (Corals)	12	40	52
Arthropoda (Crustaceans)	20	34	54
Echinodermata	3	12	15
Annelida	1	8	9
Porifera	Not Recorded	8	9
Bryozoa	Not Recorded	5	5
Ctenophora	Not Recorded	2	2
Plantae (Rhodophyta & Chlorophyta)	Not Recorded	8	8
Total	**148**	**249**	**397**

Thanks to the consistent water quality management at Mailiao Harbor, the Lionfish—an indigenous species to the Indo-Pacific waters and Taiwan's west coast—is widely distributed across the primary survey zones. Documented species include diverse members of the Scorpaenidae family, specifically the Red Lionfish (Pterois volitans), the Zebra Lionfish (Dendrochirus zebra), and the Broad-barred Firefish (Pterois antennata). Unlike in regions where they are invasive, these lionfish are a natural and integral part of the local ecosystem, and their thriving presence underscores the richness and stability of the harbor's marine environment.

The widespread distribution of these sensitive predators serves as a critical biological indicator, reflecting the long-term success of the harbor's pollution control and habitat preservation efforts. As a native species, the health of the Lionfish population provides a reliable gauge of the local ecological balance. By maintaining high standards of environmental stewardship, Mailiao Harbor has created a resilient sanctuary for native marine life, successfully harmonizing industrial operations with sustainable biodiversity conservation.

Mailiao Harbor Marine Ecological Guidebook



Installation of High-Voltage OPS Facilities for Commercial Vessels

To reduce air pollution, Mailiao Harbor installed a 6.6kV/1800kW High-Voltage Shore Power (HVSP) system at East Pier 3, specifically designed for 200,000 DWT bulk and coal carriers. Since its official launch in May 2023, the harbor has actively promoted this green infrastructure by offering specialized incentive programs to encourage calling commercial vessels to switch from auxiliary engines to shore power during their stay.

The system's efficiency was validated by the vessel FPMC B SHINE (owned by Formosa Plastics Marine Corporation), which achieved a 72% reduction in fuel costs during a pilot test in May 2023. From its launch through late 2024, the system accumulated 533 operational hours, saving approximately 92.34 kL of heavy fuel oil. This initiative has effectively improved local air quality while achieving a triple-win outcome for air pollution reduction, energy transition, and the advancement of green shipping.

System Optimization and Circuit Inspection

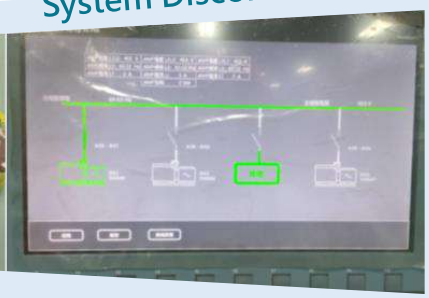
Power Connection (Shore Power Socket)

Inserting the safety locking pins

Ship-to-Shore Cable Coupling

Synchronizing and Paralleling

System Disconnection



08

Green Statistics

Environmental Investment and Costs

The costs of investment for Mailiao Harbor in environmental issues could be classified into employees, environmental maintenance and management, environmental monitoring, emergency response, and communication and publications. The goal was to enhance the environmental awareness of employees, maintain harbor area environment and enhance quality, increase emergency response ability, and enhance public understanding of the harbor. The various costs are explained as follows:

- **Employees:** The staff costs for hiring employees handling environmental affairs and the expenses of environmental education and training
- **Environmental maintenance and management:** Harbor area landscaping, waste removal, and harbor dredging
- **Environmental monitoring and planning:** Environmental monitoring such as air, noise, water quality, sediment, dredging, and environmental patrol; planning focused on the harbor's environmental protection objectives or measures
- **Emergency response:** Accident handling expenses, and verification expenses for materials and dangerous substances polluting the harbor area
- **Communications and publications:** Website maintenance, promotional activities, and environmental publications

The total costs of investment for Mailiao Harbor in 2023 and 2024 were NT$ 1,175,225,783 and NT$ 1,207,044,655 respectively, equaling approximately 31.76 million Euros and 32.62 million Euros. The following table presents the detailed cost breakdown.

The cost of investment of Mailiao Harbor toward environmental issues in 2023 and 2024

(Unit: NT$)

Expenses	2023	2024
Employees	401,308,641	396,594,673
Environmental maintenance and management	728,905,019	753,156,547
Environmental monitoring and planning	39,573,185	51,765,079
Emergency response	490,000	490,000
Communications and publications	4,948,938	5,038,356
Total	1,175,225,783	1,207,044,655

Environmental Assets

To develop the harbor into an environmentally friendly green port, Mailiao Harbor invested considerable fixed assets toward tackling environmental issues to promote harbor development and renewal. The total amount of fixed assets invested by Mailiao Harbor toward environmental issues in 2023 and 2024 was NT$ 29,945,325 and NT$ 10,689,802 respectively, equaling approximately 1,107.97 million Euros and 395.52 million Euros .

Assets invested by Mailiao Harbor toward environmental issues in 2023 and 2024

(Unit: NT$)

Year	Type of asset	Item	Amount	Total
2023	Machine and equipment	Dual-Circuit Power System Improvement	16,453,345	29,945,325
		WiMESH-enabled Surveillance System Deployment	10,750,000	
		Electric Forklift	1,860,000	
		Engine-Powered Hot Water High-Pressure Washer	248,000	
		22-inch LCD Monitor	1,980	
		Container House	632,000	
2024	Machine and equipment	Onshore Power Supply Facilities at East Pier 3	5,762,105	10,689,802
		Surveillance System Installation (West Embankment Control Gate & Marine Warehouse)	3,824,000	
		Anti-Drone Jammer	850,000	
		Split-Type Air Conditioner (220V)	146,297	
		Automatic Drum-Type Washing Machine	84,400	
		Program-Controlled UV Sterilizing Water Dispenser	23,000	

09

Innovation and Cooperation

Participating and Collaborating Organizations

Government authorities

Environmental Protection Bureau, Yunlin County

- Collaborated with Yunlin County's Environmental Protection Bureau to inspect Mailiao Harbor and its ships.
- Participated in the 2023 Emergency Drill for marine pollution held in Mailiao Harbor.
- Coordinated the 2024 Yunlin Joint Emergency Drill for marine pollution and rescue, in collaboration with Mailiao Harbor and Formosa Plastics Group.

Taiwan Centers for Disease Control

- Awarded the "2024 Anti-Epidemic Merit Group Award (Non-Governmental Section)" by the Ministry of Health and Welfare for excellence in border quarantine.
- In 2023 and 2024, hosted the "Infectious Disease Prevention and Harbor Pandemic Response Promotion Event" over 3 sessions, covering Japanese Encephalitis, Dengue Fever, and Severe Influenza.In 2023 and 2024, organized the "Workplace Health and Safety Promotion Training" with 3 sessions held.

Maritime and Port Bureau, Ministry of Transportation and Communications Central Taiwan Maritime Affairs Center

- Facilitated on-board PSC and FSC inspections at Mailiao Harbor in coordination with the MPB Central Taiwan Maritime Affairs Center.

Yunlin County Fire Department

- Participated in the 2021 Emergency Drill for marine pollution held in Mailiao Harbor.
- Participated in the 2024 Yunlin County Emergency Response Drill for pollution and rescue in marine ecologically sensitive areas.

Academic institutions

Coastal Water and Environment Center, National Kaohsiung University of Science and Technology

- The university was tasked with conducting the Wave Monitoring Plan in Mailiao Harbor. Analyzing the measured wave data, the university developed guidelines for ship docking during swells, with the goal of ensuring ship and harbor facility safety. It provided measured wave data to the MAI-LIAO Terminal Department as a reference for issuing warnings, halting loading/unloading operations, or disconnecting hoses when necessary. This proactive approach prevents loading arm breakage and spills due to wave-induced stresses.
- Conducted the 2nd Marine Ecological Survey of Mailiao Harbor, covering six major areas: the Service Vessel Basin, East Piers 1-5, East Piers 6-10, Northwest Pier, West Breakwater, and South Breakwater.

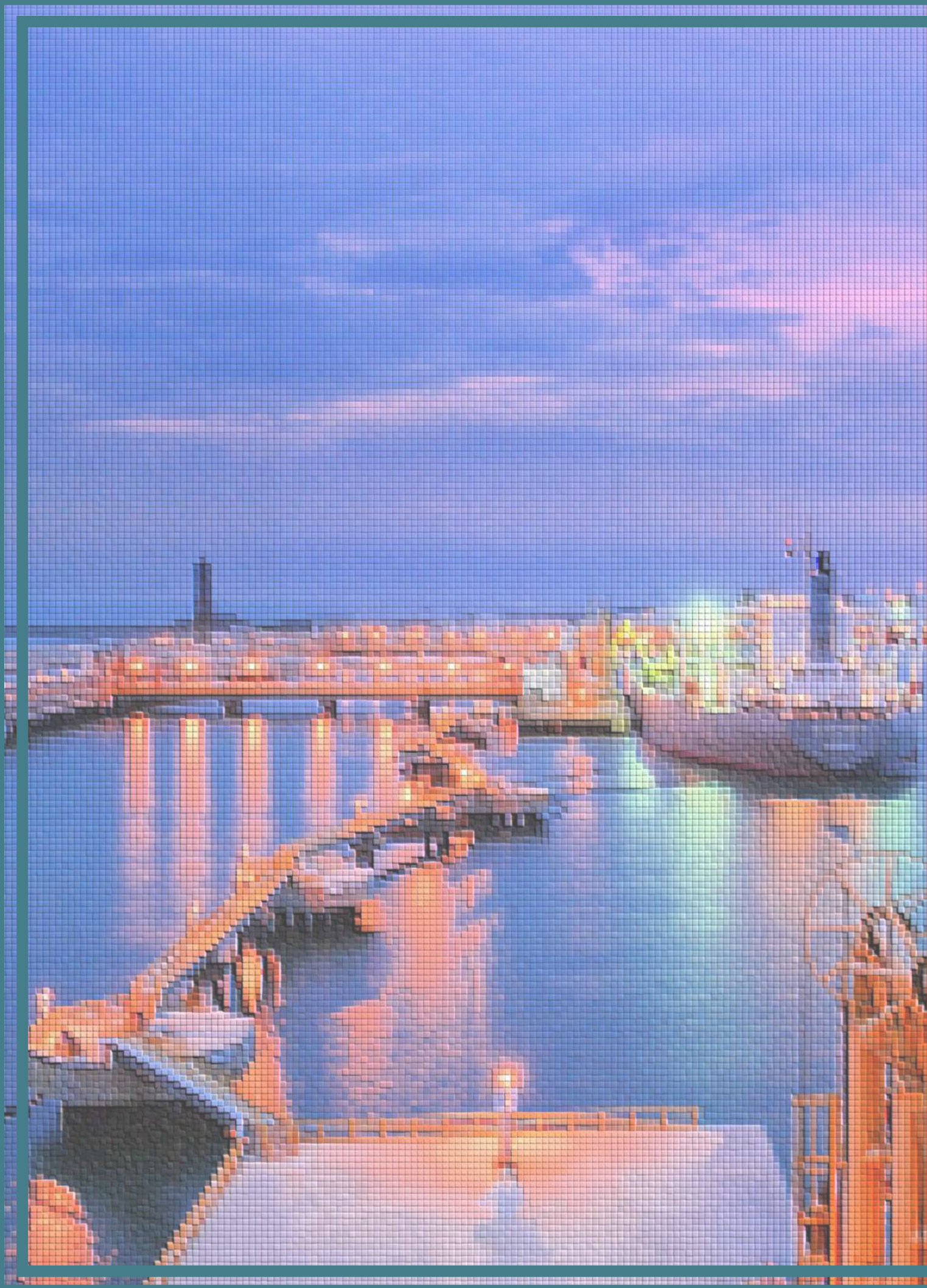
Taiwan Hydraulics Laboratory, National Cheng Kung University

- This specialized research institution was formed through collaboration between the Water Resources Agency, Ministry of Economic Affairs, and National Cheng Kung University. It has been commissioned by the Industrial Development Bureau, Ministry of Economic Affairs, for over 20 years to conduct the Environmental Monitoring Plan in Yunlin's coastal areas

Foundations and consulting companies

Sinothch Engineering Services, Ltd.

- Sinotech Engineering Services, Ltd. was commissioned by MHAC to conduct the Green Port/EcoPort Certification Plan for Mailiao Harbor, helping Mailiao Harbor Administration Corporation apply for certification as a green, ecofriendly port from the European Sea Ports Organization.



10

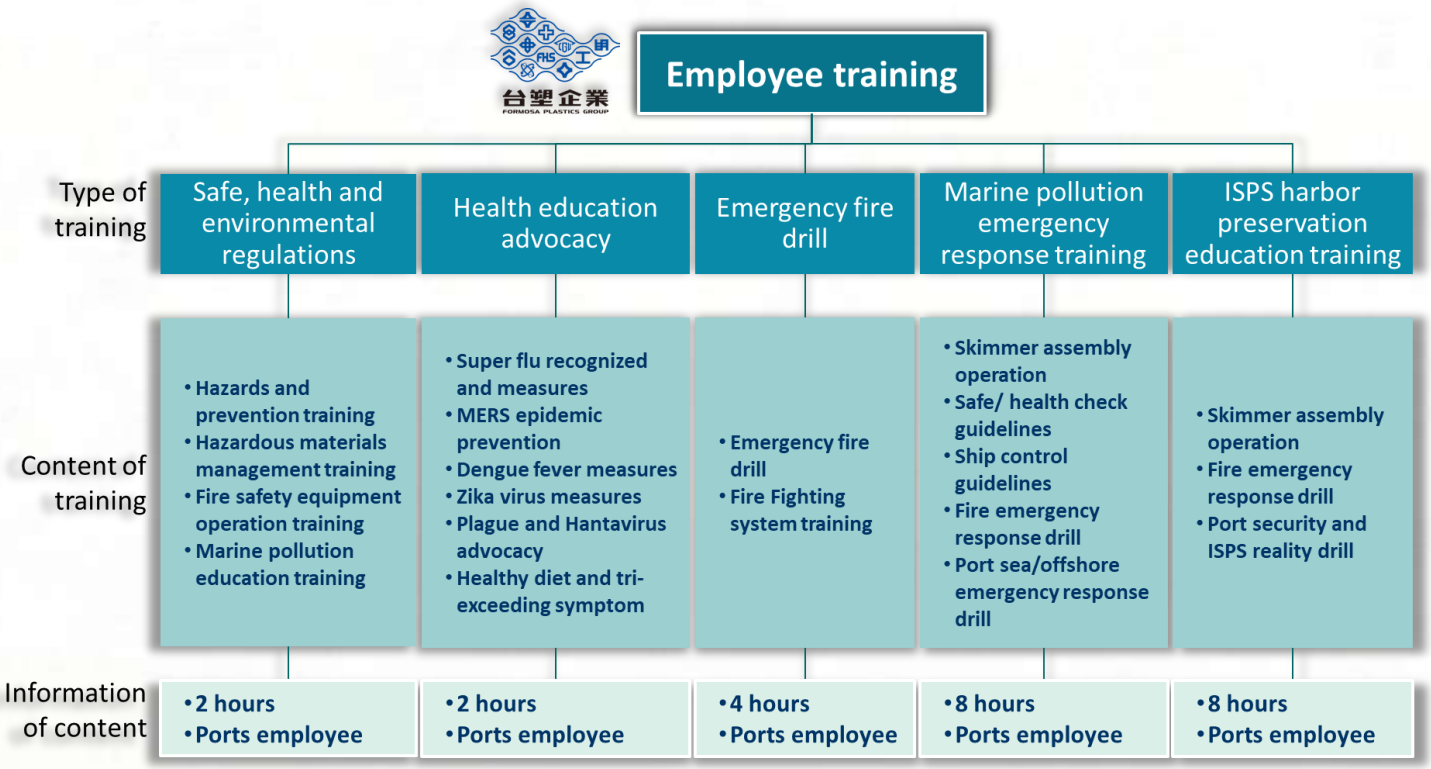
Training

Employee Training

Increasing environmental awareness in recent years has prompted Formosa Plastics Group, to recognize environmental protection as a public concern. Today, environmental education is an emerging public movement. However, the public generally considers factories or businesses to be the main sources of environmental pollution. Therefore, this company constantly improves and enhances its measures of pollution prevention, and believes that its duty is to educate the public. Thus, implementing comprehensive corporate environmental education provides the company and its workers with a joint target, namely to enhance the environmental literacy of its employees and the people's sense of identification with this place, thereby enabling everyone to learn more about this company.

Employee training and education in Mailiao harbor can be divided into five parts: "Safe, health and environmental regulations" "Health education advocacy" "Emergency fire drill" "Marine pollution emergency response training" "ISPS harbor preservation education training". The total training hours is 10,990 man-hour in 2023 and 13,536 man-hour in 2024.

Mailiao harbor employee training contents



Employee training situation from 2023 to 2024

(Unit: man-hour)

Curriculum Field	Mailiao Harbor		Terminal Department	
	2023	2024	2023	2024
Safe, health and environmental regulations	1,184	1,296	3,600	3600
Health education advocacy	164	72	3,360	3,864
Emergency fire drill	180	504	120	120
Marine pollution emergency response training	814	3,696	-	-
ISPS harbor preservation education training	1,568	384	-	-
Total	3,910	5,952	7,080	7,584

Furthermore, the “Mailiao Harbor Working Committee for the Promotion of a Green Ecological Port” was formed to advance a variety of green port work. This committee comprised major unit and assistant unit. Major unit include the Mailiao Harbor Administration Corporation; Mailiao Terminal Department, Formosa Petrochemical Corporation. Assistant unit include the Safety, Health and Environmental Center of the Group Administration of Formosa Plastics Group; the Safety and Health Management Office of Nan Ya Plastics Corporation; the Safety and Health Management Office of Formosa Petrochemical Corporation; the Safety and Health Management Office of Formosa Plastics Group; the Safety and Health Management Office of Formosa Chemicals & Fibre Corporation; and the Chang Chun Group. Mailiao harbor’s environmental policy and its concept to the internal members and the public was as follows.

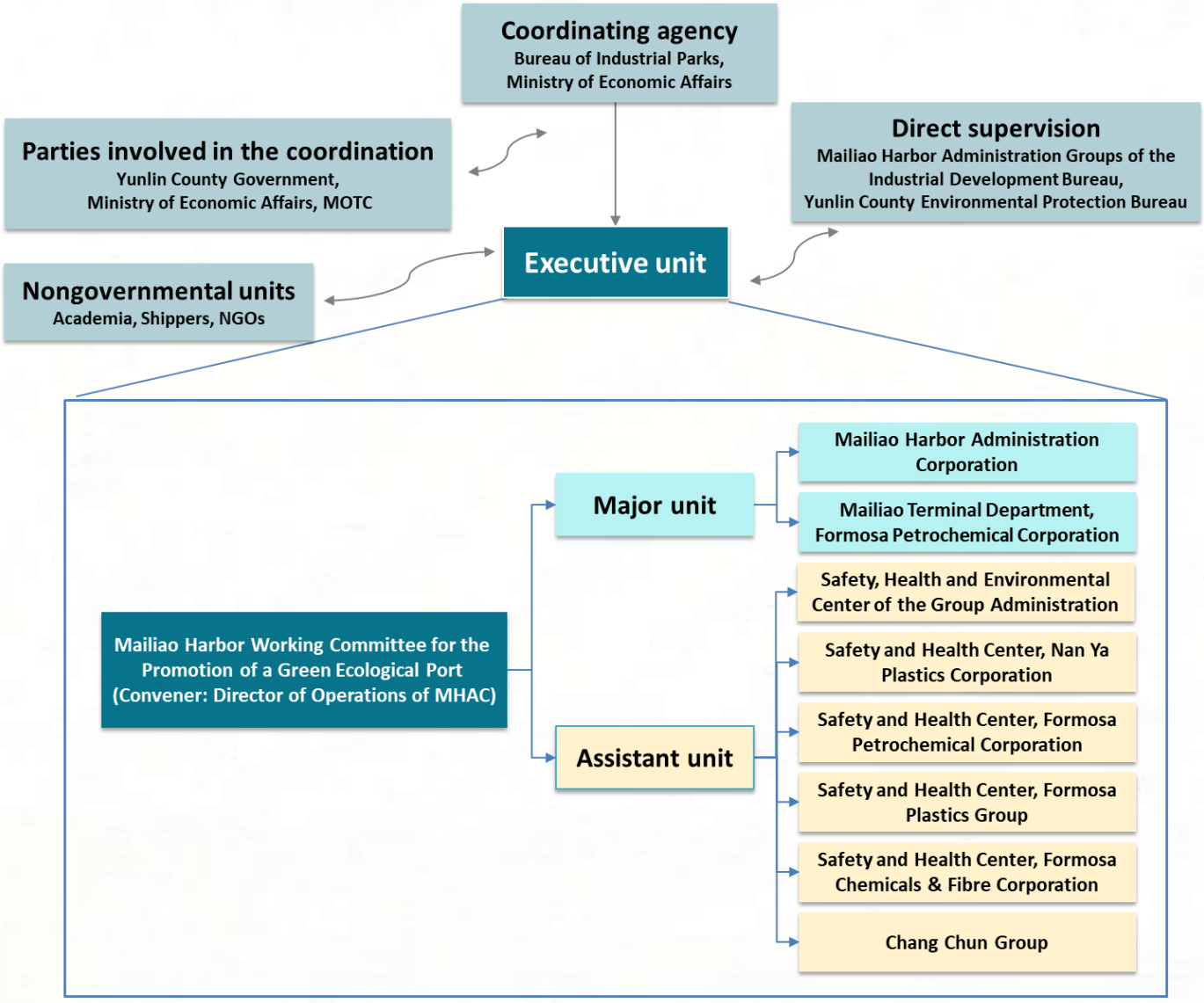
- Internal

  1) We have held the regular meeting of the industrial safety and the environmental protection every month. We continue to convey the environmental policy and the concept to the employee at the meeting.

  2) We invited the employee and their family to visit the harbor regularly that we can communicate the concept of the environmental policy.

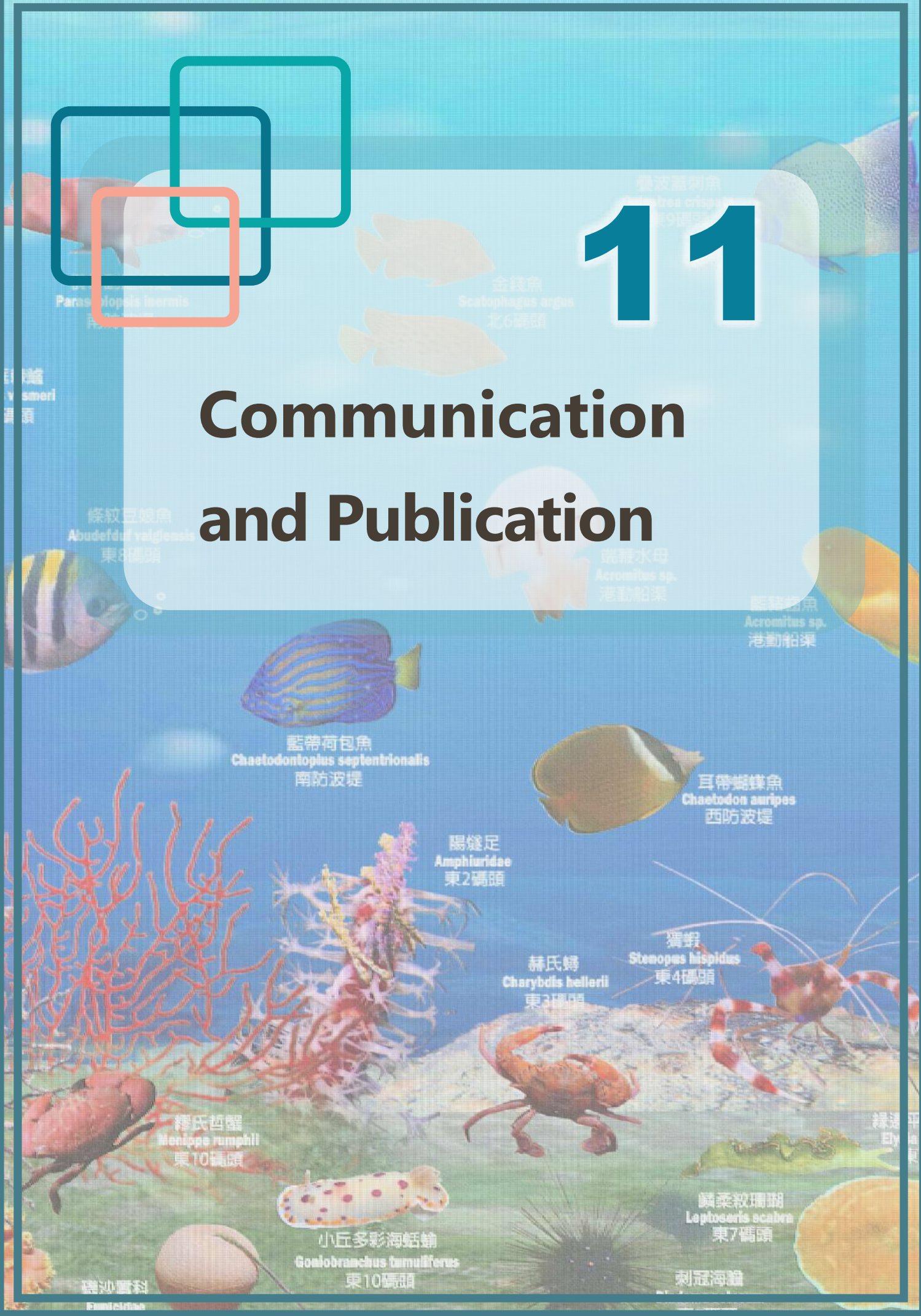
- External (the public)
  1) We have held the regular meeting with contractors every month.
  2) The exclusive page of the Eco-Parts, including the environmental policy and the environmental report, has shown on our official website.
  3) The experience of the Eco-Ports certification of our harbor was published on the 40th Ocean Engineering Conference of Taiwan.
  4) We have hosted the coordination meeting for Eco-ports every quarter at least.
  5) We continue to invite the government groups, the local communities, and the academic institutions to visit our harbor.

Organizational Responsibility for Environmental Issues



11

Communication and Publication



Environmental Promotion

Relationship with local community

National Oceans Day

In response to National Ocean Day, Mailiao Harbor promoted marine eco-education activities, enhancing public awareness of port sustainability and environmental protection through guided tours, visits, and interactive learning.

Between 2023 and 2024, Mailiao Harbor was invited to participate in National Oceans Day events, including the "2023 Love the Ocean: Ocean Waste as Art Exhibition" and the "2024 Ocean Waste Creativity: Making the Ocean More Beautiful" exhibition. Through booth presentations and guided tours, Mailiao Harbor promoted its green port initiatives and shared practical experiences, addressing environmental issues of public concern. These events showcased Mailiao Harbor's long-term dedication to ecological preservation while providing a platform to gather diverse feedback for future improvements. During this period, the harbor's exhibition booths attracted a total of approximately 289 visitors.

Ocean Engineering Conference in Taiwan

Mailiao Harbor showcased its green port success at the 46th Ocean Engineering Symposium in 2024. It actively contributed submissions to share its certification experiences, promote the sustainable management philosophy of Mailiao Harbor, and continuously review the port's current status and implementation of the ten major environmental issues through certification operations. This effort aims to convey Mailiao Harbor's long-standing commitment to port environmental management and ecological protection, as well as facilitate exchanges with experts and scholars in the field.

Community Activities

Relationship with local community

In order to maintaining a good environment, Formosa Plastics Group is committed to community engagement and contributes significantly to society, fulfilling its corporate responsibility of fostering neighborly relations.

Cultural Enrichment and Community Relations

Formosa Plastics Group actively supports cultural initiatives through the "Wang Jhan-yang Social Welfare Trust" and its "Development of Taiwan's Featured Culture Project." With a long-term commitment to local communities and corporate social responsibility, Formosa Plastics Group hosted eight performances by children's theater groups and the Ming Hwa Yuan Arts & Cultural Group across various townships in Yunlin from 2023 to 2024. These events drew approximately 9,900 participants. This multi-year initiative has consistently attracted large audiences and remains a highly supported cultural highlight for local residents.

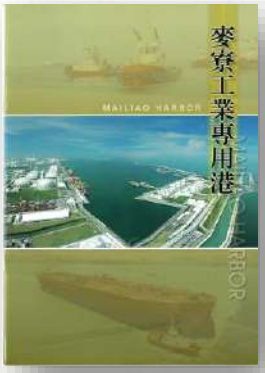
Supporting Local Agriculture

In support of Yunlin's agricultural sector, Formosa Plastics Group has consistently collaborated with local growers to purchase 30 tons of Douliu pomelos each year. By leveraging the nationwide presence of Formosa Oil gas stations, the group effectively promotes these "Yunlin Good Products" to a broader audience during the Mid-Autumn Festival. This effort highlights the enterprise's spirit of giving back to the community and its dedication to the sustainable development of the local economy.

HPV Vaccination Program for Students

In partnership with the Yunlin County Government, Formosa Plastics Group has sponsored 9-valent HPV vaccinations for 8th-grade students since 2017. By covering healthcare costs exceeding NT$10,000 per person, the program effectively prevents multiple cancers. To date, 27,846 students have benefited from this initiative, highlighting the Group's proactive role in local public health enhancement.

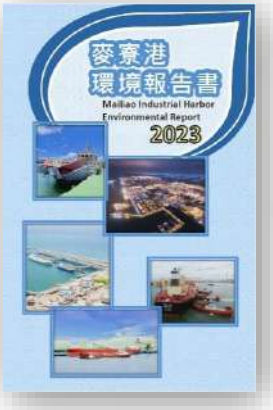
Publications



Mailiao Harbor introduction

The Mailiao Harbor introduction introduces the background information of the harbor, including the harbor's location, an aerial view of the harbor, the harbor's history, operations characteristics, administration organization structure, and berths on operation.

Key statistics of Mailiao Harbor



The key statistics of Mailiao Harbor includes the information of the number of vessels and the amount of cargo entering and exiting the port every year, and facts about stevedoring, financial affairs, organizational staff, and port facilities.

Environmental report

The report described Mailiao Harbor's ecological efforts from 2021 to 2022 and the Mailiao Harbor Administration Corporation's environmental policy, objectives, pledges, and action plans for green port development.

Formosa Plastics Group Magazine

Bringing together the latest developments of Formosa Plastics Group, showcasing its ongoing efforts in environmental improvement, corporate sustainability, community contributions, and port sustainability. It also promotes related arts and culture columns and other initiatives.

Environmental protection map

The map presents the Formosa Petrochemical Corporation persistence in care for the Earth, advertisement of ecological and conservation concepts, and dedication to comprehensive and advanced facilities for environmental protection.

Mailiao Harbor Marine Ecological Guidebook

The Mailiao Harbor Marine Ecology Photography Project conducted underwater ecological surveys and field filming in 2016 and 2023. The scope of the investigation covered six major areas: the Service Boat Basin, Wharves E1-E5, Wharves E6-E10, the Northwest Wharf, the West Breakwater, and the South Breakwater.

Websites

Mailiao Harbor website

The information found there includes the purpose of establishing the harbor, harbor operations, services, harbor status, and harbor news. The website is available to the public.

Mailiao Harbor website(CH)

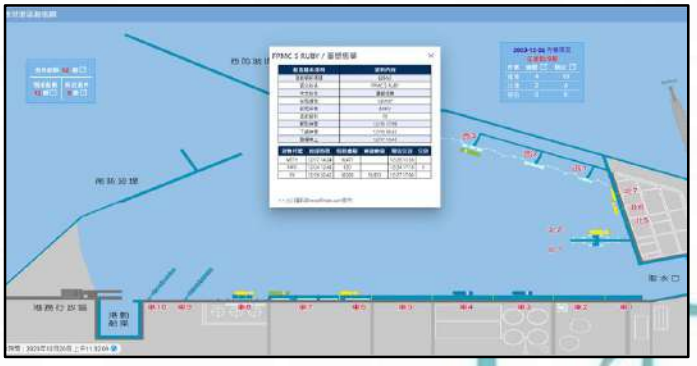
http://www.mlharbor.com.tw/j2mlh/zhtw/index.do

Mailiao Harbor website(EN)

http://www.mlharbor.com.tw/j2mlh/enus/index.do

Mailiao Harbor real-time movement of vessels

https://www.mlberth.com.tw/DSS/published-harbor/map



Facebook - Formosa Plastics Group!

(From: Facebook)

Formosa Plastics Group integrates various matters related to the Mailiao Industrial Park and provides real-time environmental information through Facebook social media. This information includes port disaster prevention drills, environmental education, harbor ecosystem updates, and air quality alerts, thereby expanding the network of communication with stakeholders connected to the port.

https://www.facebook.com/share/1AzZyXPATU/?mibextid=LQQJ4d

The beauty of Mailiao Eco-industrial Park, FPG

Formosa Plastics Group transforms desolation into prosperity, embracing the spirit of responsibility by prioritizing environmental protection, offering healthcare to locals, engaging with the community, and supporting the fishing industry. Join us in celebrating the beauty of Mailiao Eco-industrial Park!

六輕之美
The Beauty of Mailiao Eco-industrial Park, FPG.

http://mailiao.fpg.com.tw/j2pk/sea.do

12

Future Prospects

Mailiao Harbor is the first industrial harbor in Taiwan funded and managed by enterprises. It officially began operations in 2001, and since then, has become the largest industrial harbor in the country.

Even though Mailiao Harbor already used low impact sand extraction and landfilling measures during the harbor construction stage to minimize potential impacts on marine and coastal ecology, pollution discharge during operations such as vessels entering and exiting the harbor, mooring, stevedoring warehousing, and refueling, remain unavoidable. Other operations that could generate pollution include moving heavy machinery on harbor land at the terminal and warehousing areas, which may deteriorate the environmental quality of the harbor.

To reverse environmental deterioration and maintain the international trend of green, ecofriendly ports, the Mailiao Harbor Administration Corporation has actively implemented measures for green port implementation, namely reducing pollution in the harbor, maintaining the ecosystem, improving the operational effectiveness of the harbor, and increasing benefits to local communities. Certified as a green, ecofriendly port for the first time in September 2018, it will continue its efforts to implement environmental policy for harbors and to promote green, ecofriendly certification with the aim of green, ecofriendly, and sustainable port development.

Appendix 1 - monitoring results of marine water quality near Mailiao

2023 Q1 monitoring results of marine water quality near Mailiao (1/3)

Station	Units	A type marine water quality standard (2018.02.13~)	1A	1A	1A	2A	2A	2A	3A	3A	3A	4A	4A	4A
Depth	meter		1.0	6.5	12.0	1.0	10.0	19.5	1.0	11.5	22.0	1.0	11.0	21.0
Tepm.	℃	—	18.5	18.5	18.6	18.5	18.5	18.5	18.7	18.7	18.7	19.7	19.8	19.8
Salinity	PSU	—	31.2	33.0	33.3	32.6	33.2	33.4	33.7	33.7	33.7	34.1	34.1	34.1
pH	-	7.5~8.5	8.0	8.0	8.0	8.0	8.0	8.0	8.1	8.1	8.1	8.1	8.1	8.1
D.O.	mg/L	≥5.0	6.8	6.6	6.4	6.6	6.4	6.3	6.7	6.3	6.3	6.6	6.4	6.3
B.O.D.	mg/L	≤ 2	0.6	0.7	0.8	1.1	1.2	0.8	1.4	0.9	0.8	1.1	1.0	0.7
E. coli	CFU/100ml	≤ 1000	ND	ND	25	75	ND	ND	ND	ND	ND	ND	ND	ND
S.S.	mg/L	—	17.8	20.8	23.1	21.5	20.6	26.8	15.3	18.0	14.5	10.4	23.4	14.3
Cyanide	μg/L	10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total phenols	μg/L	5	ND	ND	ND	ND	ND	1.58	ND	ND	ND	ND	ND	ND
Mineral oil	mg/L	2	0.7	ND	0.6	ND	0.7	ND	0.5	1.0	ND	ND	ND	0.5
Chlorophyll a	μg/L	—	2.1	1.3	1.3	1.5	1.0	0.9	0.7	0.7	0.6	0.7	0.9	0.7
Total phosphorus	mg/L	0.05	0.034	0.022	0.020	0.020	0.023	0.025	0.017	0.013	0.019	0.018	0.016	0.018
NH3-N	mg/L	0.3	0.14	0.06	0.06	0.17	0.07	0.07	0.07	0.19	0.04	0.04	0.02	0.10
Nitrite nitrogen	μg/L	—	27.94	22.92	23.42	28.11	21.58	21.58	17.06	15.56	18.57	6.19	5.52	4.68
Nitrate nitrogen	mg/L	—	0.13	0.12	0.10	0.12	0.14	0.12	0.10	0.08	0.08	0.03	0.04	0.04
Cd	μg/L	5	0.0107	0.0129	0.0141	0.0155	0.0141	0.0142	0.0295	0.0287	0.0150	0.0149	0.0124	0.0120
Cr	μg/L	—	0.03	0.04	0.03	0.04	0.04	0.04	0.07	0.05	0.03	0.03	0.03	0.03
Co	μg/L	—	0.678	0.873	0.650	1.425	0.952	0.402	1.288	1.311	0.373	0.461	0.377	0.521
Cu	μg/L	30	0.318	0.299	0.290	0.359	0.369	0.345	0.765	0.627	0.245	0.336	0.323	0.299
Ni	μg/L	100	0.063	0.061	0.101	0.067	0.102	0.089	0.122	0.112	0.090	0.114	0.094	0.107
Pb	μg/L	10	0.508	1.349	0.836	1.054	1.031	1.266	2.188	1.985	0.696	1.343	0.847	0.853
Zn	μg/L	500	5.38	2.15	2.08	2.23	5.94	4.79	3.56	4.30	2.38	2.19	1.79	4.59
Fe	μg/L	—	0.98	0.85	0.86	1.11	0.99	0.98	0.85	0.97	0.87	0.54	0.69	0.98
As	μg/L	50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hg	μg/L	1	16.4	21.4	18.5	10	14.2	12.2	7.66	9.96	8.7	7.78	8.04	8.38
Turbidty	NTU	—	1.0	1.0	1.0	1.0	1.0	1.0	1.5	1.5	1.5	1.5	1.5	1.5
Transparency	m	—	0.7	0.4	0.4	0.5	0.5	0.3	0.3	0.3	0.4	0.2	0.2	0.2
Silicate	mg/L	—	2.40	2.30	2.50	2.40	2.50	3.00	2.40	1.90	2.20	1.70	2.10	1.80
Total oil	mg/L	—	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

*Noote：When the measured value is below the method detection limit (MDL), it is indicated as "ND ".

2023 Q1 monitoring results of marine water quality near Mailiao (2/3)

Station	Units	A type marine water quality standard (2018.02.13~)	5A	5A	5A	1B	1B	1B	2B	2B	2B	3B	3B	3B
Depth	meter		1.0	11.5	22.0	1.0	2.0	4.0	1.0	2.0	3.5	1.0	10.0	20.0
Tepm.	℃	—	20.2	20.2	20.3	18.6	18.6	18.6	18.8	18.8	18.8	18.6	18.5	18.5
Salinity	PSU	—	34.1	34.1	34.1	33.3	33.3	33.3	33.6	33.6	33.6	33.5	33.6	33.6
pH	-	7.5~8.5	8.1	8.1	8.1	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
D.O.	mg/L	≥5.0	6.2	6.4	6.3	7.0	6.7	6.7	7.0	7.0	7.0	6.6	6.6	6.6
B.O.D.	mg/L	≤ 2	0.9	0.6	0.6	0.8	1.2	0.9	1.3	0.4	0.7	1.1	1.0	1.1
E. coli	CFU/100ml	≤ 1000	ND	ND	ND	20	ND	10	ND	ND	10	ND	ND	10
S.S.	mg/L	—	21.2	18.8	16.4	40.2	74.3	78.8	57.0	62.0	64.1	22.0	29.5	24.8
Cyanide	μg/L	10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total phenols	μg/L	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.18	ND	ND
Mineral oil	mg/L	2	0.5	0.5	ND	ND	0.6	ND	ND	0.7	ND	1.0	0.9	1.1
Chlorophyll a	μg/L	—	0.1	0.4	0.6	1.6	1.8	1.6	1.6	1.5	1.3	1.2	0.9	0.9
Total phosphorus	mg/L	0.05	0.013	0.008	0.006	0.024	0.027	0.029	0.033	0.032	0.031	0.021	0.024	0.021
NH3-N	mg/L	0.3	0.08	0.10	0.12	0.05	0.03	0.17	0.06	0.07	0.04	0.07	0.07	0.07
Nitrite nitrogen	μg/L	—	8.03	4.18	5.69	28.44	27.44	26.60	22.92	22.25	21.92	28.78	21.58	21.25
Nitrate nitrogen	mg/L	—	0.03	0.03	0.02	0.11	0.10	0.11	0.12	0.12	0.09	0.11	0.10	0.10
Cd	μg/L	5	0.0155	0.0144	0.0121	0.0136	0.0123	0.0142	0.0123	0.0120	0.0166	0.0110	0.0126	0.0136
Cr	μg/L	—	0.03	0.04	0.02	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Co	μg/L	—	0.571	0.755	0.253	0.509	0.627	0.464	0.621	0.435	0.325	0.447	0.703	0.476
Cu	μg/L	30	0.390	0.343	0.245	0.485	0.506	0.341	0.357	0.330	0.324	0.201	0.300	0.353
Ni	μg/L	100	0.106	0.120	0.078	0.064	0.054	0.029	0.050	0.032	0.080	0.031	0.059	0.120
Pb	μg/L	10	1.380	1.295	0.700	1.048	1.080	0.980	1.062	1.036	0.819	0.749	0.969	1.023
Zn	μg/L	500	5.83	2.09	1.84	3.94	4.12	2.38	2.30	3.59	2.81	1.11	2.14	4.44
Fe	μg/L	—	0.83	0.70	0.86	0.88	0.98	0.78	1.00	0.99	0.80	0.76	0.72	0.74
As	μg/L	50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hg	μg/L	1	5.47	6.65	5.69	59.7	96.1	90.7	42.6	66	50.4	14.9	22.9	22
Turbidty	NTU	—	2.0	2.0	2.0	0.5	0.5	0.5	0.4	0.4	0.4	1.0	1.0	1.0
Transparency	m	—	0.3	0.3	0.2	0.4	0.5	0.4	0.3	0.3	0.4	0.4	0.3	0.4
Silicate	mg/L	—	1.80	1.60	1.50	2.20	2.20	2.40	2.10	2.20	2.00	2.20	2.60	2.40
Total oil	mg/L	—	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

*Noote：When the measured value is below the method detection limit (MDL), it is indicated as "ND ".

2023 Q1 monitoring results of marine water quality near Mailiao (3/3)

Station	Units	A type marine water quality standard (2018.02.13~)	4B	4B	4B	5B	5B	5B	2C	3C	4M
Depth	meter		1.0	10.5	20.0	1.0	10.0	19.0	1.0	1.0	1.0
Tepm.	℃	—	19.6	19.4	19.2	19.8	19.7	19.7	18.8	19.2	18.9
Salinity	PSU	—	33.9	34.0	33.9	34.0	34.0	33.9	33.3	33.6	33.1
pH	-	7.5~8.5	8.1	8.1	8.1	8.1	8.1	8.1	8.0	8.0	8.0
D.O.	mg/L	≥5.0	6.4	6.8	6.5	7.0	6.4	6.7	7.3	6.8	6.8
B.O.D.	mg/L	≤ 2	1.4	1.0	0.8	1.4	1.2	0.7	1.1	0.5	1.7
E. coli	CFU/100ml	≤ 1000	ND	ND	ND	ND	ND	ND	15	ND	25
S.S.	mg/L	—	19.5	60.0	38.0	14.0	19.0	24.2	52.8	74.2	23.2
Cyanide	μg/L	10	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total phenols	μg/L	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Mineral oil	mg/L	2	0.9	1.1	0.6	0.8	1.1	1.1	0.5	0.8	0.9
Chlorophyll a	μg/L	—	0.9	1.6	0.6	1.8	1.0	1.0	2.8	1.8	1.8
Total phosphorus	mg/L	0.05	0.023	0.024	0.036	0.024	0.021	0.029	0.034	0.024	0.044
NH3-N	mg/L	0.3	0.08	0.14	0.14	0.14	0.15	0.08	0.14	0.10	0.22
Nitrite nitrogen	μg/L	—	12.88	17.90	14.05	14.39	13.89	10.71	23.59	18.90	23.42
Nitrate nitrogen	mg/L	—	0.06	0.07	0.06	0.07	0.05	0.05	0.13	0.07	0.12
Cd	μg/L	5	0.0166	0.0141	0.0197	0.0241	0.0153	0.0127	0.0134	0.0167	0.0175
Cr	μg/L	—	0.04	0.06	0.04	0.06	0.05	0.06	0.04	0.04	0.07
Co	μg/L	—	0.858	0.728	0.497	1.071	1.266	0.488	0.411	0.354	0.526
Cu	μg/L	30	0.421	0.374	0.372	0.752	0.497	0.335	0.295	0.374	0.538
Ni	μg/L	100	0.134	0.143	0.126	0.131	0.107	0.125	0.078	0.064	0.171
Pb	μg/L	10	1.617	2.084	2.502	2.229	1.590	2.348	1.368	1.398	1.678
Zn	μg/L	500	2.75	4.03	2.58	6.78	5.23	3.20	6.60	1.99	6.19
Fe	μg/L	—	0.96	0.82	0.69	0.69	0.98	1.04	1.28	1.01	0.80
As	μg/L	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hg	μg/L	1	12	82.6	32.4	9.39	8.75	11.9	79.3	87.8	19.3
Turbidty	NTU	—	1.0	1.0	1.0	1.2	1.2	1.2	0.5	0.3	0.5
Transparency	m	—	0.2	0.3	0.3	0.3	0.4	0.3	0.4	0.4	0.6
Silicate	mg/L	—	1.90	2.40	2.30	1.60	1.70	2.00	2.00	2.20	2.70
Total oil	mg/L	—	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

*Noote：When the measured value is below the method detection limit (MDL), it is indicated as "ND ".

2023 Q2 monitoring results of marine water quality near Mailiao (1/3)

Station	Units	A type marine water quality standard (2018.02.13~)	1A	1A	1A	2A	2A	2A	3A	3A	3A	4A	4A	4A
Depth	meter		1.0	7.5	14.0	1.0	10.0	19.0	1.0	12.0	23.0	1.0	10.0	20.0
Tepm.	℃	—	22.9	22.8	22.8	22.8	22.8	22.8	22.8	22.8	22.8	23.0	23.1	23.1
Salinity	PSU	—	34.0	34.0	34.1	34.2	34.2	34.2	34.4	34.3	34.3	34.4	34.4	34.4
pH	-	7.5~8.5	8.1	8.1	8.1	8.1	8.1	8.1	8.3	8.1	8.1	8.1	8.1	8.1
D.O.	mg/L	≥5.0	6.5	6.3	6.9	6.4	6.4	6.3	6.1	6.7	6.5	6.1	6.5	6.7
B.O.D.	mg/L	≤ 2	1.1	1.5	1.1	1.4	1.0	0.9	1.2	1.2	1.4	1.3	1.2	1.1
E. coli	CFU/100ml	≤ 1000	ND	ND	15	ND	ND	ND	ND	ND	ND	ND	ND	ND
S.S.	mg/L	—	18.8	17.0	16.9	11.7	14.4	11.7	12.9	7.7	12.6	11.0	9.2	9.7
Cyanide	μg/L	10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total phenols	μg/L	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Mineral oil	mg/L	2	0.5	0.5	ND	ND	ND	0.5	ND	ND	ND	ND	ND	ND
Chlorophyll a	μg/L	—	2.2	0.7	1.8	1.9	2.4	0.3	1.6	1.3	1.3	1.5	0.1	0.9
Total phosphorus	mg/L	0.05	0.036	0.029	0.029	0.033	0.032	0.043	0.019	0.019	0.016	0.020	0.021	0.021
NH3-N	mg/L	0.3	0.06	0.05	0.06	0.03	0.07	0.06	0.07	0.06	0.08	0.10	0.09	0.08
Nitrite nitrogen	μg/L	—	14.10	36.90	12.70	12.10	12.10	9.90	10.90	9.90	8.50	7.50	6.70	8.10
Nitrate nitrogen	mg/L	—	0.12	0.10	0.10	0.06	0.15	0.08	0.16	0.11	0.11	0.06	0.05	0.05
Cd	μg/L	5	0.0203	0.0207	0.0218	0.0098	0.0230	0.0130	0.0154	0.0225	0.0197	0.0132	0.0118	0.0148
Cr	μg/L	—	0.04	0.04	0.03	0.03	0.05	0.03	0.03	0.04	0.06	0.03	0.02	0.03
Co	μg/L	—	0.719	0.420	0.709	0.489	0.416	0.553	0.829	0.999	0.578	1.755	0.905	0.474
Cu	μg/L	30	0.193	0.230	0.189	0.167	0.278	0.169	0.217	0.330	0.464	0.228	0.173	0.190
Ni	μg/L	100	0.021	0.049	0.122	0.095	0.151	0.168	0.145	0.162	0.179	0.048	0.033	0.065
Pb	μg/L	10	0.873	1.110	0.821	0.724	1.065	1.428	1.140	1.885	1.950	0.872	0.723	0.744
Zn	μg/L	500	3.06	2.36	1.85	3.04	2.35	1.82	3.68	2.85	4.17	3.07	5.42	2.77
Fe	μg/L	—	0.89	1.15	0.76	1.12	1.17	1.10	1.00	1.38	0.98	1.17	0.87	1.55
As	μg/L	50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hg	μg/L	1	13.6	8.2	11.3	13.2	10.9	12.8	14.3	9.4	9.6	12.7	15.1	12.9
Turbidty	NTU	—	1.3	0.0	0.0	2.0	0.0	0.0	2.3	0.0	0.0	3.0	0.0	0.0
Transparency	m	—	0.2	0.1	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.3	0.2	0.2
Silicate	mg/L	—	2.63	2.88	2.43	2.35	2.77	2.22	2.16	2.48	2.60	2.84	2.45	2.52
Total oil	mg/L	—	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

*Noote：When the measured value is below the method detection limit (MDL), it is indicated as "ND ".

2023 Q2 monitoring results of marine water quality near Mailiao (2/3)

Station	Units	A type marine water quality standard (2018.02.13~)	5A	5A	5A	1B	1B	1B	2B	2B	2B	3B	3B	3B
Depth	meter		1.0	11.0	21.5	1.0	2.0	4.0	1.0	2.0	4.5	1.0	11.0	22.0
Tepm.	℃	—	23.2	23.2	23.2	23.1	23.1	23.3	23.0	23.0	23.1	22.8	22.8	22.8
Salinity	PSU	—	34.5	34.5	34.5	34.2	34.2	34.2	34.2	34.2	34.2	34.2	34.2	34.2
pH	-	7.5~8.5	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1
D.O.	mg/L	≥5.0	6.5	6.6	6.8	6.3	6.3	6.5	6.9	6.9	6.7	6.9	7.0	7.1
B.O.D.	mg/L	≤ 2	1.2	1.2	1.4	1.3	1.2	1.1	1.0	1.3	1.2	1.4	1.6	1.3
E. coli	CFU/100ml	≤ 1000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
S.S.	mg/L	—	10.4	18.1	18.1	24.3	29.2	32.3	31.7	33.0	30.2	10.2	14.2	10.8
Cyanide	μg/L	10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total phenols	μg/L	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Mineral oil	mg/L	2	ND	ND	ND	ND	0.6	ND	ND	ND	ND	0.6	0.9	ND
Chlorophyll a	μg/L	—	1.0	0.4	0.4	2.8	1.6	2.1	1.9	3.0	0.7	1.5	1.8	1.6
Total phosphorus	mg/L	0.05	0.030	0.031	0.018	0.039	0.030	0.026	0.026	0.020	0.016	0.037	0.030	0.035
NH3-N	mg/L	0.3	0.09	0.11	0.08	0.07	0.07	0.06	0.06	0.06	0.07	0.07	0.07	0.04
Nitrite nitrogen	μg/L	—	8.70	48.30	6.90	10.10	11.70	12.50	9.30	9.70	8.90	11.30	12.10	15.50
Nitrate nitrogen	mg/L	—	0.05	0.03	0.05	0.11	0.09	0.07	0.06	0.07	0.06	0.18	0.17	0.18
Cd	μg/L	5	0.0152	0.0215	0.0112	0.0225	0.0221	0.0173	0.0148	0.0123	0.0192	0.0200	0.0224	0.0125
Cr	μg/L	—	0.04	0.07	0.04	0.03	0.04	0.03	0.03	0.04	0.04	0.03	0.06	0.03
Co	μg/L	—	0.906	0.226	0.243	0.755	0.407	0.632	0.493	1.007	0.806	1.002	0.913	0.424
Cu	μg/L	30	0.307	0.340	0.188	0.151	0.282	0.175	0.175	0.297	0.221	0.206	0.482	0.204
Ni	μg/L	100	0.098	0.121	0.099	0.097	0.150	0.116	0.100	0.157	0.151	0.140	0.115	0.094
Pb	μg/L	10	1.103	1.755	0.976	0.749	1.423	1.128	1.309	1.187	1.537	1.337	1.804	0.986
Zn	μg/L	500	3.50	3.11	1.26	3.61	2.41	2.85	2.40	5.83	4.60	2.36	4.72	4.16
Fe	μg/L	—	1.17	1.10	1.05	0.70	0.63	0.82	0.83	1.23	1.21	1.19	1.29	0.92
As	μg/L	50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hg	μg/L	1	11.5	12.3	14	18.7	17.3	19.6	22.1	25.7	24.1	9.5	10.6	12.6
Turbidty	NTU	—	2.5	0.0	0.0	1.0	0.0	0.0	0.8	0.0	0.0	2.3	0.0	0.0
Transparency	m	—	0.3	0.2	0.2	0.2	0.2	0.3	0.2	0.1	0.1	0.2	0.1	0.1
Silicate	mg/L	—	2.72	2.63	2.10	2.60	2.85	2.30	2.60	2.15	2.45	1.87	2.60	2.13
Total oil	mg/L	—	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

*Noote：When the measured value is below the method detection limit (MDL), it is indicated as "ND ".

2023 Q2 monitoring results of marine water quality near Mailiao (3/3)

Station	Units	A type marine water quality standard (2018.02.13~)	4B	4B	4B	5B	5B	5B	2C	3C	4M
Depth	meter		1.0	10.0	20.0	1.0	10.5	20.0	1.0	1.0	1.0
Tepm.	℃	—	23.2	23.0	23.0	23.5	23.2	23.2	23.2	24.0	23.0
Salinity	PSU	—	34.3	34.3	34.3	34.5	34.4	34.4	34.2	34.1	34.2
pH	-	7.5~8.5	8.1	8.1	8.1	8.1	8.2	8.1	8.1	8.0	8.1
D.O.	mg/L	≥5.0	6.8	6.5	6.3	6.7	6.5	6.7	6.9	6.9	6.6
B.O.D.	mg/L	≤ 2	1.2	1.3	1.1	1.4	1.0	1.1	1.0	1.1	1.7
E. coli	CFU/100ml	≤ 1000	ND	ND	ND	ND	ND	ND	ND	ND	ND
S.S.	mg/L	—	11.1	8.0	9.0	9.5	8.4	7.0	24.8	24.1	10.1
Cyanide	μg/L	10	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total phenols	μg/L	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Mineral oil	mg/L	2	ND	ND	ND	ND	ND	0.5	ND	ND	ND
Chlorophyll a	μg/L	—	1.3	1.5	1.3	1.6	1.8	0.3	3.0	1.6	1.5
Total phosphorus	mg/L	0.05	0.014	0.013	0.019	0.010	0.030	0.032	0.046	0.040	0.052
NH3-N	mg/L	0.3	0.10	0.11	0.10	0.10	0.09	0.08	0.06	0.04	0.13
Nitrite nitrogen	μg/L	—	8.10	8.30	7.10	4.10	3.70	6.50	12.30	13.70	15.90
Nitrate nitrogen	mg/L	—	0.06	0.05	0.05	0.06	0.05	0.03	0.07	0.17	x
Cd	μg/L	5	0.0145	0.0174	0.0294	0.0127	0.0109	0.0284	0.0127	0.0090	0.0143
Cr	μg/L	—	0.03	0.06	0.05	0.04	0.03	0.04	0.05	0.06	0.04
Co	μg/L	—	1.121	1.018	1.414	0.433	0.927	1.179	0.288	1.075	0.457
Cu	μg/L	30	0.175	0.416	0.513	0.360	0.182	0.223	0.356	0.757	0.621
Ni	μg/L	100	0.069	0.099	0.156	0.059	0.069	0.067	0.015	0.090	0.076
Pb	μg/L	10	0.770	1.250	3.514	0.856	0.726	1.483	1.339	2.233	0.873
Zn	μg/L	500	5.09	3.40	5.56	5.39	2.18	3.20	2.93	7.52	3.76
Fe	μg/L	—	1.36	0.95	1.15	0.83	0.92	0.90	0.94	1.02	1.03
As	μg/L	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hg	μg/L	1	13.3	11.8	12.2	12.1	10.2	9.9	20.1	12.7	13.1
Turbidty	NTU	—	2.0	0.0	0.0	2.0	0.0	0.0	0.6	0.7	1.2
Transparency	m	—	0.3	0.2	0.3	0.2	0.2	0.3	0.1	0.2	0.4
Silicate	mg/L	—	2.60	2.67	2.38	2.90	1.10	1.83	2.50	2.13	2.30
Total oil	mg/L	—	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

*Noote：When the measured value is below the method detection limit (MDL), it is indicated as "ND ".

2023 Q3 monitoring results of marine water quality near Mailiao (1/3)

Station	Units	A type marine water quality standard (2018.02.13~)	1A	1A	1A	2A	2A	2A	3A	3A	3A	4A	4A	4A
Depth	meter		1.0	7.5	14.5	1.0	10.0	19.5	1.0	12.0	23.5	1.0	12.0	23.5
Tepm.	℃	—	30.6	30.5	30.5	30.5	30.3	30.3	30.3	30.2	30.2	30.4	30.3	30.3
Salinity	PSU	—	33.7	32.9	33.4	32.8	33.2	33.6	33.9	33.8	33.8	33.8	33.8	33.8
pH	-	7.5~8.5	8.2	8.2	8.2	8.1	8.1	8.2	8.1	8.2	8.2	8.1	8.2	8.1
D.O.	mg/L	≥5.0	6.6	6.5	6.5	6.2	6.2	6.4	6.6	6.1	6.6	6.3	6.2	6.2
B.O.D.	mg/L	≤ 2	1.2	1.2	0.9	1.1	1.1	0.9	1.1	1.1	1.0	1.1	0.8	1.0
E. coli	CFU/100ml	≤ 1000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
S.S.	mg/L	—	22.3	21.1	24.3	15.7	13.1	14.5	12.8	15.3	8.4	17.4	22.4	12.1
Cyanide	μg/L	10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total phenols	μg/L	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Mineral oil	mg/L	2	ND	ND	ND	ND	0.6	ND	ND	ND	ND	ND	ND	ND
Chlorophyll a	μg/L	—	3.4	1.8	0.9	1.6	1.3	2.4	0.7	0.4	2.2	1.3	0.6	0.3
Total phosphorus	mg/L	0.05	0.019	0.011	0.016	0.025	0.012	0.020	0.013	0.035	0.032	0.020	0.020	0.013
NH3-N	mg/L	0.3	0.12	0.18	0.15	0.08	0.14	0.11	0.13	0.15	0.09	0.05	0.04	0.05
Nitrite nitrogen	μg/L	—	35.50	21.42	21.86	25.82	20.98	16.58	11.30	18.78	13.50	12.62	10.86	10.86
Nitrate nitrogen	mg/L	—	0.19	0.13	0.15	0.17	0.15	0.11	0.13	0.12	0.08	0.11	0.08	0.13
Cd	μg/L	5	0.0574	0.0336	0.0402	0.0172	0.0512	0.0151	0.0158	0.0118	0.0579	0.0122	0.0204	0.0138
Cr	μg/L	—	0.05	0.04	0.06	0.04	0.03	0.03	0.04	0.02	0.04	0.03	0.03	0.03
Co	μg/L	—	0.865	0.793	1.586	0.789	0.929	0.923	0.817	0.458	0.950	1.020	1.169	0.917
Cu	μg/L	30	0.566	0.426	0.728	0.332	0.323	0.351	0.338	0.240	0.399	0.356	0.311	0.268
Ni	μg/L	100	0.055	0.061	0.070	0.060	0.060	0.057	0.065	0.061	0.059	0.090	0.074	0.085
Pb	μg/L	10	2.161	2.043	1.975	2.543	2.783	1.610	1.764	1.031	2.299	1.481	1.715	1.291
Zn	μg/L	500	1.81	2.13	3.39	3.21	2.26	3.24	3.48	2.86	4.83	1.66	2.26	2.69
Fe	μg/L	—	1.26	1.27	0.88	0.91	1.09	1.11	0.78	1.37	1.10	1.64	0.97	0.97
As	μg/L	50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hg	μg/L	1	21.7152	23.9424	14.8944	22.1676	15.6948	13.0152	7.482	7.7604	3.132	15.486	16.1124	10.8228
Turbidty	NTU	—	0.8	0.8	0.8	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Transparency	m	—	0.3	0.5	0.2	0.5	0.3	0.4	0.1	0.4	0.1	0.3	0.1	0.4
Silicate	mg/L	—	2.30	2.60	2.00	2.50	2.10	1.20	1.90	1.00	0.60	ND	0.90	ND
Total oil	mg/L	—	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

*Noote：When the measured value is below the method detection limit (MDL), it is indicated as "ND ".

2023 Q3 monitoring results of marine water quality near Mailiao (2/3)

Station	Units	A type marine water quality standard (2018.02.13~)	5A	5A	5A	1B	1B	1B	2B	2B	2B	3B	3B	3B
Depth	meter		1.0	11.0	21.5	1.0	4.5	2.5	1.0	2.0	3.5	1.0	11.0	21.5
Tepm.	℃	—	30.2	30.1	30.1	31.2	31.3	31.2	30.9	30.9	31.0	30.6	30.4	30.4
Salinity	PSU	—	33.8	33.8	33.8	33.7	33.7	33.7	33.7	33.7	33.7	33.8	33.8	33.8
pH	-	7.5~8.5	8.1	8.2	8.1	8.2	8.2	8.2	8.1	8.2	8.2	8.2	8.2	8.2
D.O.	mg/L	≥5.0	6.4	6.6	6.6	6.2	6.4	6.4	6.5	6.6	7.0	6.7	6.0	6.4
B.O.D.	mg/L	≤ 2	0.9	0.9	1.2	1.4	1.0	1.3	0.8	1.0	1.0	1.0	1.2	0.8
E. coli	CFU/100ml	≤ 1000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
S.S.	mg/L	—	17.9	17.2	8.6	35.2	36.7	37.1	27.9	31.0	34.8	11.8	11.3	17.2
Cyanide	μg/L	10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total phenols	μg/L	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Mineral oil	mg/L	2	ND	ND	ND	ND	1.2	ND	0.6	ND	ND	ND	ND	ND
Chlorophyll a	μg/L	—	0.3	0.3	0.3	3.7	2.2	2.1	2.5	3.1	2.4	0.9	1.9	1.3
Total phosphorus	mg/L	0.05	0.031	0.010	0.011	0.034	0.011	0.011	0.018	0.018	0.023	0.035	0.024	0.037
NH3-N	mg/L	0.3	0.09	0.07	0.02	0.10	0.01	0.03	0.15	0.12	0.27	0.08	0.10	0.15
Nitrite nitrogen	μg/L	—	17.90	22.74	17.90	16.14	17.90	16.14	17.02	15.26	19.22	20.10	17.02	19.66
Nitrate nitrogen	mg/L	—	0.14	0.12	0.14	0.07	0.11	0.11	0.11	0.10	0.10	0.10	0.10	0.11
Cd	μg/L	5	0.0159	0.0382	0.0449	0.0187	0.0218	0.0121	0.0152	0.0170	0.0428	0.0531	0.0151	0.0137
Cr	μg/L	—	0.02	0.04	0.04	0.03	0.03	0.03	0.04	0.04	0.03	0.03	0.03	0.03
Co	μg/L	—	0.859	0.743	0.836	1.032	0.991	0.877	0.739	0.846	0.817	0.842	0.641	0.820
Cu	μg/L	30	0.240	0.210	0.187	0.295	0.292	0.286	0.353	0.179	0.268	0.331	0.280	0.326
Ni	μg/L	100	0.076	0.060	0.053	0.060	0.066	0.057	0.063	0.037	0.058	0.057	0.062	0.065
Pb	μg/L	10	1.203	1.186	0.922	1.368	1.346	0.995	1.391	0.727	1.559	1.532	1.179	2.152
Zn	μg/L	500	1.97	1.46	1.16	3.52	1.80	1.82	3.07	5.24	5.20	2.54	2.39	2.67
Fe	μg/L	—	1.01	1.03	0.96	0.98	0.87	1.26	1.23	0.97	0.95	0.98	1.04	1.30
As	μg/L	50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hg	μg/L	1	10.0224	11.7624	8.526	30.9372	30.2412	38.28	37.236	47.676	51.156	11.4492	9.9528	12.5976
Turbidty	NTU	—	1.8	1.8	1.8	0.9	0.9	0.9	0.5	0.5	0.5	2.0	2.0	2.0
Transparency	m	—	0.4	0.0	0.2	0.2	0.2	0.1	0.3	0.1	0.2	0.5	0.2	0.6
Silicate	mg/L	—	0.70	1.10	ND	2.80	2.80	2.50	2.10	2.20	2.00	1.20	1.50	0.80
Total oil	mg/L	—	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

*Noote：When the measured value is below the method detection limit (MDL), it is indicated as "ND ".

2023 Q3 monitoring results of marine water quality near Mailiao (3/3)

Station	Units	A type marine water quality standard (2018.02.13~)	4B	4B	4B	5B	5B	5B	2C	3C	4M
Depth	meter		1.0	10.0	19.5	1.0	10.5	19.5	1.0	1.0	1.0
Tepm.	℃	—	30.4	30.3	30.3	30.4	30.3	30.3	31.6	31.6	31.1
Salinity	PSU	—	33.8	33.8	33.8	33.6	33.8	33.8	33.5	33.7	33.3
pH	-	7.5~8.5	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.1	8.1
D.O.	mg/L	≥5.0	5.9	5.9	6.3	6.5	6.2	6.6	6.4	6.1	6.1
B.O.D.	mg/L	≤ 2	0.8	1.0	0.9	0.9	0.9	0.8	1.2	0.8	1.2
E. coli	CFU/100ml	≤ 1000	ND	ND	ND	ND	ND	ND	ND	ND	ND
S.S.	mg/L	—	12.3	14.9	10.8	13.8	14.6	16.7	24.3	39.7	29.1
Cyanide	μg/L	10	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total phenols	μg/L	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Mineral oil	mg/L	2	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorophyll a	μg/L	—	1.8	2.1	0.6	1.6	2.1	2.7	8.4	2.8	4.7
Total phosphorus	mg/L	0.05	0.027	0.014	0.035	0.016	0.038	0.011	0.012	0.021	0.013
NH3-N	mg/L	0.3	0.04	0.05	0.07	0.06	0.19	0.07	0.17	0.21	0.18
Nitrite nitrogen	μg/L	—	14.82	13.50	11.74	4.70	9.98	9.54	13.94	16.58	30.66
Nitrate nitrogen	mg/L	—	0.08	0.10	0.13	0.07	0.07	0.09	0.08	0.16	0.25
Cd	μg/L	5	0.0334	0.0145	0.0441	0.0282	0.0129	0.0354	0.0319	0.0394	0.0124
Cr	μg/L	—	0.03	0.04	0.02	0.04	0.03	0.03	0.03	0.05	0.03
Co	μg/L	—	0.779	1.058	1.003	1.534	0.875	0.909	0.772	0.726	0.975
Cu	μg/L	30	0.322	0.469	0.454	0.367	0.379	0.296	0.233	0.454	0.449
Ni	μg/L	100	0.089	0.086	0.082	0.089	0.082	0.077	0.058	0.062	0.081
Pb	μg/L	10	1.703	2.563	2.114	1.914	1.479	1.630	1.338	3.158	1.388
Zn	μg/L	500	3.59	3.85	1.93	3.75	1.97	2.73	3.43	4.77	2.26
Fe	μg/L	—	1.03	1.21	1.13	1.09	0.92	1.05	1.11	1.48	1.47
As	μg/L	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hg	μg/L	1	12.5976	4.35	13.746	15.5208	24.6036	13.1196	32.538	43.848	45.936
Turbidty	NTU	—	1.8	1.8	1.8	1.8	1.8	1.8	0.5	0.5	0.5
Transparency	m	—	0.1	0.2	0.1	0.1	0.3	0.5	0.0	0.3	0.4
Silicate	mg/L	—	0.70	1.00	0.80	ND	0.90	ND	1.80	ND	0.70
Total oil	mg/L	—	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

*Noote：When the measured value is below the method detection limit (MDL), it is indicated as "ND ".

2023 Q4 monitoring results of marine water quality near Mailiao (1/3)

Station	Units	A type marine water quality standard (2018.02.13~)	1A	1A	1A	2A	2A	2A	3A	3A	3A	4A	4A	4A
Depth	meter		1.0	8.0	16.0	1.0	11.0	21.0	1.0	12.0	24.0	1.0	12.0	24.0
Tepm.	℃	—	26.0	25.8	25.8	26.2	25.8	25.7	25.9	25.7	25.7	26.7	25.9	25.9
Salinity	PSU	—	33.9	33.9	33.9	33.9	33.9	33.9	33.9	33.9	33.8	34.2	34.1	34.1
pH	-	7.5~8.5	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.2	8.2	8.1
D.O.	mg/L	≥5.0	6.1	6.2	6.1	6.0	6.3	6.2	6.9	6.3	6.2	6.4	6.2	6.0
B.O.D.	mg/L	≤ 2	1.3	1.1	0.9	1.1	1.1	0.9	1.1	1.1	1.0	1.2	0.9	0.8
E. coli	CFU/100ml	≤ 1000	ND	ND	ND	ND	ND	ND	50	50	25	ND	ND	ND
S.S.	mg/L	—	14.8	23.0	18.8	13.9	20.2	16.8	12.3	23.7	18.7	19.7	18.1	21.5
Cyanide	μg/L	10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total phenols	μg/L	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Mineral oil	mg/L	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorophyll a	μg/L	—	0.7	0.4	0.6	0.7	0.6	0.9	0.9	0.7	0.9	0.9	0.7	0.4
Total phosphorus	mg/L	0.05	0.020	0.019	0.019	0.020	0.020	0.024	0.019	0.035	0.018	0.022	0.017	0.019
NH3-N	mg/L	0.3	0.10	0.07	0.10	0.07	0.06	0.12	0.18	0.16	0.09	0.06	0.11	0.06
Nitrite nitrogen	μg/L	—	23.35	15.50	18.15	17.10	9.55	12.80	9.15	9.80	12.50	8.05	8.10	8.50
Nitrate nitrogen	mg/L	—	0.24	0.11	0.12	0.12	0.11	0.11	0.11	0.13	0.13	0.11	0.12	0.10
Cd	μg/L	5	0.0091	0.0099	0.0178	0.0153	0.0107	0.0156	0.0127	0.0076	0.0148	0.0183	0.0247	0.0169
Cr	μg/L	—	0.02	0.02	0.02	0.07	0.02	0.04	0.03	0.02	0.05	0.04	0.03	0.03
Co	μg/L	—	0.278	0.823	0.694	0.166	0.690	0.693	0.992	0.568	1.127	0.835	0.771	0.683
Cu	μg/L	30	0.428	0.292	0.334	0.305	0.377	0.403	0.422	0.299	0.683	0.389	0.353	0.381
Ni	μg/L	100	0.081	0.064	0.082	0.095	0.075	0.082	0.103	0.081	0.072	0.081	0.063	0.083
Pb	μg/L	10	2.991	1.863	1.795	0.984	1.841	2.174	2.653	2.101	1.508	2.823	2.024	2.057
Zn	μg/L	500	1.64	2.93	4.17	5.39	4.00	6.83	4.69	4.19	3.74	4.49	1.99	2.33
Fe	μg/L	—	0.71	0.70	1.15	1.00	1.10	1.38	1.34	1.07	1.67	1.21	1.24	0.65
As	μg/L	50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hg	μg/L	1	17.3	18.2	19.2	9.32	14.2	12.2	7.66	9.96	8.7	8.1	8.3	8.5
Turbidty	NTU	—	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	1.0	1.0	1.0
Transparency	m	—	0.1	0.1	0.1	0.1	0.3	0.1	0.3	0.3	0.3	0.3	0.3	0.3
Silicate	mg/L	—	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total oil	mg/L	—	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

*Noote：When the measured value is below the method detection limit (MDL), it is indicated as "ND ".

2023 Q4 monitoring results of marine water quality near Mailiao (2/3)

Station	Units	A type marine water quality standard (2018.02.13~)	5A	5A	5A	1B	1B	1B	2B	2B	2B	3B	3B	3B
Depth	meter		1.0	24.0	12.5	1.0	4.0	7.5	1.0	3.0	5.5	1.0	12.0	23.5
Tepm.	℃	—	27.0	25.9	25.9	25.8	25.8	25.8	25.8	25.8	25.9	26.1	25.8	25.7
Salinity	PSU	—	34.3	34.2	34.3	33.6	33.6	33.6	33.6	33.6	33.6	34.0	34.0	33.9
pH	-	7.5~8.5	8.2	8.2	8.2	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1
D.O.	mg/L	≥5.0	6.2	6.0	6.1	6.2	6.2	6.4	6.5	6.4	6.4	6.6	6.2	6.0
B.O.D.	mg/L	≤ 2	0.9	1.3	0.9	1.4	1.3	1.0	0.8	1.0	0.9	1.0	1.1	0.9
E. coli	CFU/100ml	≤ 1000	ND	ND	ND	10	45	15	40	35	35	50	40	30
S.S.	mg/L	—	21.9	18.7	18.9	18.9	11.2	14.4	12.3	14.0	17.0	18.8	18.4	14.4
Cyanide	μg/L	10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total phenols	μg/L	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Mineral oil	mg/L	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorophyll a	μg/L	—	0.6	0.6	0.6	0.7	0.4	0.7	0.4	0.7	0.1	0.9	0.9	0.6
Total phosphorus	mg/L	0.05	0.018	0.019	0.018	0.020	0.020	0.021	0.021	0.023	0.020	0.020	0.025	0.023
NH3-N	mg/L	0.3	0.07	0.04	0.07	0.12	0.09	0.13	0.10	0.13	0.15	0.18	0.13	0.13
Nitrite nitrogen	μg/L	—	5.30	4.85	4.85	22.85	20.05	20.20	18.50	20.05	18.00	13.40	15.70	11.40
Nitrate nitrogen	mg/L	—	0.09	0.08	0.08	0.16	0.16	0.17	0.18	0.17	0.17	0.12	0.11	0.14
Cd	μg/L	5	0.0146	0.0104	0.0165	0.0142	0.0100	0.0060	0.0085	0.0074	0.0106	0.0188	0.0142	0.0098
Cr	μg/L	—	0.03	0.02	0.03	0.03	0.02	0.05	0.03	0.02	0.03	0.03	0.04	0.03
Co	μg/L	—	0.584	0.285	0.528	0.965	0.717	0.563	0.514	0.451	1.076	1.042	0.745	0.579
Cu	μg/L	30	0.453	0.232	0.499	0.522	0.364	0.550	0.381	0.547	0.372	0.448	0.396	0.328
Ni	μg/L	100	0.076	0.029	0.084	0.074	0.066	0.092	0.074	0.111	0.094	0.078	0.060	0.055
Pb	μg/L	10	2.104	1.770	2.109	2.001	1.885	0.891	1.810	1.902	2.709	2.246	1.812	2.134
Zn	μg/L	500	3.53	1.89	3.25	3.32	4.84	5.27	3.52	2.86	6.37	4.44	3.99	4.74
Fe	μg/L	—	0.73	0.74	0.88	0.90	0.79	0.86	0.93	0.69	0.99	1.06	0.90	0.93
As	μg/L	50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hg	μg/L	1	5.6	5.4	7	10	16.1	19.2	12.6	16	10.4	14.9	22.9	22
Turbidty	NTU	—	1.0	1.0	1.0	0.5	0.5	0.5	0.5	0.5	0.5	0.7	0.7	0.7
Transparency	m	—	0.4	0.1	0.1	0.3	0.4	0.4	0.1	0.4	0.6	0.3	0.3	0.5
Silicate	mg/L	—	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total oil	mg/L	—	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

*Noote：When the measured value is below the method detection limit (MDL), it is indicated as "ND ".

2023 Q4 monitoring results of marine water quality near Mailiao (3/3)

Station	Units	A type marine water quality standard (2018.02.13~)	4B	4B	4B	5B	5B	5B	2C	3C	4M
Depth	meter		1.0	10.0	18.0	1.0	10.0	19.0	0.5	0.5	0.5
Tepm.	℃	—	25.7	25.7	25.7	25.7	25.7	25.7	26.6	26.9	25.8
Salinity	PSU	—	33.6	33.7	33.7	33.7	33.7	33.7	33.6	33.5	33.4
pH	-	7.5~8.5	8.1	8.1	8.1	8.1	8.1	8.0	8.1	8.0	8.1
D.O.	mg/L	≥5.0	6.8	6.6	6.2	6.8	6.6	6.2	6.1	6.0	6.7
B.O.D.	mg/L	≤ 2	0.9	0.8	1.0	0.9	0.9	0.8	1.2	0.7	1.2
E. coli	CFU/100ml	≤ 1000	30	20	ND	20	ND	ND	45	40	90
S.S.	mg/L	—	17.5	11.4	13.9	19.0	14.3	20.5	21.5	18.6	16.5
Cyanide	μg/L	10	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total phenols	μg/L	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Mineral oil	mg/L	2	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorophyll a	μg/L	—	0.9	0.7	0.4	0.7	0.3	0.1	0.6	0.9	1.0
Total phosphorus	mg/L	0.05	0.019	0.022	0.020	0.020	0.019	0.018	0.022	0.021	0.022
NH3-N	mg/L	0.3	0.09	0.09	0.09	0.09	0.12	0.08	0.21	0.16	0.29
Nitrite nitrogen	μg/L	—	19.60	19.50	11.50	16.80	17.70	21.35	25.00	20.45	28.50
Nitrate nitrogen	mg/L	—	0.19	0.20	0.17	0.17	0.16	0.17	0.17	0.22	0.23
Cd	μg/L	5	0.0243	0.0258	0.0141	0.0202	0.0074	0.0131	0.0117	0.0130	0.0165
Cr	μg/L	—	0.03	0.02	0.02	0.03	0.02	0.03	0.03	0.03	0.04
Co	μg/L	—	1.116	0.968	0.761	1.178	0.955	0.989	0.664	0.827	1.391
Cu	μg/L	30	0.475	0.362	0.332	0.408	0.340	0.446	0.420	0.358	0.439
Ni	μg/L	100	0.097	0.075	0.064	0.081	0.090	0.072	0.080	0.085	0.074
Pb	μg/L	10	2.258	1.815	1.580	2.139	2.042	1.868	1.760	2.516	2.730
Zn	μg/L	500	6.05	2.64	4.01	6.15	4.43	4.12	4.18	4.63	5.40
Fe	μg/L	—	0.94	1.16	0.88	1.14	0.79	1.26	0.92	0.95	1.42
As	μg/L	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hg	μg/L	1	15.2	10.8	16.8	9.8	8.9	13.2	29.3	37.8	20.8
Turbidty	NTU	—	0.5	0.5	0.5	0.2	0.2	0.2	0.5	0.3	0.2
Transparency	m	—	0.3	0.4	0.3	0.1	0.1	0.1	0.5	0.5	0.2
Silicate	mg/L	—	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total oil	mg/L	—	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

*Noote：When the measured value is below the method detection limit (MDL), it is indicated as "ND ".

2024 Q1 monitoring results of marine water quality near Mailiao (1/3)

Station	Units	A type marine water quality standard (2018.02.13~)	1A	1A	1A	2A	2A	2A	3A	3A	3A	4A	4A	4A
Depth	meter		0.5	7.0	13.5	0.5	9.5	18.5	0.5	12.0	23.5	0.5	11.0	21.5
Tepm.	℃	—	20.6	20.5	20.5	20.5	20.7	20.6	21.1	21.1	21.0	20.8	20.8	20.8
Salinity	PSU	—	34.5	34.5	34.5	34.2	34.2	34.2	34.5	34.5	34.5	34.5	34.5	34.5
pH	-	7.5~8.5	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1
D.O.	mg/L	≥5.0	7.2	7.2	7.2	7.2	7.1	7.2	7.3	7.3	7.3	7.1	7.1	7.1
B.O.D.	mg/L	≤ 2	0.4	0.5	0.5	0.5	0.5	0.4	0.3	0.5	0.3	0.4	0.3	0.2
E. coli	CFU/100ml	≤ 1000	0	2	3	5	2	9	6	9	6	0	7	7
S.S.	mg/L	—	9.0	21.0	7.2	13.0	16.4	36.6	37.2	37.6	36.8	37.0	17.6	19.0
Cyanide	μg/L	10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total phenols	μg/L	5	ND	ND	ND	ND	ND	3.27	2.86	ND	ND	1.31	ND	ND
Mineral oil	mg/L	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorophyll a	μg/L	—	0.1	0.2	0.2	1.6	1.2	1.2	0.2	0.1	0.1	0.2	0.1	ND
Total phosphorus	mg/L	0.05	0.023	0.019	0.018	0.034	0.046	0.035	0.062	0.013	0.011	0.013	0.046	0.032
NH3-N	mg/L	0.3	ND	0.01	0.05	0.12	0.10	0.12	ND	0.02	0.01	0.01	0.03	0.01
Nitrite nitrogen	μg/L	—	5.00	6.00	5.00	4.00	5.00	8.00	2.00	1.00	3.00	7.00	14.00	4.00
Nitrate nitrogen	mg/L	—	0.01	0.03	0.01	0.02	0.01	0.02	0.01	ND	0.01	0.00	0.01	ND
Cd	μg/L	5	0.0948	0.0884	0.0452	0.0376	0.0354	0.0347	0.0344	0.0235	0.0236	0.0177	0.0119	0.0229
Cr	μg/L	—	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.05	ND
Co	μg/L	—	0.291	0.115	0.425	0.208	0.141	0.141	0.273	0.135	0.586	0.361	0.833	0.164
Cu	μg/L	30	1.264	0.472	0.333	0.240	0.313	0.311	0.327	0.294	0.360	0.303	0.785	0.392
Ni	μg/L	100	0.022	0.018	0.023	0.022	0.023	0.018	0.120	0.017	0.016	0.033	0.125	0.011
Pb	μg/L	10	0.441	0.398	0.429	0.389	0.460	0.449	0.416	0.433	2.720	0.703	4.402	0.617
Zn	μg/L	500	98.42	21.94	72.40	98.98	84.85	108.21	77.88	59.04	82.96	40.83	2.08	71.14
Fe	μg/L	—	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
As	μg/L	50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hg	μg/L	1	8.52	4.55	8.05	19.6	7.24	21.1	7.24	5.23	6.34	5.94	7.19	5.72
Turbidty	NTU	—	0.8	0.8	0.8	1.0	1.0	1.0	1.5	1.5	1.5	1.2	1.2	1.2
Transparency	m	—	0.2	0.1	0.2	0.3	0.3	0.3	0.2	0.2	0.2	0.3	0.2	0.2
Silicate	mg/L	—	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total oil	mg/L	—	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

*Noote：When the measured value is below the method detection limit (MDL), it is indicated as "ND ".

2024 Q1 monitoring results of marine water quality near Mailiao (2/3)

Station	Units	A type marine water quality standard (2018.02.13~)	5A	5A	5A	1B	1B	1B	2B	2B	2B	3B	3B	3B
Depth	meter		0.5	11.0	21.5	0.5	4.5	2.5	0.5	6.5	12.5	0.5	11.0	21.5
Tepm.	℃	—	21.0	21.0	21.0	20.8	20.7	20.7	20.8	20.8	20.8	20.6	20.7	20.6
Salinity	PSU	—	34.5	34.5	34.5	34.5	34.5	34.5	34.5	34.5	34.5	34.4	34.4	34.4
pH	-	7.5~8.5	8.1	8.1	8.1	8.0	8.0	8.1	8.1	8.1	8.1	8.1	8.0	8.1
D.O.	mg/L	≥5.0	7.1	7.1	7.1	6.9	6.9	6.9	7.0	7.0	7.0	7.2	7.2	7.2
B.O.D.	mg/L	≤ 2	0.4	0.3	0.3	1.0	0.8	0.4	0.4	0.7	0.4	0.3	0.3	0.5
E. coli	CFU/100ml	≤ 1000	6	13	10	2	10	4	1	3	7	3	7	7
S.S.	mg/L	—	20.0	18.8	19.4	40.2	10.8	42.0	31.0	11.0	20.2	17.2	17.6	4.6
Cyanide	μg/L	10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total phenols	μg/L	5	1.41	ND	1.62	ND	3.45	4.90	4.10	1.45	2.09	1.70	2.28	1.91
Mineral oil	mg/L	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorophyll a	μg/L	—	0.1	0.2	ND	0.3	0.3	0.7	0.4	0.5	0.5	0.7	0.7	0.5
Total phosphorus	mg/L	0.05	0.029	0.022	0.022	0.020	0.027	0.054	0.022	0.024	0.021	0.026	0.025	0.024
NH3-N	mg/L	0.3	0.04	0.01	0.03	0.04	0.03	0.07	0.03	0.02	0.02	0.04	0.17	0.06
Nitrite nitrogen	μg/L	—	15.00	14.00	6.00	3.00	5.00	4.00	1.00	5.00	13.00	5.00	13.00	21.00
Nitrate nitrogen	mg/L	—	0.01	ND	ND	0.01	ND	ND	0.01	ND	ND	ND	0.01	0.02
Cd	μg/L	5	0.0095	0.0220	0.0071	0.0290	0.0427	0.0401	0.0323	0.0411	0.0422	0.0228	0.0259	0.0182
Cr	μg/L	—	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Co	μg/L	—	0.123	0.419	0.083	0.320	0.194	0.188	0.157	0.216	0.191	0.136	0.109	0.132
Cu	μg/L	30	0.167	0.752	0.208	1.128	0.317	0.257	0.239	0.265	0.263	0.320	0.324	0.265
Ni	μg/L	100	0.007	0.018	0.006	0.017	0.020	0.023	0.019	0.023	0.021	0.014	0.017	0.015
Pb	μg/L	10	0.330	0.826	0.300	1.040	0.548	0.454	0.389	0.481	0.355	0.376	0.357	0.593
Zn	μg/L	500	79.02	56.87	56.51	286.18	216.37	199.52	97.62	149.26	186.51	58.52	37.67	53.44
Fe	μg/L	—	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
As	μg/L	50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hg	μg/L	1	6.15	8.04	6.32	20.6	22.4	14.3	12.6	7.43	5.51	9.17	4.39	11.3
Turbidty	NTU	—	1.0	1.0	1.0	0.6	0.6	0.6	0.8	0.8	0.8	1.3	1.3	1.3
Transparency	m	—	0.2	0.2	0.3	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.3
Silicate	mg/L	—	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total oil	mg/L	—	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

*Noote：When the measured value is below the method detection limit (MDL), it is indicated as "ND ".

2024 Q1 monitoring results of marine water quality near Mailiao (3/3)

Station	Units	A type marine water quality standard (2018.02.13~)	4B	4B	4B	5B	5B	5B	2C	3C	4M
Depth	meter		0.5	10.5	20.5	0.5	10.5	20.5	0.5	0.5	0.5
Tepm.	℃	—	21.5	21.3	21.3	21.9	21.5	21.4	20.9	20.8	20.8
Salinity	PSU	—	34.5	34.5	34.5	34.5	34.5	34.6	34.4	34.1	34.5
pH	-	7.5~8.5	8.1	8.1	8.1	8.1	8.1	8.1	8.0	8.0	8.1
D.O.	mg/L	≥5.0	7.1	7.1	7.1	7.0	7.1	7.0	6.9	6.9	7.1
B.O.D.	mg/L	≤ 2	0.5	0.5	1.2	0.5	0.5	0.5	0.4	0.8	ND
E. coli	CFU/100ml	≤ 1000	0	7	5	2	0	1	4	5	1
S.S.	mg/L	—	14.4	6.2	5.2	16.6	5.8	8.6	12.4	8.0	18.8
Cyanide	μg/L	10	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total phenols	μg/L	5	2.17	ND	2.56	1.93	ND	ND	1.52	2.06	2.62
Mineral oil	mg/L	2	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorophyll a	μg/L	—	0.3	0.1	0.2	0.3	0.3	0.4	1.4	2.9	0.6
Total phosphorus	mg/L	0.05	0.019	0.056	0.053	0.029	0.040	0.021	0.031	0.043	0.035
NH3-N	mg/L	0.3	0.01	0.02	0.01	0.01	0.01	0.00	0.03	0.14	0.05
Nitrite nitrogen	μg/L	—	10.00	10.00	23.00	4.00	1.00	11.00	2.00	25.00	14.00
Nitrate nitrogen	mg/L	—	0.01	0.01	ND	0.01	0.01	0.01	0.60	0.03	0.02
Cd	μg/L	5	0.0214	0.0205	0.0163	0.0164	0.0179	0.0191	0.0401	0.0237	0.0154
Cr	μg/L	—	ND	ND	ND	ND	ND	ND	ND	ND	ND
Co	μg/L	—	0.131	0.117	0.086	0.120	0.120	0.158	0.379	0.201	0.156
Cu	μg/L	30	0.358	0.367	0.385	0.418	0.409	0.369	0.542	0.262	0.384
Ni	μg/L	100	0.012	0.012	0.028	0.011	0.024	0.015	0.034	0.022	0.013
Pb	μg/L	10	0.595	0.572	0.637	0.613	0.629	0.569	1.250	0.434	0.617
Zn	μg/L	500	42.09	35.34	34.94	31.63	57.68	46.35	226.94	317.83	35.19
Fe	μg/L	—	ND	ND	ND	ND	ND	ND	ND	ND	ND
As	μg/L	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hg	μg/L	1	3.89	3.25	2.44	2.54	3.55	3.36	22.5	54.6	5.05
Turbidty	NTU	—	1.5	1.5	1.5	1.5	1.5	1.5	0.5	0.5	0.8
Transparency	m	—	0.0	0.1	0.2	0.3	0.2	0.2	0.1	0.3	0.2
Silicate	mg/L	—	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total oil	mg/L	—	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

*Noote：When the measured value is below the method detection limit (MDL), it is indicated as "ND ".

2024 Q2 monitoring results of marine water quality near Mailiao (1/3)

Station	Units	A type marine water quality standard (2018.02.13~)	1A	1A	1A	2A	2A	2A	3A	3A	3A	4A	4A	4A
Depth	meter		0.5	8.0	15.0	0.5	11.5	22.0	0.5	11.5	22.0	0.5	11.5	22.0
Tepm.	℃	—	27.5	27.5	27.5	27.5	27.5	27.5	27.5	27.4	27.5	27.5	27.4	27.4
Salinity	PSU	—	34.5	34.5	34.5	34.5	34.5	34.5	34.5	34.5	34.5	34.5	34.5	34.5
pH	-	7.5~8.5	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2
D.O.	mg/L	≥5.0	7.1	7.1	7.1	7.0	7.0	7.0	7.1	7.1	7.1	7.0	7.0	7.0
B.O.D.	mg/L	≤ 2	1.4	1.3	ND	0.3	0.3	0.5	0.3	1.0	1.1	0.5	0.4	0.7
E. coli	CFU/100ml	≤ 1000	11	10	10	ND	24	21	24	17	29	22	ND	ND
S.S.	mg/L	—	6.0	9.0	7.5	20.0	4.0	13.5	18.0	8.5	11.0	20.0	9.0	12.5
Cyanide	μg/L	10	ND	ND	ND	ND	ND	ND	ND	ND	10	6	8	6
Total phenols	μg/L	5	5.99	21.93	31.71	4.74	11.60	1.54	2.60	ND	ND	ND	ND	ND
Mineral oil	mg/L	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorophyll a	μg/L	—	0.6	0.6	0.6	0.6	0.5	0.5	0.4	0.4	0.4	0.2	0.2	0.3
Total phosphorus	mg/L	0.05	0.060	0.037	0.024	0.020	0.033	0.048	0.022	0.029	0.050	0.024	0.018	0.056
NH3-N	mg/L	0.3	0.04	0.01	0.01	0.04	0.02	0.02	0.07	0.03	0.04	0.08	0.01	0.01
Nitrite nitrogen	μg/L	—	0.00	0.00	0.00	0.00	0.00	ND	0.00	0.00	0.00	ND	0.00	0.00
Nitrate nitrogen	mg/L	—	0.02	0.01	ND	ND	ND	ND	0.01	ND	0.01	0.01	0.01	0.01
Cd	μg/L	5	0.0578	0.0422	0.0570	0.0386	0.0497	0.0295	0.0556	0.0217	0.0230	0.0263	0.0273	0.0253
Cr	μg/L	—	0.11	0.11	0.09	0.10	0.09	0.10	0.08	0.08	0.08	0.05	0.05	0.05
Co	μg/L	—	1.304	1.041	0.714	0.919	0.833	0.906	0.997	1.261	1.477	1.283	1.175	1.888
Cu	μg/L	30	1.501	0.866	0.970	0.685	0.682	1.208	1.318	0.835	1.464	0.423	0.680	0.949
Ni	μg/L	100	0.706	0.625	0.524	0.676	0.710	0.716	0.696	0.830	0.717	0.445	0.481	0.396
Pb	μg/L	10	22.621	21.049	16.390	21.676	18.600	19.994	29.170	17.897	17.246	12.805	9.484	16.260
Zn	μg/L	500	82.71	65.47	54.81	56.70	56.13	49.48	70.63	50.99	49.75	41.18	44.97	39.36
Fe	μg/L	—	0.20	0.18	0.13	0.12	0.12	0.12	0.16	0.09	0.10	0.13	0.10	0.09
As	μg/L	50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hg	μg/L	1	2.85	3.5	2.28	1.81	3.71	2.36	4.89	2.03	2.47	1.96	2.22	2.05
Turbidty	NTU	—	1.0	1.0	1.0	2.0	2.0	2.0	1.8	1.8	1.8	2.0	2.0	2.0
Transparency	m	—	0.1	0.1	0.3	0.1	0.1	ND	0.1	0.1	0.1	0.1	0.1	0.1
Silicate	mg/L	—	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total oil	mg/L	—	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

*Noote：When the measured value is below the method detection limit (MDL), it is indicated as "ND ".

2024 Q2 monitoring results of marine water quality near Mailiao (2/3)

Station	Units	A type marine water quality standard (2018.02.13~)	5A	5A	5A	1B	1B	1B	2B	2B	2B	3B	3B	3B
Depth	meter		0.5	12.0	23.0	0.5	4.0	6.0	0.5	3.5	6.0	0.5	11.5	22.0
Tepm.	℃	—	27.5	27.4	27.4	27.7	27.7	27.7	27.7	27.7	27.7	27.6	27.6	27.6
Salinity	PSU	—	34.5	34.5	34.5	34.5	34.5	34.5	34.5	34.5	34.5	34.5	34.5	34.5
pH	-	7.5~8.5	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2
D.O.	mg/L	≥5.0	7.1	7.1	7.1	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
B.O.D.	mg/L	≤ 2	0.3	ND	0.3	0.2	ND	0.6	0.4	1.4	1.1	0.8	0.1	0.6
E. coli	CFU/100ml	≤ 1000	ND	13	19	52	38	ND	20	52	62	10	ND	ND
S.S.	mg/L	—	2.0	4.0	13.0	13.5	10.0	9.5	10.5	21.0	2.0	29.0	10.0	6.5
Cyanide	μg/L	10	7	6	6	ND	ND	ND	9	6	6	ND	5	6
Total phenols	μg/L	5	2.60	ND	ND	1.43	ND	ND	ND	3.11	1.98	ND	6.92	ND
Mineral oil	mg/L	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorophyll a	μg/L	—	0.2	0.2	0.2	1.4	0.9	1.5	1.4	1.4	1.5	0.4	0.5	0.5
Total phosphorus	mg/L	0.05	0.068	0.069	0.030	0.057	0.037	0.036	0.028	0.061	0.046	0.030	0.045	0.041
NH3-N	mg/L	0.3	0.04	0.01	0.01	0.01	0.01	0.02	0.01	0.03	0.02	0.01	0.01	0.01
Nitrite nitrogen	μg/L	—	0.00	0.00	0.00	0.00	ND	ND	0.00	ND	0.00	0.00	0.00	ND
Nitrate nitrogen	mg/L	—	0.01	0.01	0.01	ND	0.01	ND	0.01	ND	0.01	0.02	0.01	0.01
Cd	μg/L	5	0.0304	0.0203	0.1210	0.0308	0.0618	0.0317	0.0333	0.0283	0.0414	0.0424	0.0262	0.0357
Cr	μg/L	—	0.05	0.04	0.05	0.17	0.17	0.17	0.18	0.20	0.18	0.09	0.09	0.09
Co	μg/L	—	0.698	0.534	0.620	1.561	1.500	1.611	1.231	1.946	1.175	1.338	1.458	1.234
Cu	μg/L	30	0.415	0.426	0.658	1.485	2.344	1.221	1.931	1.282	1.711	1.643	1.615	1.273
Ni	μg/L	100	0.553	0.409	0.781	0.481	0.713	0.491	0.865	0.892	0.787	0.693	0.663	0.676
Pb	μg/L	10	11.412	10.319	21.544	24.075	15.631	26.114	29.315	39.128	40.564	31.839	26.723	26.037
Zn	μg/L	500	26.03	25.80	45.87	107.85	106.04	104.68	158.17	184.14	165.00	65.08	217.03	69.52
Fe	μg/L	—	0.06	0.04	ND	0.11	0.27	0.15	0.27	0.39	0.32	0.17	0.36	0.14
As	μg/L	50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hg	μg/L	1	2.38	2.34	1.52	4.08	0.41	3.47	4.5	6.18	5.69	3.2	2.92	3.13
Turbidty	NTU	—	2.2	2.2	2.2	1.3	1.3	1.3	1.0	1.0	1.0	2.0	2.0	2.0
Transparency	m	—	0.1	0.2	0.1	0.1	0.2	0.2	ND	0.1	0.2	0.2	0.1	0.1
Silicate	mg/L	—	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total oil	mg/L	—	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

*Noote：When the measured value is below the method detection limit (MDL), it is indicated as "ND ".

2024 Q2 monitoring results of marine water quality near Mailiao (3/3)

Station	Units	A type marine water quality standard (2018.02.13~)	4B	4B	4B	5B	5B	5B	2C	3C	4M
Depth	meter		0.5	9.0	17.0	0.5	10.0	19.0	0.5	0.5	0.5
Tepm.	℃	—	27.6	27.6	27.6	27.6	27.6	27.6	28.1	28.8	27.9
Salinity	PSU	—	34.5	34.5	34.5	34.5	34.5	34.5	34.5	34.4	34.5
pH	-	7.5~8.5	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.1	8.2
D.O.	mg/L	≥5.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.1	7.0
B.O.D.	mg/L	≤ 2	1.2	1.3	1.2	0.2	ND	0.3	1.2	ND	ND
E. coli	CFU/100ml	≤ 1000	ND	ND	ND	ND	ND	ND	63	50	ND
S.S.	mg/L	—	16.5	4.5	10.0	4.0	15.0	2.5	9.0	4.0	6.0
Cyanide	μg/L	10	10	5	ND	ND	8	9	8	8	6
Total phenols	μg/L	5	ND	1.65	ND	ND	ND	1.42	8.33	12.19	ND
Mineral oil	mg/L	2	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorophyll a	μg/L	—	0.6	0.5	0.5	0.3	0.4	0.3	2.0	2.8	1.1
Total phosphorus	mg/L	0.05	0.053	0.035	0.046	0.065	0.077	0.037	0.050	0.036	0.058
NH3-N	mg/L	0.3	0.01	0.04	0.02	0.03	0.08	0.04	0.04	0.02	0.08
Nitrite nitrogen	μg/L	—	ND	ND	0.00	0.00	0.00	0.00	0.01	0.00	0.00
Nitrate nitrogen	mg/L	—	0.01	0.01	ND	0.02	0.02	0.01	0.01	0.02	0.02
Cd	μg/L	5	0.0208	0.0710	0.0339	0.0347	0.0688	0.0416	0.0238	0.0377	0.0312
Cr	μg/L	—	0.08	0.10	0.11	0.12	0.14	0.16	0.34	0.74	0.30
Co	μg/L	—	1.595	2.246	0.628	1.893	1.908	2.256	4.077	2.114	1.156
Cu	μg/L	30	0.647	1.224	0.792	1.102	4.173	1.250	1.057	1.578	1.308
Ni	μg/L	100	0.307	0.526	0.307	0.616	0.695	0.952	0.492	0.570	0.751
Pb	μg/L	10	22.235	25.438	21.550	17.333	9.361	17.546	22.559	24.621	26.190
Zn	μg/L	500	93.07	95.94	84.34	130.15	126.28	203.53	72.93	144.09	331.98
Fe	μg/L	—	0.17	ND	0.15	0.35	0.11	0.39	0.14	0.28	0.59
As	μg/L	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hg	μg/L	1	3.68	2.98	2.92	1.64	2.63	2.04	2.12	5.28	8.3
Turbidty	NTU	—	2.2	2.2	2.2	2.5	2.5	2.5	0.7	0.5	0.5
Transparency	m	—	0.2	0.7	0.1	0.2	0.2	0.2	0.2	0.1	0.2
Silicate	mg/L	—	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total oil	mg/L	—	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

*Noote：When the measured value is below the method detection limit (MDL), it is indicated as "ND ".

2024 Q3 monitoring results of marine water quality near Mailiao (1/3)

Station	Units	A type marine water quality standard (2018.02.13~)	1A	1A	1A	2A	2A	2A	3A	3A	3A	4A	4A	4A
Depth	meter		0.5	16.0	8.5	0.5	10.0	20.0	0.5	12.0	23.0	0.5	12.0	23.0
Tepm.	℃	—	29.9	29.9	29.9	29.9	29.9	29.9	29.9	29.8	29.8	29.8	29.8	29.7
Salinity	PSU	—	32.8	32.8	32.8	32.8	32.8	32.8	32.8	32.8	32.8	33.2	33.2	33.2
pH	-	7.5~8.5	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2
D.O.	mg/L	≥5.0	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1
B.O.D.	mg/L	≤ 2	2.1	1.8	0.6	1.0	1.0	2.2	1.4	1.6	1.9	0.9	1.5	2.4
E. coli	CFU/100ml	≤ 1000	ND	13	116	51	81	196	43	89	74	211	19	40
S.S.	mg/L	—	9.5	5.0	26.0	7.5	8.5	8.0	5.5	5.5	3.5	2.5	5.5	5.5
Cyanide	μg/L	10	4	4	4	8	ND	10	5	7	4	ND	10	ND
Total phenols	μg/L	5	ND	2.84	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Mineral oil	mg/L	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorophyll a	μg/L	—	0.2	0.4	0.2	0.2	0.2	0.3	0.2	0.2	0.1	0.1	0.2	0.1
Total phosphorus	mg/L	0.05	0.048	0.059	0.059	0.069	0.117	0.057	0.049	0.052	0.072	ND	0.012	0.019
NH3-N	mg/L	0.3	0.08	0.04	0.07	0.06	0.11	0.04	0.04	0.01	0.06	0.07	0.06	0.08
Nitrite nitrogen	μg/L	—	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Nitrate nitrogen	mg/L	—	0.01	0.01	0.02	0.01	0.01	0.01	0.02	0.02	0.02	0.01	0.01	0.01
Cd	μg/L	5	0.0856	0.0327	0.0615	0.0533	0.0320	0.0430	0.0521	0.0941	0.0395	0.0954	0.0331	0.0672
Cr	μg/L	—	0.19	0.19	0.19	0.21	0.19	0.20	0.12	0.11	0.11	0.14	0.13	0.11
Co	μg/L	—	1.237	1.699	1.474	2.941	1.875	1.553	1.245	1.752	1.581	2.322	1.617	0.882
Cu	μg/L	30	1.529	0.886	2.362	1.545	2.200	1.380	1.080	1.127	1.341	1.303	1.923	0.888
Ni	μg/L	100	0.470	0.570	0.527	0.607	0.497	0.547	0.384	0.441	0.382	0.442	0.357	0.178
Pb	μg/L	10	25.883	22.349	17.967	26.040	20.281	20.246	13.766	13.081	17.004	20.114	25.272	12.814
Zn	μg/L	500	229.86	276.16	215.08	272.35	258.94	258.15	140.41	121.52	117.32	149.72	144.33	110.82
Fe	μg/L	—	0.31	0.38	0.33	0.57	0.48	0.40	0.33	0.31	0.23	0.28	0.15	0.18
As	μg/L	50	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.007	ND	0.002
Hg	μg/L	1	15.9	17.3	16.6	14.3	16.9	16.3	8.31	7.65	9.5	9.51	7.52	7.32
Turbidty	NTU	—	0.5	0.5	0.5	0.8	0.8	0.8	1.0	1.0	1.0	1.0	1.0	1.0
Transparency	m	—	1.8	0.4	0.3	0.4	0.4	0.3	0.3	0.1	0.3	0.3	0.3	0.3
Silicate	mg/L	—	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total oil	mg/L	—	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

*Noote：When the measured value is below the method detection limit (MDL), it is indicated as "ND ".

2024 Q3 monitoring results of marine water quality near Mailiao (2/3)

Station	Units	A type marine water quality standard (2018.02.13~)	5A	5A	5A	1B	1B	1B	2B	2B	2B	3B	3B	3B
Depth	meter		0.5	12.0	23.0	0.5	3.0	5.0	0.5	3.0	5.7	0.5	11.5	22.0
Tepm.	℃	—	29.6	29.6	29.6	30.0	29.9	29.9	30.0	30.0	30.0	30.0	29.9	29.9
Salinity	PSU	—	33.2	33.2	33.2	32.6	32.6	32.6	32.6	32.6	32.6	32.7	32.7	32.7
pH	-	7.5~8.5	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2
D.O.	mg/L	≥5.0	7.2	7.2	7.2	7.0	7.0	7.0	7.0	7.0	7.0	7.1	7.1	7.1
B.O.D.	mg/L	≤ 2	0.7	0.6	0.8	1.7	2.2	1.7	2.1	0.9	1.3	0.5	1.8	1.1
E. coli	CFU/100ml	≤ 1000	42	36	26	92	66	234	102	96	4	84	61	147
S.S.	mg/L	—	7.5	2.5	1.0	25.5	44.0	42.5	9.5	13.0	12.5	3.5	5.0	1.0
Cyanide	μg/L	10	10	2	ND	ND	7	6	10	ND	2	8	8	6
Total phenols	μg/L	5	ND	ND	1.41	2.52	1.88	1.38	ND	ND	2.03	ND	ND	2.05
Mineral oil	mg/L	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorophyll a	μg/L	—	0.2	0.1	0.1	0.7	0.9	0.8	0.9	0.8	0.9	0.2	0.2	0.2
Total phosphorus	mg/L	0.05	0.315	0.002	0.015	0.113	0.114	0.081	0.076	0.115	0.070	0.061	0.088	0.012
NH3-N	mg/L	0.3	0.05	0.06	0.03	0.03	0.09	0.06	0.15	0.16	0.07	0.04	0.06	0.09
Nitrite nitrogen	μg/L	—	ND	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01
Nitrate nitrogen	mg/L	—	0.01	0.02	0.01	0.01	ND	ND	0.03	0.03	0.01	0.03	0.02	0.01
Cd	μg/L	5	0.0465	0.0393	0.0511	0.0491	0.0380	0.0442	0.0500	0.0532	0.0633	0.0318	0.0324	0.0454
Cr	μg/L	—	0.14	0.13	0.15	0.46	0.45	0.36	0.50	0.50	0.56	0.14	0.13	0.13
Co	μg/L	—	1.136	0.990	1.217	2.488	1.799	1.940	2.133	2.773	2.481	1.553	1.106	1.139
Cu	μg/L	30	1.308	1.279	1.287	2.526	2.000	1.761	1.964	2.995	2.104	1.083	1.054	1.314
Ni	μg/L	100	0.389	0.354	0.842	1.463	1.348	1.059	1.238	1.150	1.413	0.349	0.290	0.260
Pb	μg/L	10	12.485	13.060	19.968	29.788	31.782	19.827	29.168	27.805	34.858	16.161	14.410	16.660
Zn	μg/L	500	188.41	197.09	192.96	681.53	708.95	601.16	726.65	693.53	744.46	197.14	162.45	142.40
Fe	μg/L	—	0.41	0.34	0.34	0.63	0.91	0.59	1.02	0.98	0.97	0.33	0.34	0.23
As	μg/L	50	ND	ND	ND	ND	ND	ND	0.002	ND	ND	ND	ND	ND
Hg	μg/L	1	12.6	10.3	10.3	67.9	72.5	60.5	67.1	66.9	75.6	9.78	11.4	10.9
Turbidty	NTU	—	1.0	1.0	1.0	0.3	0.3	0.3	0.3	0.3	0.3	1.0	1.0	1.0
Transparency	m	—	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.3	0.8	0.3	0.3	0.3
Silicate	mg/L	—	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total oil	mg/L	—	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

*Noote：When the measured value is below the method detection limit (MDL), it is indicated as "ND ".

2024 Q3 monitoring results of marine water quality near Mailiao (3/3)

Station	Units	A type marine water quality standard (2018.02.13~)	4B	4B	4B	5B	5B	5B	2C	3C	4M
Depth	meter		0.5	9.0	17.0	0.5	10.0	19.0	0.2	0.5	0.5
Tepm.	℃	—	29.8	29.8	29.8	29.9	29.8	29.8	30.5	32.0	30.2
Salinity	PSU	—	32.6	32.6	32.6	32.7	32.7	32.7	32.5	32.3	29.4
pH	-	7.5~8.5	8.2	8.2	8.2	8.1	8.1	8.1	8.1	8.0	8.0
D.O.	mg/L	≥5.0	7.1	7.1	7.1	7.2	7.2	7.2	6.9	7.0	6.8
B.O.D.	mg/L	≤ 2	2.5	1.0	1.7	1.6	1.3	2.6	1.5	1.7	1.5
E. coli	CFU/100ml	≤ 1000	9	11	14	7	105	ND	85	104	72
S.S.	mg/L	—	7.5	7.0	5.5	3.0	0.5	2.0	7.0	16.0	5.5
Cyanide	μg/L	10	3	6	6	9	8	7	2	9	5
Total phenols	μg/L	5	ND	ND	ND	ND	1.35	1.72	ND	2.97	2.20
Mineral oil	mg/L	2	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorophyll a	μg/L	—	0.2	0.2	0.1	0.3	0.2	0.2	2.5	3.0	1.8
Total phosphorus	mg/L	0.05	ND	0.034	0.009	0.014	0.023	0.029	0.069	0.005	0.005
NH3-N	mg/L	0.3	0.08	0.09	0.07	0.10	0.08	0.08	0.06	0.08	1.13
Nitrite nitrogen	μg/L	—	0.01	0.00	0.00	0.01	0.00	ND	0.00	0.00	0.02
Nitrate nitrogen	mg/L	—	0.01	0.02	0.01	0.01	0.02	0.04	0.01	0.02	0.06
Cd	μg/L	5	0.2078	0.1443	0.0452	0.1107	0.0431	0.0518	0.0516	0.0484	0.0353
Cr	μg/L	—	0.16	0.18	0.16	0.15	0.16	0.18	0.03	0.62	0.28
Co	μg/L	—	1.165	1.696	1.212	1.293	1.745	1.959	0.847	1.738	1.282
Cu	μg/L	30	1.441	1.776	1.493	1.839	1.581	1.723	1.279	2.057	2.238
Ni	μg/L	100	0.759	0.691	0.432	0.408	0.417	1.134	0.107	0.933	0.454
Pb	μg/L	10	24.412	28.857	17.792	13.301	22.176	19.973	13.566	26.480	17.878
Zn	μg/L	500	179.97	203.09	153.89	173.56	174.85	209.08	7.42	522.90	164.72
Fe	μg/L	—	0.29	0.33	0.26	0.37	0.37	0.25	0.02	0.84	0.13
As	μg/L	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hg	μg/L	1	6.77	6.56	6.44	16.7	20.1	14.8	57.2	43.3	14.5
Turbidty	NTU	—	0.8	0.8	0.8	1.0	1.0	1.0	0.3	0.3	0.5
Transparency	m	—	0.4	0.4	0.3	0.7	0.3	0.3	0.5	0.3	1.1
Silicate	mg/L	—	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total oil	mg/L	—	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

*Noote：When the measured value is below the method detection limit (MDL), it is indicated as "ND ".

2024 Q4 monitoring results of marine water quality near Mailiao (1/3)

Station	Units	A type marine water quality standard (2018.02.13~)	1A	1A	1A	2A	2A	2A	3A	3A	3A	4A	4A	4A
Depth	meter		0.5	16.0	8.5	0.5	11.0	21.0	0.5	13.0	25.0	0.5	12.0	23.0
Tepm.	℃	—	27.2	27.0	27.0	27.0	26.9	26.9	27.1	26.9	26.9	27.1	26.9	26.9
Salinity	PSU	—	33.7	33.7	33.7	33.7	33.7	33.7	33.7	33.7	33.7	33.7	33.7	33.7
pH	-	7.5~8.5	8.1	8.1	8.2	8.2	8.1	8.1	8.2	8.2	8.1	8.2	8.2	8.2
D.O.	mg/L	≥5.0	7.2	7.3	7.3	7.4	7.4	7.5	7.4	7.2	7.3	7.4	7.5	7.3
B.O.D.	mg/L	≤ 2	0.2	0.3	ND	0.3	1.0	1.6	1.1	1.3	0.9	1.1	0.9	0.8
E. coli	CFU/100ml	≤ 1000	ND	ND	ND	ND	ND	17	ND	ND	ND	ND	ND	ND
S.S.	mg/L	—	20.5	40.0	30.0	10.0	30.5	37.5	13.0	21.5	85.0	33.5	31.0	24.5
Cyanide	μg/L	10	5	5	4	7	7	4	6	2	8	3	3	8
Total phenols	μg/L	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Mineral oil	mg/L	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorophyll a	μg/L	—	0.4	0.5	0.4	1.0	1.0	0.8	0.3	0.4	0.4	0.3	0.3	0.3
Total phosphorus	mg/L	0.05	0.039	0.057	0.057	0.052	0.031	0.082	0.018	0.046	0.046	0.031	0.039	0.040
NH3-N	mg/L	0.3	0.02	0.08	0.03	ND	0.01	ND	0.04	ND	0.02	0.01	ND	0.01
Nitrite nitrogen	μg/L	—	1.20	0.90	0.80	0.80	0.70	0.90	0.70	0.70	0.70	0.60	0.20	0.30
Nitrate nitrogen	mg/L	—	0.03	0.02	0.02	0.02	0.01	0.02	0.02	0.03	0.03	0.01	0.01	0.01
Cd	μg/L	5	0.0423	0.0341	0.0452	0.0960	0.0603	ND	ND	ND	0.0607	ND	ND	ND
Cr	μg/L	—	ND	ND	0.04	0.06	ND	ND	ND	ND	ND	ND	ND	ND
Co	μg/L	—	1.332	0.786	1.260	0.249	0.305	0.040	ND	0.807	0.776	1.151	0.604	1.363
Cu	μg/L	30	1.648	0.714	1.323	ND	0.577	ND	ND	1.126	0.712	1.450	0.703	2.860
Ni	μg/L	100	0.168	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.185
Pb	μg/L	10	12.851	7.282	12.074	1.114	2.043	0.540	0.480	7.199	7.512	11.739	7.283	11.168
Zn	μg/L	500	18.36	6.82	7.24	22.13	2.29	0.51	0.44	7.81	7.03	7.46	6.71	10.70
Fe	μg/L	—	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
As	μg/L	50	0.007	0.036	ND	ND	0.152	ND	0.118	ND	0.265	0.153	0.023	0.050
Hg	μg/L	1	24.1	18.8	11.7	21.2	28.2	14.9	10.5	11.4	9.48	7.61	10.6	4.59
Turbidty	NTU	—	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.5	1.5	1.5
Transparency	m	—	0.6	0.6	0.5	0.3	0.4	0.2	0.3	0.4	0.5	0.5	0.2	0.4
Silicate	mg/L	—	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total oil	mg/L	—	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

*Noote：When the measured value is below the method detection limit (MDL), it is indicated as "ND ".

2024 Q4 monitoring results of marine water quality near Mailiao (2/3)

Station	Units	A type marine water quality standard (2018.02.13~)	5A	5A	5A	1B	1B	1B	2B	2B	2B	3B	3B	3B
Depth	meter		0.5	11.5	22.0	0.5	3.5	6.5	0.5	3.5	6.5	0.5	12.0	23.0
Tepm.	℃	—	27.1	26.9	26.9	27.2	27.1	27.2	27.1	27.1	27.1	27.2	26.9	27.0
Salinity	PSU	—	33.7	33.8	33.8	33.6	33.6	33.6	33.6	33.6	33.6	33.7	33.7	33.7
pH	-	7.5~8.5	8.2	8.1	8.2	8.1	8.1	8.1	8.1	8.1	8.1	8.2	8.2	8.2
D.O.	mg/L	≥5.0	7.4	7.4	7.3	7.1	7.2	7.3	7.6	7.4	7.3	7.4	7.4	7.4
B.O.D.	mg/L	≤ 2	0.8	0.8	0.4	0.5	1.7	0.6	0.3	0.8	0.4	1.2	0.3	0.3
E. coli	CFU/100ml	≤ 1000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
S.S.	mg/L	—	9.0	8.5	16.5	87.5	72.5	71.0	76.5	76.5	88.5	66.5	17.0	20.0
Cyanide	μg/L	10	4	7	4	5	7	3	4	6	4	8	7	2
Total phenols	μg/L	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Mineral oil	mg/L	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorophyll a	μg/L	—	0.4	0.2	0.2	0.5	0.5	0.5	0.5	0.4	0.5	0.4	0.3	0.5
Total phosphorus	mg/L	0.05	0.080	0.019	0.027	0.048	0.066	0.045	0.049	0.081	0.027	0.028	0.055	0.035
NH3-N	mg/L	0.3	0.03	0.05	0.05	0.01	ND	ND	ND	0.03	0.02	0.01	0.01	0.01
Nitrite nitrogen	μg/L	—	0.30	0.40	0.50	1.50	1.20	1.60	1.60	1.70	2.40	0.80	0.70	0.80
Nitrate nitrogen	mg/L	—	0.01	0.02	0.02	0.03	0.04	0.04	0.06	0.04	0.04	0.02	0.02	0.02
Cd	μg/L	5	ND	0.0451	ND	0.0358	0.0337	0.0938	ND	ND	ND	0.0333	ND	0.0345
Cr	μg/L	—	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.04
Co	μg/L	—	0.560	0.734	0.789	0.953	0.645	0.519	ND	ND	ND	0.802	0.685	0.882
Cu	μg/L	30	0.888	0.940	1.162	1.484	0.883	0.708	ND	ND	ND	1.343	0.719	1.090
Ni	μg/L	100	ND	0.207	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Pb	μg/L	10	6.663	6.408	8.576	12.005	10.514	9.372	0.550	0.556	0.894	9.878	14.491	14.098
Zn	μg/L	500	6.80	7.88	7.30	6.63	5.61	5.40	0.42	0.78	0.50	7.08	8.35	7.28
Fe	μg/L	—	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
As	μg/L	50	ND	0.040	ND	ND	0.009	ND	0.045	0.133	ND	ND	0.006	0.023
Hg	μg/L	1	5.72	4.53	8.21	55.8	35.5	37.1	54.5	59.6	48.5	23.8	17.6	19.9
Turbidty	NTU	—	1.5	1.5	1.5	0.8	0.8	0.8	0.8	0.8	0.8	1.0	1.0	1.0
Transparency	m	—	0.3	0.2	0.2	0.3	0.5	0.4	0.4	0.4	0.3	0.2	0.5	0.3
Silicate	mg/L	—	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total oil	mg/L	—	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

*Noote：When the measured value is below the method detection limit (MDL), it is indicated as "ND ".

2024 Q4 monitoring results of marine water quality near Mailiao (3/3)

Station	Units	A type marine water quality standard (2018.02.13~)	4B	4B	4B	5B	5B	5B	2C	3C	4M
Depth	meter		0.5	9.0	17.0	0.5	10.0	19.0	0.5	0.5	0.5
Tepm.	℃	—	27.1	27.0	27.0	27.0	27.0	27.0	27.3	27.2	27.4
Salinity	PSU	—	33.4	33.4	33.4	33.7	33.7	33.6	33.3	33.2	32.9
pH	-	7.5~8.5	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1
D.O.	mg/L	≥5.0	7.4	7.3	7.5	7.4	7.4	7.4	7.4	7.3	7.4
B.O.D.	mg/L	≤ 2	1.5	1.2	1.4	1.1	1.1	1.1	0.5	1.6	0.2
E. coli	CFU/100ml	≤ 1000	ND	14	ND	ND	ND	ND	ND	ND	ND
S.S.	mg/L	—	46.0	104.5	49.5	113.0	139.5	130.0	10.0	21.0	70.5
Cyanide	μg/L	10	7	4	3	6	7	5	4	ND	7
Total phenols	μg/L	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Mineral oil	mg/L	2	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorophyll a	μg/L	—	0.4	0.4	0.4	0.4	0.5	0.5	0.6	0.5	1.8
Total phosphorus	mg/L	0.05	0.046	0.052	0.071	0.087	0.032	0.023	0.026	0.054	0.025
NH3-N	mg/L	0.3	0.02	0.01	0.05	0.11	0.09	0.11	ND	0.08	0.17
Nitrite nitrogen	μg/L	—	2.30	2.40	2.10	1.90	1.30	1.20	2.70	3.10	3.20
Nitrate nitrogen	mg/L	—	0.05	0.05	0.05	0.03	0.03	0.03	0.07	0.07	0.08
Cd	μg/L	5	0.0633	0.0433	0.0417	0.0466	0.0412	0.0483	0.0340	ND	0.0614
Cr	μg/L	—	0.04	ND	ND	0.04	ND	ND	0.04	ND	ND
Co	μg/L	—	1.294	0.732	0.711	1.143	1.082	1.669	0.925	0.619	1.469
Cu	μg/L	30	2.163	0.921	1.563	1.373	1.112	2.581	0.971	0.938	1.967
Ni	μg/L	100	ND	ND	ND	0.211	ND	ND	ND	ND	ND
Pb	μg/L	10	12.445	9.451	12.278	30.321	24.693	14.066	8.269	7.879	26.642
Zn	μg/L	500	7.29	6.14	6.43	6.70	6.46	7.03	6.66	6.29	14.67
Fe	μg/L	—	ND	ND	ND	ND	ND	ND	ND	ND	ND
As	μg/L	50	ND	0.025	ND	ND	ND	ND	ND	ND	ND
Hg	μg/L	1	35	4.8	15.9	55.9	94	48.3	42.6	33.3	31.1
Turbidty	NTU	—	0.8	0.8	0.8	0.5	0.5	0.5	0.5	0.8	0.8
Transparency	m	—	0.4	0.6	1.0	0.4	0.5	0.4	0.3	0.5	0.8
Silicate	mg/L	—	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total oil	mg/L	—	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

*Noote：When the measured value is below the method detection limit (MDL), it is indicated as "ND ".

Appendix 2 - monitoring results of harbor area water quality

2023 Q1 monitoring results of harbor area water quality

Monitoring items	Units	A type marine water quality standard (2018.02.13~)	3H			4H			5H		
Depth	m		1.0	10.0	20.0	1.0	10.0	20.0	1.0	10.0	20.0
Tepm.	℃	—	17.2	17.1	17.0	16.9	16.6	16.5	17.0	16.8	16.7
pH	-	7.5~8.5	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.3
Salinity	PSU	—	31.6	31.7	31.5	31.5	31.4	31.4	31.7	31.6	31.5
S.S.	mg/L	—	4.6	5.5	8.1	8.1	3.7	5.0	4.4	5.1	3.7
C.O.D.	mg/L	—	ND	ND	ND	ND	ND	ND	ND	ND	ND
B.O.D.	mg/L	≤ 2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
D.O.	mg/L	≥5.0	5.8	5.9	5.9	5.8	5.8	5.9	5.7	5.8	5.8
Cyanide	mg/L	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND
Nitrate-N	mg/L	—	0.26	0.25	0.26	0.26	0.26	0.26	0.26	0.26	0.27
Nitrite-N	mg/L	—	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.02	0.02
NH3-N	mg/L	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Total phosphorus	mg/L	0.05	0.02	0.03	0.02	0.02	0.03	0.02	0.02	0.02	0.02
T.O.C.	mg/L	—	<1.0	<1.0	1.1	<1.0	<1.0	1.0	<1.0	1.2	<1.0
Mineral oil	mg/L	2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorophyll a	g/m^3	—	1	1	1	1	1	1	1	2	1
Total phenols	mg/L	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND
E. coli	CFU/100ml	≤ 1000	<10	<10	<10	<10	<10	<10	<10	<10	<10
Co	mg/L	—	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Fe	mg/L	—	0.015	0.014	0.021	0.016	0.019	0.015	0.017	0.017	0.015
As	mg/L	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hg	mg/L	0.001	ND	ND	ND	ND	ND	ND	ND	ND	ND
Zn	mg/L	0.5	0.0	0.0	0.0	0.0	0.0	0.0	<0.0050	0.0	0.0
Total Cr	mg/L	—	ND	ND	ND	ND	ND	ND	ND	ND	ND
Pb	mg/L	0.01	<0.0010	0.00	0.00	<0.0010	<0.0010	<0.0010	ND	<0.0010	<0.0010
Cu	mg/L	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cd	mg/L	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ni	mg/L	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND

*Noote：When the measured value is below the method detection limit (MDL), it is indicated as "ND ".

2023 Q2 monitoring results of harbor area water quality

Monitoring items	Units	A type marine water quality standard (2018.02.13~)	3H			4H			5H		
Depth	m		1.0	10.0	20.0	1.0	10.0	20.0	1.0	10.0	20.0
Tepm.	℃	—	27.5	27.3	26.9	26.9	26.7	26.2	26.9	26.6	26.2
pH	-	7.5~8.5	8.2	8.2	8.1	8.4	8.4	8.4	8.2	8.3	8.2
Salinity	PSU	—	31.3	31.4	31.1	31.1	31.0	31.2	31.3	31.1	31.1
S.S.	mg/L	—	3.8	3.9	4.1	6.5	3.8	4.0	4.3	3.9	4.0
C.O.D.	mg/L	—	ND	ND	ND	ND	ND	ND	ND	ND	ND
B.O.D.	mg/L	≤ 2	<1.0	<1.0	<1.0	1.1	<1.0	<1.0	<1.0	<1.0	<1.0
D.O.	mg/L	≥5.0	6.1	6.1	6.1	6.3	6.3	6.2	6.1	6.3	6.3
Cyanide	mg/L	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND
Nitrate-N	mg/L	—	0.26	0.29	0.26	0.26	0.22	0.25	0.26	0.26	0.27
Nitrite-N	mg/L	—	<0.01	<0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01
NH3-N	mg/L	0.3	0.1	0.1	0.0	0.1	0.1	0.1	0.0	0.1	0.1
Total phosphorus	mg/L	0.05	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02
T.O.C.	mg/L	—	1.4	1.2	<1.0	1.3	1.0	1.4	1.0	<1.0	1.2
Mineral oil	mg/L	2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorophyll a	g/m^3	—	2	3	2	2	2	3	2	2	2
Total phenols	mg/L	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND
E. coli	CFU/100ml	≤ 1000	70	<10	80	50	45	150	55	85	15
Co	mg/L	—	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Fe	mg/L	—	0.024	0.025	0.022	0.024	0.024	0.025	0.024	0.024	0.025
As	mg/L	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hg	mg/L	0.001	ND	ND	ND	ND	ND	ND	ND	ND	ND
Zn	mg/L	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Cr	mg/L	—	ND	ND	ND	ND	ND	ND	ND	ND	ND
Pb	mg/L	0.01	ND	ND	ND	ND	ND	<0.0010	ND	ND	ND
Cu	mg/L	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cd	mg/L	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ni	mg/L	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND

*Noote：When the measured value is below the method detection limit (MDL), it is indicated as "ND ".

2023 Q3 monitoring results of harbor area water quality

Monitoring items	Units	A type marine water quality standard (2018.02.13~)	3H			4H			5H		
Depth	m		1.0	10.0	20.0	1.0	10.0	20.0	1.0	10.0	20.0
Tepm.	℃	—	29.1	28.4	27.8	29.5	28.9	28.0	29.0	28.3	27.8
pH	-	7.5~8.5	8.2	8.2	8.1	8.1	8.0	8.1	8.1	8.0	8.0
Salinity	PSU	—	30.4	30.6	30.8	30.5	30.6	30.7	30.4	30.7	30.6
S.S.	mg/L	—	5.8	5.2	6.2	11.4	5.2	8.2	6.9	7.3	4.2
C.O.D.	mg/L	—	ND	ND	ND	ND	ND	ND	ND	ND	ND
B.O.D.	mg/L	≤ 2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
D.O.	mg/L	≥5.0	5.4	5.3	5.2	5.2	5.3	5.2	5.3	5.2	5.2
Cyanide	mg/L	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND
Nitrate-N	mg/L	—	0.24	0.24	0.24	0.27	0.23	0.24	0.24	0.24	0.25
Nitrite-N	mg/L	—	0.01	0.01	0.01	0.01	0.01	0.01	0.01	<0.01	<0.01
NH3-N	mg/L	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Total phosphorus	mg/L	0.05	0.02	0.02	0.02	0.01	0.02	0.01	0.02	0.03	0.02
T.O.C.	mg/L	—	1.1	1.1	1.1	1.4	1.2	1.0	1.1	1.4	1.2
Mineral oil	mg/L	2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorophyll a	g/m^3	—	1	1	1	1	1	1	1	1	1
Total phenols	mg/L	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND
E. coli	CFU/100ml	≤ 1000	95	90	<10	30	95	90	85	90	15
Co	mg/L	—	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Fe	mg/L	—	0.005	0.005	0.005	0.005	0.005	0.006	0.005	0.006	0.006
As	mg/L	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hg	mg/L	0.001	ND	ND	ND	ND	ND	ND	ND	ND	ND
Zn	mg/L	0.5	0.0	0.0	0.0	0.0	0.0	0.0	<0.0050	0.0	<0.0050
Total Cr	mg/L	—	ND	ND	ND	ND	ND	ND	ND	ND	ND
Pb	mg/L	0.01	ND	ND	<0.0010	<0.0010	ND	ND	ND	ND	ND
Cu	mg/L	0.03	0.00	0.00	0.00	0.00	0.00	0.00	<0.0010	0.00	<0.0010
Cd	mg/L	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ni	mg/L	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND

*Noote：When the measured value is below the method detection limit (MDL), it is indicated as "ND ".

2023 Q4 monitoring results of harbor area water quality

Monitoring items	Units	A type marine water quality standard (2018.02.13~)	3H			4H			5H		
Depth	m		1.0	10.0	20.0	1.0	10.0	20.0	1.0	10.0	20.0
Tepm.	℃	—	27.2	26.9	26.6	26.3	26.1	25.8	26.9	26.5	26.3
pH	-	7.5~8.5	8.2	8.2	8.1	8.3	8.4	8.4	8.2	8.3	8.2
Salinity	PSU	—	31.4	31.3	31.1	31.2	31.1	31.2	31.3	31.1	31.0
S.S.	mg/L	—	7.1	11.6	8.1	13.0	11.8	11.4	11.1	9.6	10.4
C.O.D.	mg/L	—	ND	ND	ND	ND	ND	ND	ND	ND	ND
B.O.D.	mg/L	≤ 2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
D.O.	mg/L	≥5.0	6.5	6.4	6.4	6.5	6.6	6.5	6.5	6.4	6.4
Cyanide	mg/L	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND
Nitrate-N	mg/L	—	0.25	0.26	0.25	0.22	0.22	0.21	0.23	0.25	0.26
Nitrite-N	mg/L	—	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
NH3-N	mg/L	0.3	0.0	0.0	0.0	0.0	ND	ND	0.0	ND	ND
Total phosphorus	mg/L	0.05	0.04	0.05	0.04	0.04	0.04	0.02	0.02	0.03	0.04
T.O.C.	mg/L	—	1.2	<1.0	<1.0	1.1	<1.0	<1.0	1.1	1.0	<1.0
Mineral oil	mg/L	2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorophyll a	g/m^3	—	1	1	1	1	1	1	1	1	1
Total phenols	mg/L	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND
E. coli	CFU/100ml	≤ 1000	70	65	90	35	50	95	80	70	20
Co	mg/L	—	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Fe	mg/L	—	0.066	0.064	0.065	0.075	0.057	0.059	0.064	0.066	0.066
As	mg/L	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hg	mg/L	0.001	ND	ND	ND	ND	ND	ND	ND	ND	ND
Zn	mg/L	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Cr	mg/L	—	ND	ND	ND	ND	ND	ND	ND	ND	ND
Pb	mg/L	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cu	mg/L	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cd	mg/L	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ni	mg/L	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND

*Noote：When the measured value is below the method detection limit (MDL), it is indicated as "ND ".

2024 Q1 monitoring results of harbor area water quality

Monitoring items	Units	A type marine water quality standard (2018.02.13~)	3H			4H			5H		
Depth	m		1.0	10.0	20.0	1.0	10.0	20.0	1.0	10.0	20.0
Tepm.	℃	—	20.3	19.8	19.4	19.7	19.5	19.4	20.0	19.8	19.5
pH	-	7.5~8.5	8.1	8.1	8.0	8.1	8.1	8.1	8.2	8.1	8.0
Salinity	PSU	—	33.2	33.0	32.8	33.0	33.0	32.9	33.0	32.9	32.8
S.S.	mg/L	—	4.7	6.4	5.7	9.7	4.4	7.5	10.1	6.2	4.4
C.O.D.	mg/L	—	ND	ND	ND	ND	ND	ND	ND	ND	ND
B.O.D.	mg/L	≤ 2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
D.O.	mg/L	≥5.0	6.0	5.9	5.7	6.0	5.6	5.6	6.0	5.8	5.7
Cyanide	mg/L	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND
Nitrate-N	mg/L	—	0.23	0.24	0.25	0.25	0.24	0.23	0.23	0.25	0.25
Nitrite-N	mg/L	—	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.03	0.03
NH3-N	mg/L	0.3	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Total phosphorus	mg/L	0.05	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01
T.O.C.	mg/L	—	<1.0	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Mineral oil	mg/L	2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorophyll a	g/m^3	—	4	4	5	5	5	4	4	4	4
Total phenols	mg/L	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND
E. coli	CFU/100ml	≤ 1000	<10	<10	<10	<10	<10	<10	<10	<10	<10
Co	mg/L	—	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Fe	mg/L	—	0.042	0.064	0.035	0.084	0.032	0.057	0.085	0.058	0.032
As	mg/L	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hg	mg/L	0.001	ND	ND	ND	ND	ND	ND	ND	ND	ND
Zn	mg/L	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Cr	mg/L	—	ND	ND	ND	ND	ND	ND	ND	ND	ND
Pb	mg/L	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cu	mg/L	0.03	0.00	<0.0010	<0.0010	0.00	<0.0010	0.00	0.00	0.00	<0.0010
Cd	mg/L	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ni	mg/L	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND

*Noote：When the measured value is below the method detection limit (MDL), it is indicated as "ND ".

2024 Q2 monitoring results of harbor area water quality

Monitoring items	Units	A type marine water quality standard (2018.02.13~)	3H			4H			5H		
Depth	m		1.0	10.0	20.0	1.0	10.0	20.0	1.0	10.0	20.0
Tepm.	℃	—	27.0	26.9	26.7	26.2	26.0	25.7	26.6	26.4	26.1
pH	-	7.5~8.5	8.2	8.2	8.1	8.4	8.4	8.4	8.3	8.3	8.2
Salinity	PSU	—	31.5	31.4	31.3	31.3	31.1	31.4	31.5	31.3	31.2
S.S.	mg/L	—	3.1	2.4	7.8	3.4	3.8	2.8	3.3	1.8	3.5
C.O.D.	mg/L	—	ND	ND	ND	ND	ND	2.9	ND	ND	3.1
B.O.D.	mg/L	≤ 2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
D.O.	mg/L	≥5.0	5.9	5.9	6.0	6.3	6.1	6.0	6.0	6.0	6.1
Cyanide	mg/L	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND
Nitrate-N	mg/L	—	<0.05	ND	ND	<0.05	ND	<0.05	ND	<0.05	<0.05
Nitrite-N	mg/L	—	ND	ND	ND	ND	ND	ND	ND	ND	ND
NH3-N	mg/L	0.3	0.0	ND	0.0	0.0	0.0	ND	0.0	0.0	0.0
Total phosphorus	mg/L	0.05	0.01	0.02	0.03	0.01	0.01	0.01	0.01	0.01	0.01
T.O.C.	mg/L	—	1.3	<1.0	1.3	1.3	1.4	1.4	1.3	1.3	1.3
Mineral oil	mg/L	2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorophyll a	g/m^3	—	5	5	5	5	5	5	5	5	5
Total phenols	mg/L	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND
E. coli	CFU/100ml	≤ 1000	<10	<10	<10	<10	<10	<10	<10	<10	<10
Co	mg/L	—	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Fe	mg/L	—	0.012	0.011	0.010	0.010	0.015	0.013	0.010	0.013	0.010
As	mg/L	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hg	mg/L	0.001	ND	ND	ND	ND	ND	ND	ND	ND	ND
Zn	mg/L	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Cr	mg/L	—	ND	ND	ND	ND	ND	ND	ND	ND	ND
Pb	mg/L	0.01	ND	ND	0.00	0.00	<0.0010	ND	<0.0010	ND	ND
Cu	mg/L	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cd	mg/L	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ni	mg/L	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND

*Noote：When the measured value is below the method detection limit (MDL), it is indicated as "ND ".

2024 Q3 monitoring results of harbor area water quality

Monitoring items	Units	A type marine water quality standard (2018.02.13~)	3H			4H			5H		
Depth	m		1.0	10.0	20.0	1.0	10.0	20.0	1.0	10.0	20.0
Tepm.	℃	—	32.6	31.8	30.2	32.2	31.6	30.1	32.6	31.8	30.4
pH	-	7.5~8.5	8.2	8.2	8.1	8.2	8.2	8.2	8.2	8.1	8.1
Salinity	PSU	—	31.8	31.5	31.7	31.6	31.2	31.8	31.8	31.6	31.3
S.S.	mg/L	—	2.7	3.8	3.5	3.6	4.9	4.4	2.6	2.6	4.4
C.O.D.	mg/L	—	ND	ND	2.9	ND	ND	ND	ND	3.4	3.2
B.O.D.	mg/L	≤ 2	1.0	1.2	1.3	1.3	1.2	1.3	1.2	1.3	1.1
D.O.	mg/L	≥5.0	5.4	5.3	5.2	5.6	5.6	5.4	5.5	5.4	5.3
Cyanide	mg/L	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND
Nitrate-N	mg/L	—	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Nitrite-N	mg/L	—	ND	ND	ND	ND	ND	ND	ND	ND	ND
NH3-N	mg/L	0.3	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1
Total phosphorus	mg/L	0.05	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.02
T.O.C.	mg/L	—	1.2	1.3	1.4	1.6	1.1	1.2	1.3	1.9	1.4
Mineral oil	mg/L	2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorophyll a	g/m^3	—	2	2	2	2	2	2	1	1	2
Total phenols	mg/L	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND
E. coli	CFU/100ml	≤ 1000	460	850	490	930	410	810	460	370	490
Co	mg/L	—	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fe	mg/L	—	0.019	0.004	0.010	0.004	0.005	0.011	0.013	0.003	0.009
As	mg/L	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hg	mg/L	0.001	ND	ND	ND	ND	ND	ND	ND	ND	ND
Zn	mg/L	0.5	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	ND	ND	ND
Total Cr	mg/L	—	ND	ND	ND	ND	ND	ND	ND	ND	ND
Pb	mg/L	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cu	mg/L	0.03	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cd	mg/L	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ni	mg/L	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND

*Noote：When the measured value is below the method detection limit (MDL), it is indicated as "ND ".

2024 Q4 monitoring results of harbor area water quality

Monitoring items	Units	A type marine water quality standard (2018.02.13~)	3H			4H			5H		
Depth	m		1.0	10.0	20.0	1.0	10.0	20.0	1.0	10.0	20.0
Tepm.	℃	—	22.4	21.6	21.0	22.1	21.6	21.2	22.7	22.0	21.8
pH	-	7.5~8.5	8.1	8.1	8.0	8.1	8.1	8.1	8.2	8.2	8.1
Salinity	PSU	—	32.3	32.2	32.0	32.2	32.1	32.0	32.4	32.3	32.2
S.S.	mg/L	—	10.2	10.1	10.2	9.2	10.4	10.3	10.0	10.3	9.3
C.O.D.	mg/L	—	4.2	5.4	4.3	4.2	4.0	ND	ND	5.4	ND
B.O.D.	mg/L	≤ 2	1.6	1.8	1.6	1.8	1.8	1.7	1.8	1.9	1.7
D.O.	mg/L	≥5.0	5.8	5.7	5.6	5.8	5.6	5.6	5.9	5.8	5.7
Cyanide	mg/L	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND
Nitrate-N	mg/L	—	0.11	0.10	0.12	0.10	0.11	0.09	0.11	0.11	0.11
Nitrite-N	mg/L	—	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
NH3-N	mg/L	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Total phosphorus	mg/L	0.05	0.03	0.11	0.02	0.02	0.02	0.02	0.02	0.07	0.02
T.O.C.	mg/L	—	1.1	1.3	1.0	1.2	1.1	1.0	0.9	0.7	1.1
Mineral oil	mg/L	2	<1.0	1	1	1	1	2	<1.0	1	2
Chlorophyll a	g/m^3	—	3	3	3	3	2	3	3	3	3
Total phenols	mg/L	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND
E. coli	CFU/100ml	≤ 1000	<10	<10	10	10	<10	<10	<10	<10	<10
Co	mg/L	—	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fe	mg/L	—	0.290	0.295	0.285	0.316	0.295	0.243	0.258	0.322	0.235
As	mg/L	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hg	mg/L	0.001	ND	ND	ND	ND	ND	ND	ND	ND	ND
Zn	mg/L	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Cr	mg/L	—	ND	ND	ND	ND	ND	ND	ND	ND	ND
Pb	mg/L	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cu	mg/L	0.03	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cd	mg/L	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ni	mg/L	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND

*Noote：When the measured value is below the method detection limit (MDL), it is indicated as "ND ".

If you have any inquiries regarding this report, please contact us.

Mailiao Harbor Administration Corporation

| Adress : Formosa Industrial Complex No.1-1, Mailiao, Yunlin County, Taiwan R.O.C

| Website: http://www.mlharbor.com.tw

| Email: Jeff-huang@fpcc.com.tw

Website Email

麥寮工業區專用港管理股份有限公司
MAI LIAO HARBOR ADMINISTRATION CORPORATION

經濟部
產業園區管理局
Bureau of Industrial Parks, Ministry of Economic Affairs

國立高雄科技大學
National Kaohsiung University of Science and Technology
海岸水與環境中心
Coastal Water and Environment Center

環興科技股份有限公司
SINOTECH ENGINEERING SERVICES, LTD.