STATUS IN MERCURY MONITORING AT A SUBURBAN, PHATUMTHANI THAILAND

Chanthiraporn Tangsuwan

Climate Change And Environmental Research Center

Department of Climate Change And Environment

The 13th Annual Asia-Pacific Mercury Monitoring Network (APMMN)

Partners Meeting on September 3-6, 2024



Content

- About our organization
- Mercury Monitoring at a suburban, Phatumthani Thailand
- Proficiency Testing Program & ISO17025:2017
- Future Plan

About our organization

Change of organization on August 18, 2023

Ministry of Natural Resources and Environment

Department of Environmental Quality Promotion
(Established in 1992)

→

Department of Climate Change And Environment
(2023)

Environmental Research and Training Center
(ERTC)
(Established in 1992)

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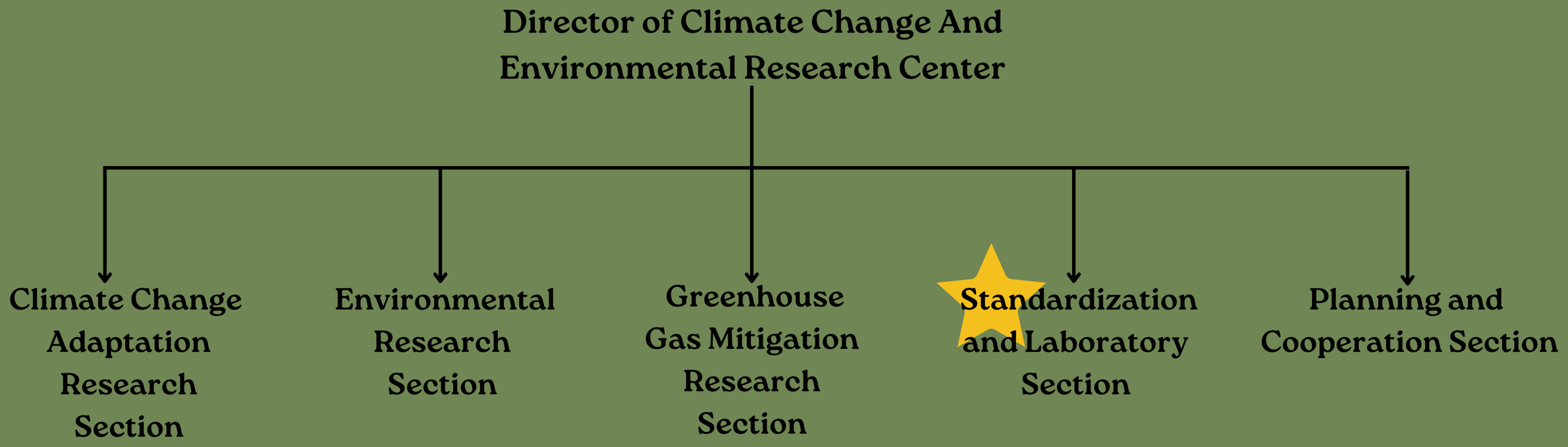
Climate Change And Environmental Research Center
(CERC)
(2023)

Mission of CERC

1. Recommend frameworks and plans for research on climate change in the whole country
2. Research studies, develop and transfer technologies and innovations to manage climate change and environment
3. Analytical studies, research and exchange information, knowledge, technology, innovation on climate change and the environment within the country, foreign countries and international organizations
4. Research and develop methods inspection of environment and climate change and production standard reference samples
5. Collaborate with or support the work of other relevant agencies or as assigned by the Director General

Organization - Division

Climate Change And Environmental Research Center (CERC)
Department of Climate Change And Environment



Role of Standardization and Laboratory Section

1. Research and develop methods inspection of environment and climate change
2. Develop production methods reference samples on the environment and greenhouse gases
3. Coordinate to check data accuracy of sample analysis between laboratories
4. Give consult and service technical support on environmental
5. Co-operation work with relevant agencies or assigned by the Director General

Mercury Monitoring at a suburban, Phatumthani, Thailand

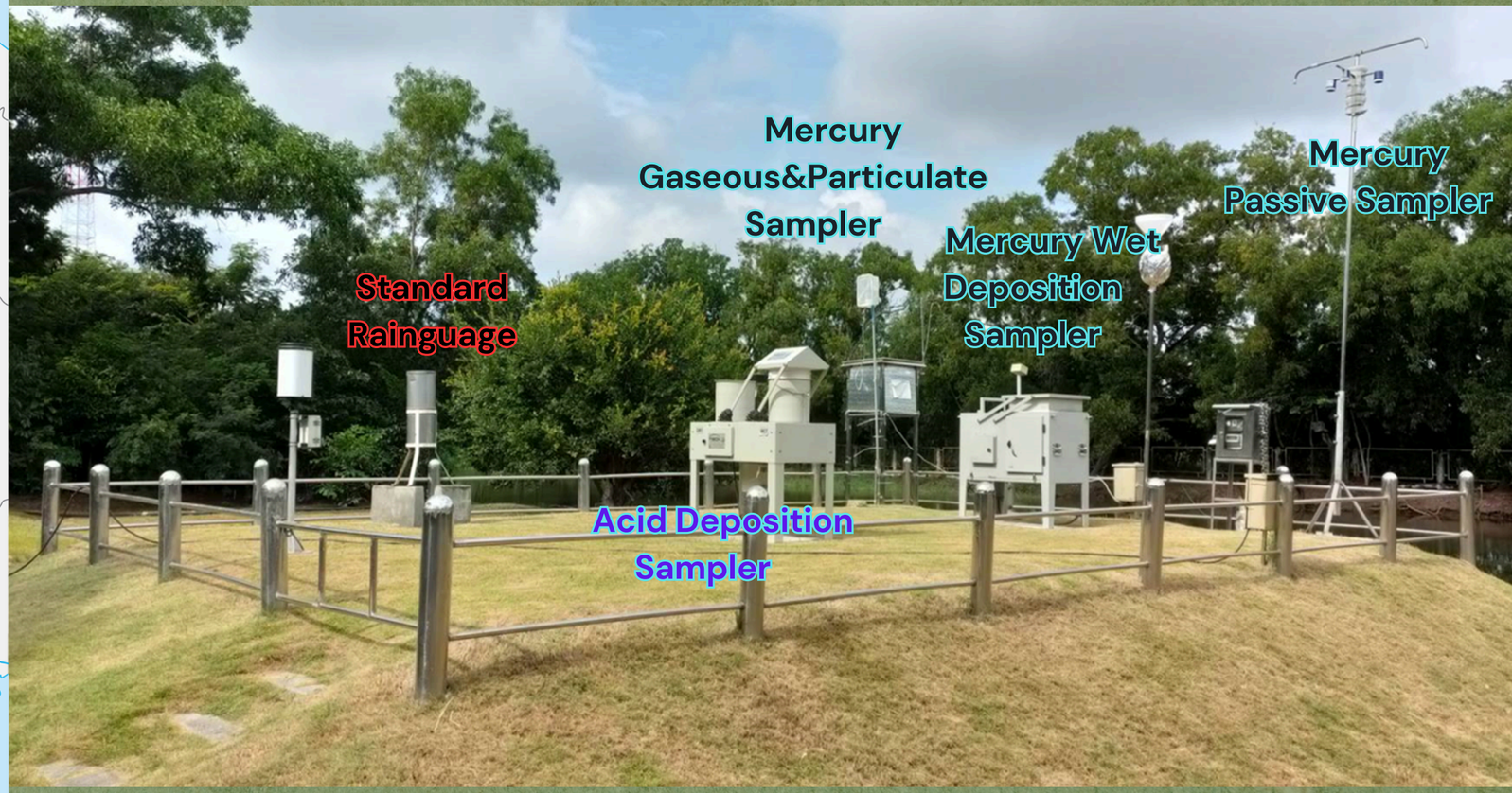
Objectives of Mercury Monitoring at a suburban, Phatumthani Thailand

- To study on the concentration of mercury wet deposition and atmospheric mercury in sub-urban Pathumthani, Thailand.
- To participate in a proficiency testing program in order to assure a laboratory quality control.
- To participate in a ISO/IEC 17025 : 2017



Sampling Site





Latitude 14° 2'46.35"N Longitude 100°42'50.13"E

Mercury wet deposition sampler







Weekly sampling

Acknowledgement : The sampler was given by Taiwan EPA in 2016



Mercury gaseous & particulate mercury sampling

- Mercury gaseous collect sampler 24 hr
- Particulate mercury collect sampler 7 days

Ultra-trace mercury level laboratory

Clean room



Hood and clean benches



Hg in rain water



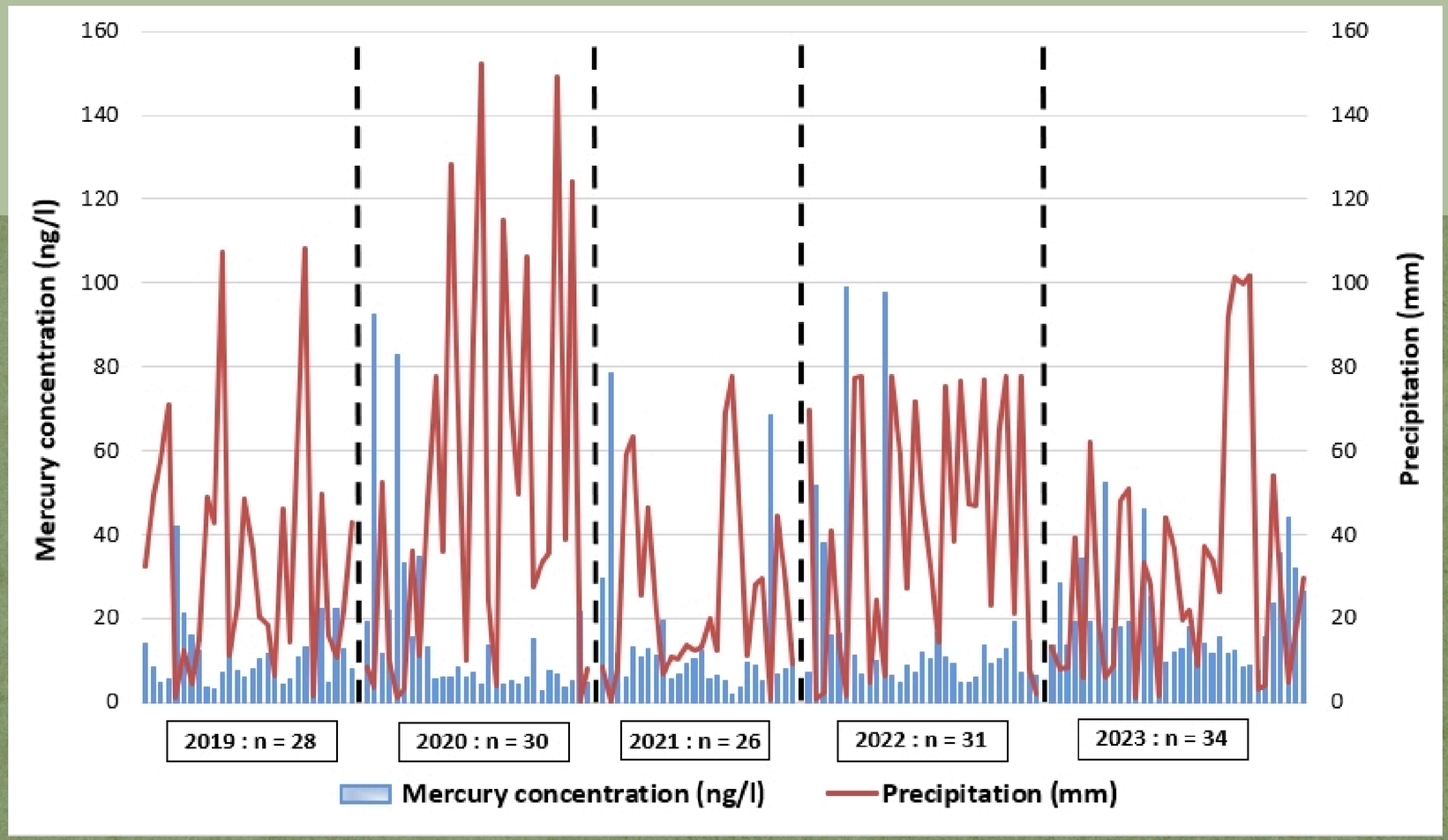
GEM



PBM

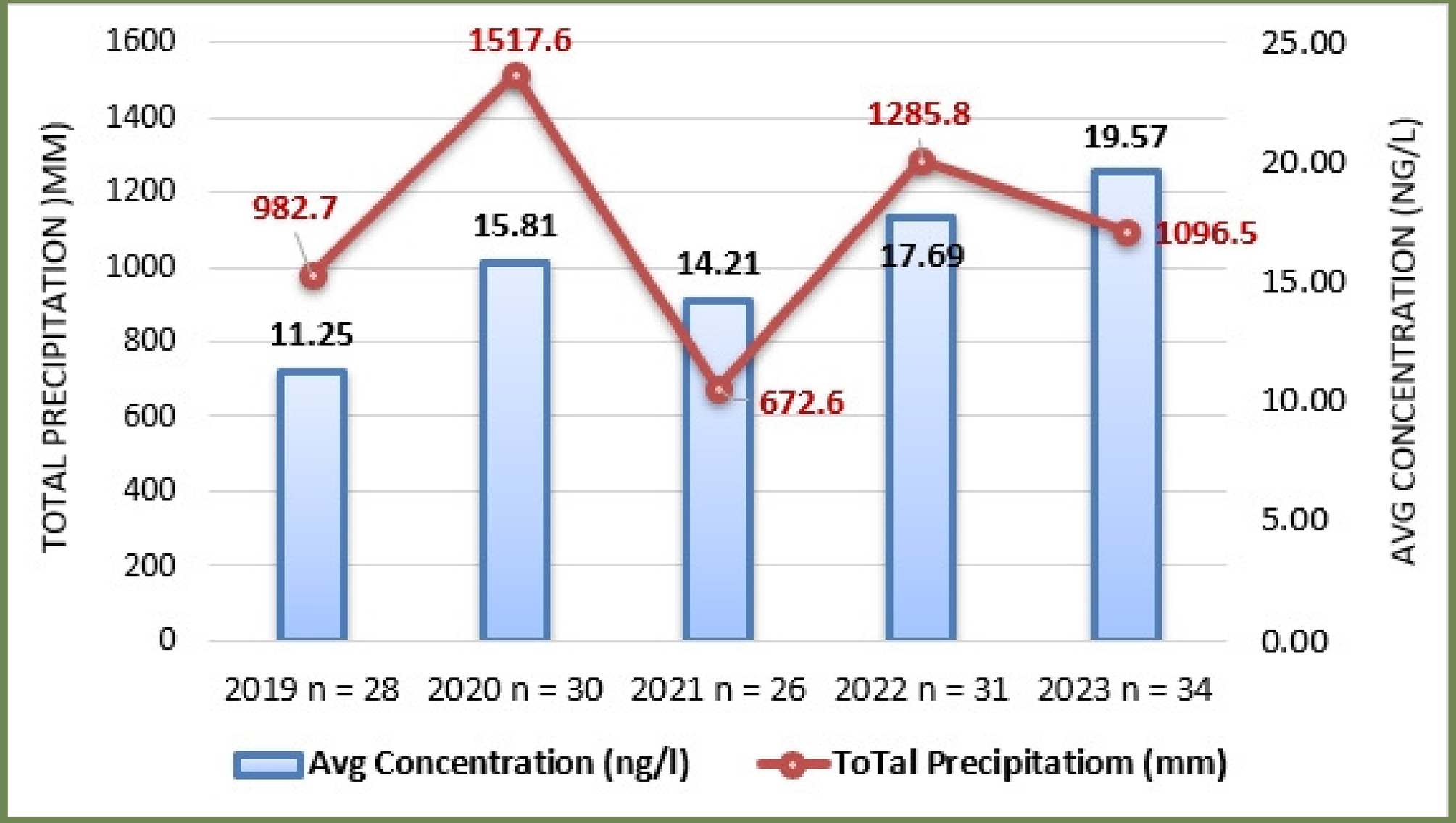


Trend of mercury concentration in precipitation during 2019 - 2023

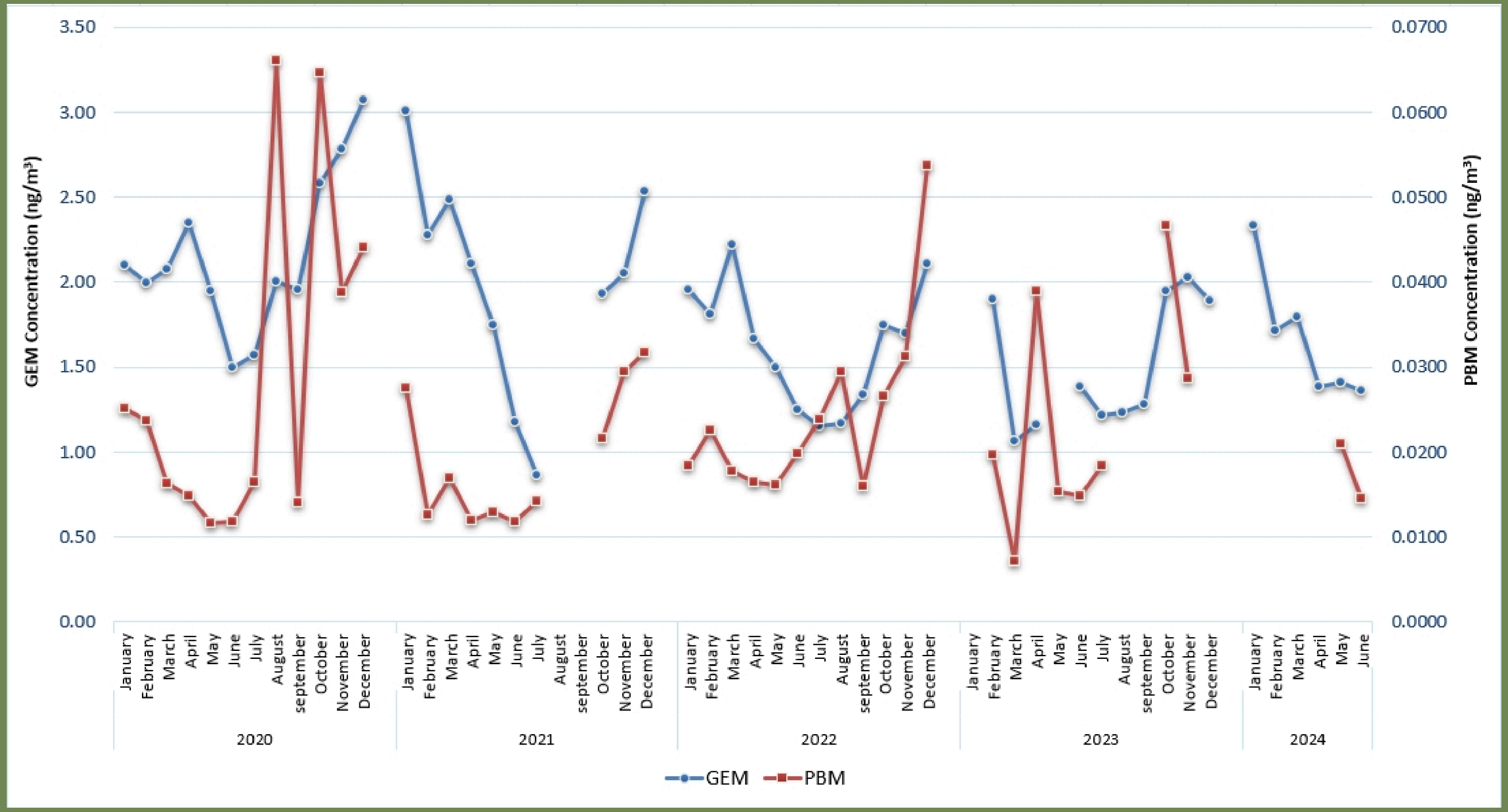


Concentration (ng/l)	2019	2020	2021	2022	2023
Min	2.81	2.42	1.51	4.50	3.76
Max	41.69	92.24	78.20	98.68	52.37
Average	11.25	15.81	14.21	17.69	19.57

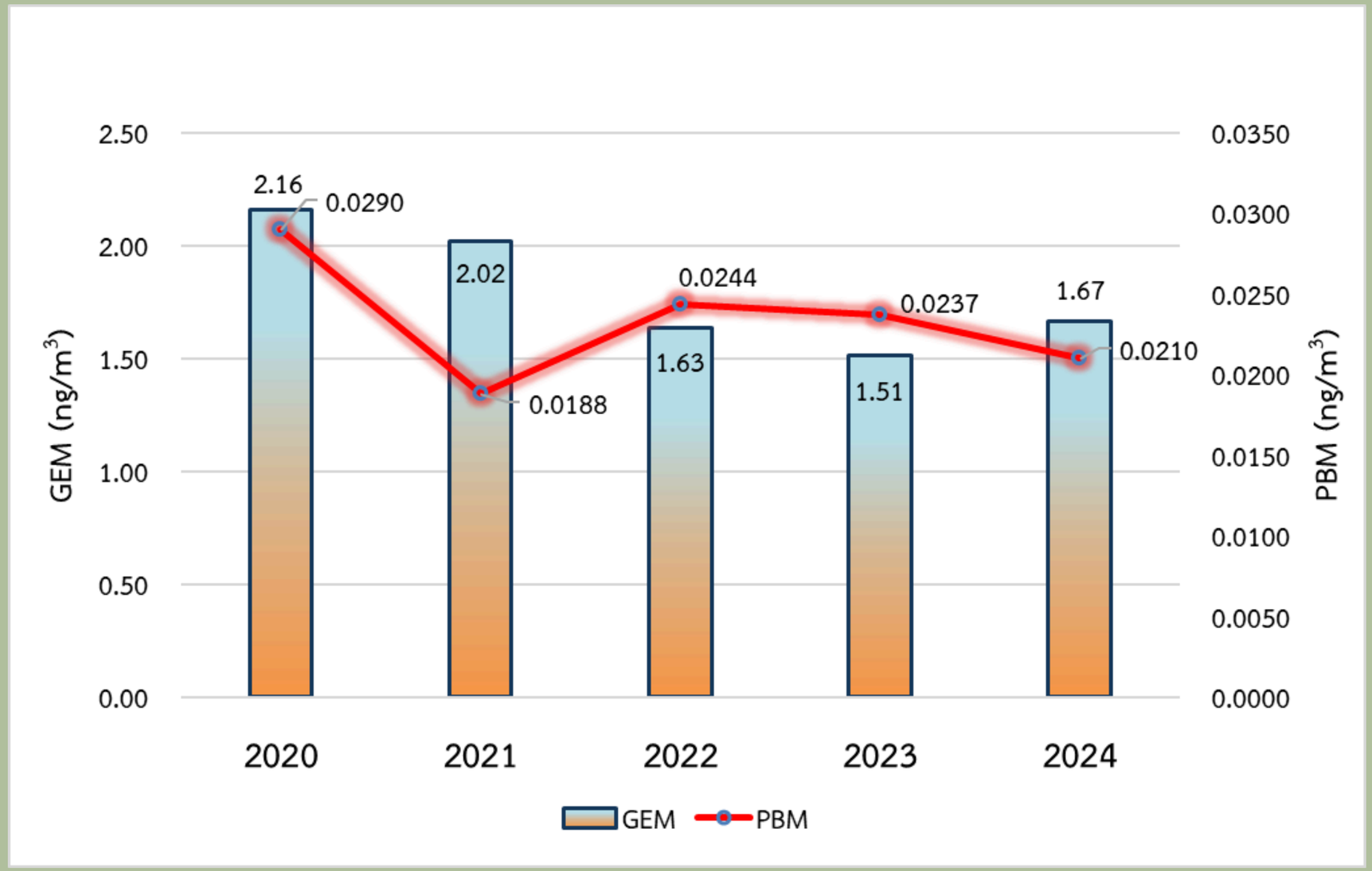
Average mercury concentration (ng/L) in Rain water vs. Total precipitation amount (mm) 2019-2023



Trend of mercury concentration in GEM&PBM during 2019 - 2024



Average Mercury Concentration in GEM&PBM(ng/m3) during 2020 - 2024



Month/Year	Blank (ng)	Ave Blank (ng)	Sample (ng/m^3)
Aug 15,2023	0.018 0.022 0.025	0.022	1.18
Sep 19,2023	0.026 0.024 0.025	0.025	2.31
Oct 17,2023	0.040 0.077 0.042	0.053	3.11
Nov 21,2023	0.010 0.010 0.009	0.010	2.39
Dec 19,2023	0.017 0.019 0.014	0.017	2.21
Feb 20,2024	0.013 0.015 0.017	0.015	1.45
Mar 19,2024	0.018 0.017 0.017	0.017	1.96
Apr 16,2024	Songkran Festival /The sample was not collected		
May 21,2024	0.032 0.029 0.031	0.031	1.47
Jun 18,2024	0.029 0.030 0.027	0.029	1.11

Same-Day monitoring by gold amalgamation trap





Sampling



Mercury Analyzer: NIC WA-5F

Conclusions

- In overall, The mercury concentration in precipitation were high when the precipitation were low. The maximum mercury concentrations were usually found during the beginning of rainy season.
- The trend in the average concentration of mercury wet deposition from 2019 to 2023 fluctuated between 11.25 and 19.57 ng/L. The highest deposition was observed in 2023, when the total precipitation amount was slightly lower compared to the previous year.
- The PBM level in the air was found to be approximately 70 times lower than the level of GEM.

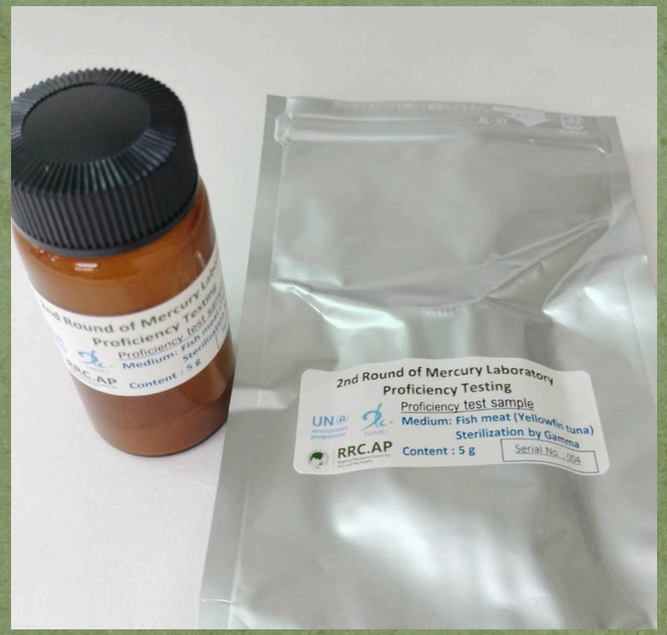
Mercury laboratory Proficiency Testing Program & ISO17025:2017

1st Round of Mercury Laboratory 2022





Mercury Analyzer: NIC MA-3000



2st Round of Mercury Laboratory 2023

Result

Results

Participant ID: 3 **Test item: One (1) human hair sample**

ID	Results submitted (mg/kg)			
	1	2	3	Average
3	1.414	1.417	1.414	1.415

Participants' statistics (mg/kg)		z score obtained
Median	NIQR	
1.458	0.122	-0.347

Performance of the result is classified by z score as follows:
|z| ≦2: Performance is satisfactory (satisfactory)
2 < |z| < 3: Performance is questionable (caution)
|z| ≧ 3: Performance is unsatisfactory (action)

Results of total mercury

Participant ID: 2 **Test item : Fish meat (Yellowfin tuna) Sterilization by Gamma**

ID	Results submitted (mg/kg)			
	1	2	3	Average
2	4.147	4.146	4.131	4.141

Participants' statistics (mg/kg)		z score obtained
Median	NIQR	
4.046	0.279	+0.343

Performance of the result is classified by z score as follows:
|z| ≦2: Performance is satisfactory (satisfactory)
2 < |z| < 3: Performance is questionable (caution)
|z| ≧ 3: Performance is unsatisfactory (action)

Proficiency Testing program 2024

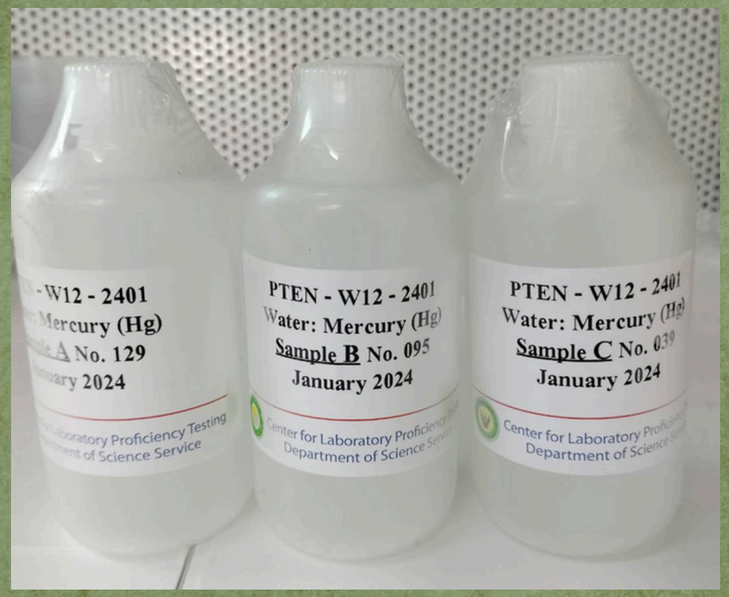
Organised by

Center for Laboratory Proficiency Testing

Department of Science Service,

Ministry of Higher Education, Science,

Research and Innovation, Thailand



Sample



Report No. 1441/2024

Proficiency Testing Program
Organised by
Center for Laboratory Proficiency Testing
Department of Science Service,
Ministry of Higher Education, Science, Research and Innovation, Thailand
Mercury (Hg) in water
PTEN - W12 - 2401
17 April 2024
SUMMARY SHEET

Laboratory Name : Standard and Laboratory group,
Climate Change and Environmental Research Center,
Department of Climate Change and Environment

Laboratory Code : W12 - 2401 - 008

Sample	Number of results	Assigned value (x_{pt}) (µg/L)	Standard deviation for proficiency assessment (σ_{pt}) (µg/L)	Lab's result (µg/L)		z score
				Value	MU	
A	85	4.900	1.470	4.97	-	0.05
B	85	4.900	1.470	5.19	-	0.20
C	88	0.050	-	0.25	-	-

Note

1. **Assigned values (x_{pt})** are the reference values determined by the reference laboratory (National Institute of Metrology Thailand).
2. **Standard deviations for proficiency assessment (σ_{pt})** are the target standard deviations from expert judgement.
3. MU are measurement uncertainties at 95% confidence level.
4. Sample C is not evaluated.
5. Each z score marked with **"A"** is an outlier ($|z| \geq 3.0$). Therefore, laboratory which is marked with **"A"** shall investigate the result. Laboratory is also encouraged to review the result which has an absolute z - score value between two and three ($2.0 < |z| < 3.0$) marked with **"W"**.
6. This summary sheet shall be read in conjunction with the final report.

Reported by
W.Suprawee
(Ms. Suprawee Wongsuchoto)
Program Coordinator

Approved by
C. Yaolux
(Mrs. Yaowalux Chinchusak)
Director of Center for Laboratory Proficiency Testing
Department of Science Service

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ISO/IEC 17025 : 2017
Testing Certificate 2023
Ultra-trace Mercury Laboratory



Ref No. : 0303/3313

CERTIFICATE OF TESTING LABORATORY ACCREDITATION

This is to certify that

Environmental Research and Training Center,
Department of Environmental Quality Promotion
34 Moo 3, Technopolis, Tambon Klong 5, Amphoe Klong Luang,
Changwat Pathumthani 12120

has successfully undergone assessment according to ISO/IEC 17025 : 2017
and under the Bureau of Laboratory Accreditation, Department of Science Service
for the requirements, regulations and criteria for the competence of testing laboratories

LABORATORY ACCREDITATION
BLA-DSS

Accreditation Number TESTING - 0019

The scope of accreditation is as annexed hereto

Issue date : *27th February 2023*
Expired date : *26th February 2027*
Signature :

(Mrs. Pochaman Tagheen)
Director of Bureau of Laboratory Accreditation

Bureau of Laboratory Accreditation, Department of Science Service,
Ministry of Higher Education, Science, Research and Innovation

Reference No. : 0303/3313

Scope of Testing Laboratory Accreditation

Laboratory Name : Environmental Research and Training Center,
Department of Environmental Quality Promotion

Address : 34 Moo 3, Technopolis, Tambon Klong 5, Amphoe Klong Luang,
Changwat Pathumthani 12120

Accreditation Number : Testing - 0019

Laboratory Status : ☑ Permanent ☐ Site ☐ Temporary ☐ Mobile

Item Number	Test Material / Product	Test Item / Range of Testing	Test Method / Technique Used
5	Rain water	- Mercury 2.0 ng/L to 20 ng/L	In - house method: WI-9-1-A7001 based on Method 1631, Revision E: Mercury in Water by Oxidation, Purge and Trap, and Cold Vapor Atomic Fluorescence Spectrometry, August 2002



Ultra-trace Mercury Laboratory
ISO/IEC 17025 : 2017

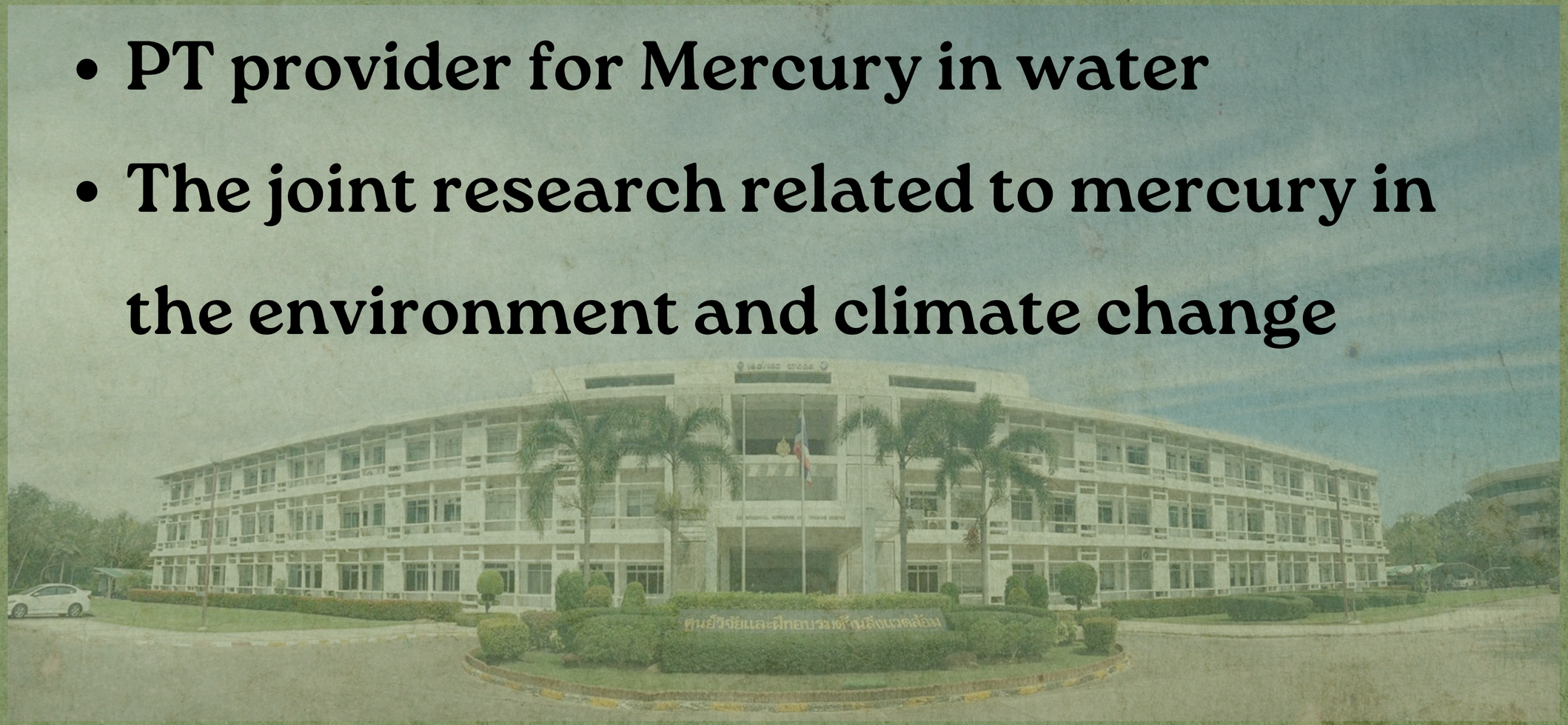
Surveillance audit activity
during March 14-15, 2024





Future Plan

- PT provider for Mercury in water
- The joint research related to mercury in the environment and climate change



Thank you very much

