



**VIETNAM ENVIRONMENT ADMINISTRATION (VEA)**  
**NORTHERN CENTER FOR ENVIRONMENTAL MONITORING (NCEM)**



# **UPDATE 2019 ON MERCURY MONITORING IN VIETNAM**

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**2019 ASIA-PACIFIC MERCURY MONITORING NETWORK WORKSHOP**

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# GENERAL INTRODUCTION



# INTRODUCTION OF VIETNAM

- Located at the Southeast of Asia
- Area: 331.210 km<sup>2</sup>
- Population: 96,2 million
- Density: 290 people/km<sup>2</sup>
- Urban population: 34,4 %
- Rural population: 65,6 %



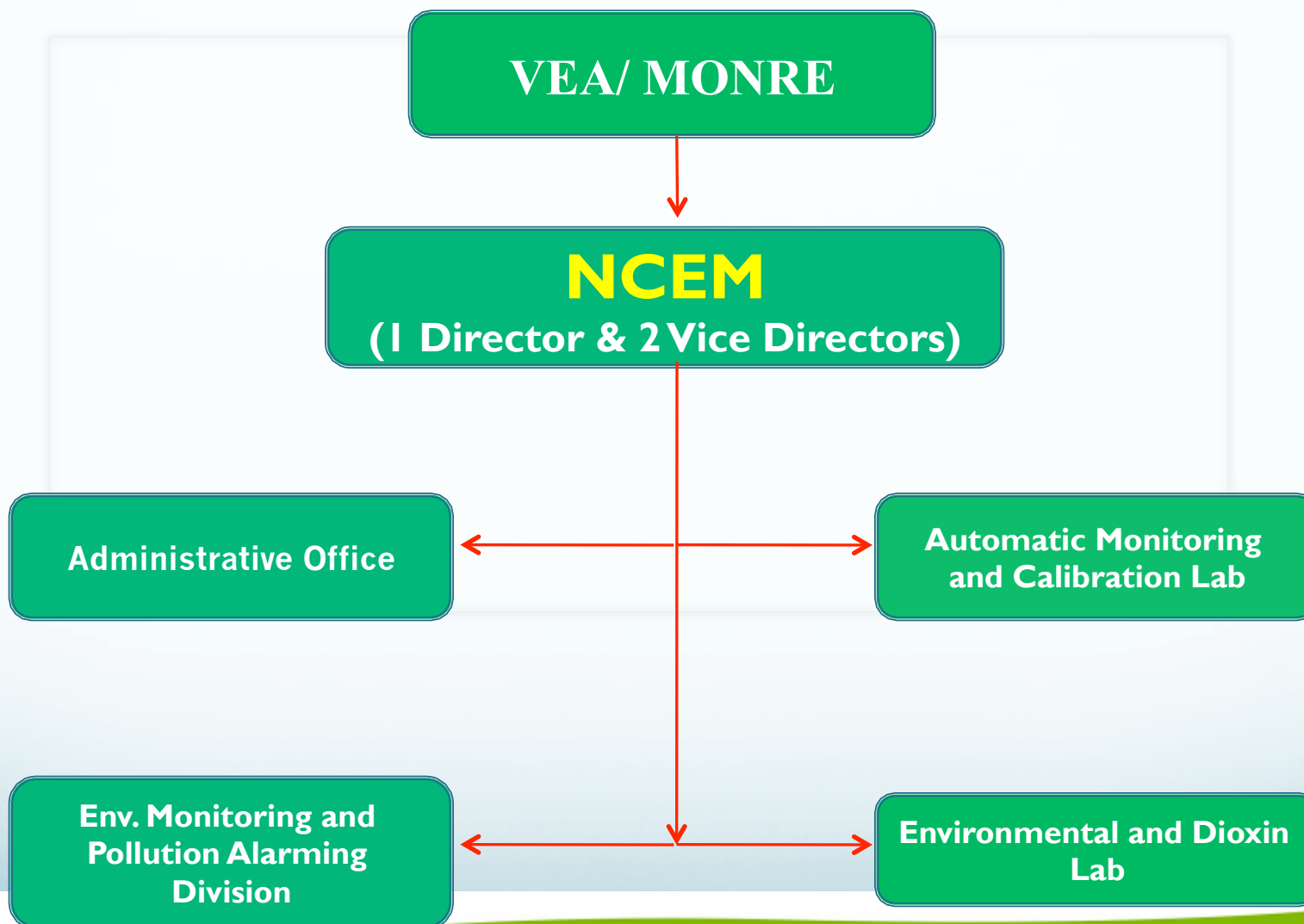
# INTRODUCTION OF VIETNAM



# National Technical Regulation on Environment for Mercury

| No. | Component                                    | Maximum value                           |
|-----|----------------------------------------------|-----------------------------------------|
| 1.  | Surface water quality                        |                                         |
|     | - Water supply, Irrigation water purposes    | 0.001 mg/L                              |
|     | - Waterway traffic                           | 0.002 mg/L                              |
| 2.  | Underground water quality                    | 0.001 mg/L                              |
| 3.  | Sea water quality                            |                                         |
|     | - Aquaculture and aquatic conservation areas | 0.001 mg/L                              |
|     | - Beach and amusement areas                  | 0.002 mg/L                              |
|     | - Other areas                                | 0.005 mg/L                              |
| 4.  | Ambient air quality (hazardous substances)   | 0.3 $\mu\text{g}/\text{m}^3$ (24 hours) |
| 5.  | Sediment quality                             |                                         |
|     | - In surface water                           | 0.5 mg/kg                               |
|     | - In sea water                               | 0.7 mg/kg                               |

# About NCEM, VEA

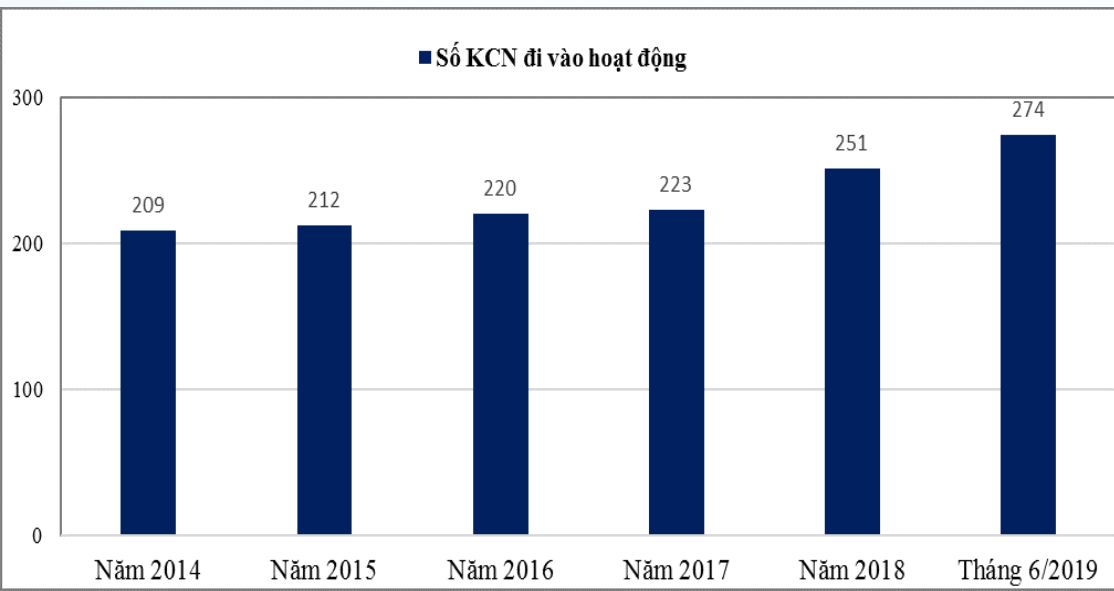


# SOURCES OF MERCURY

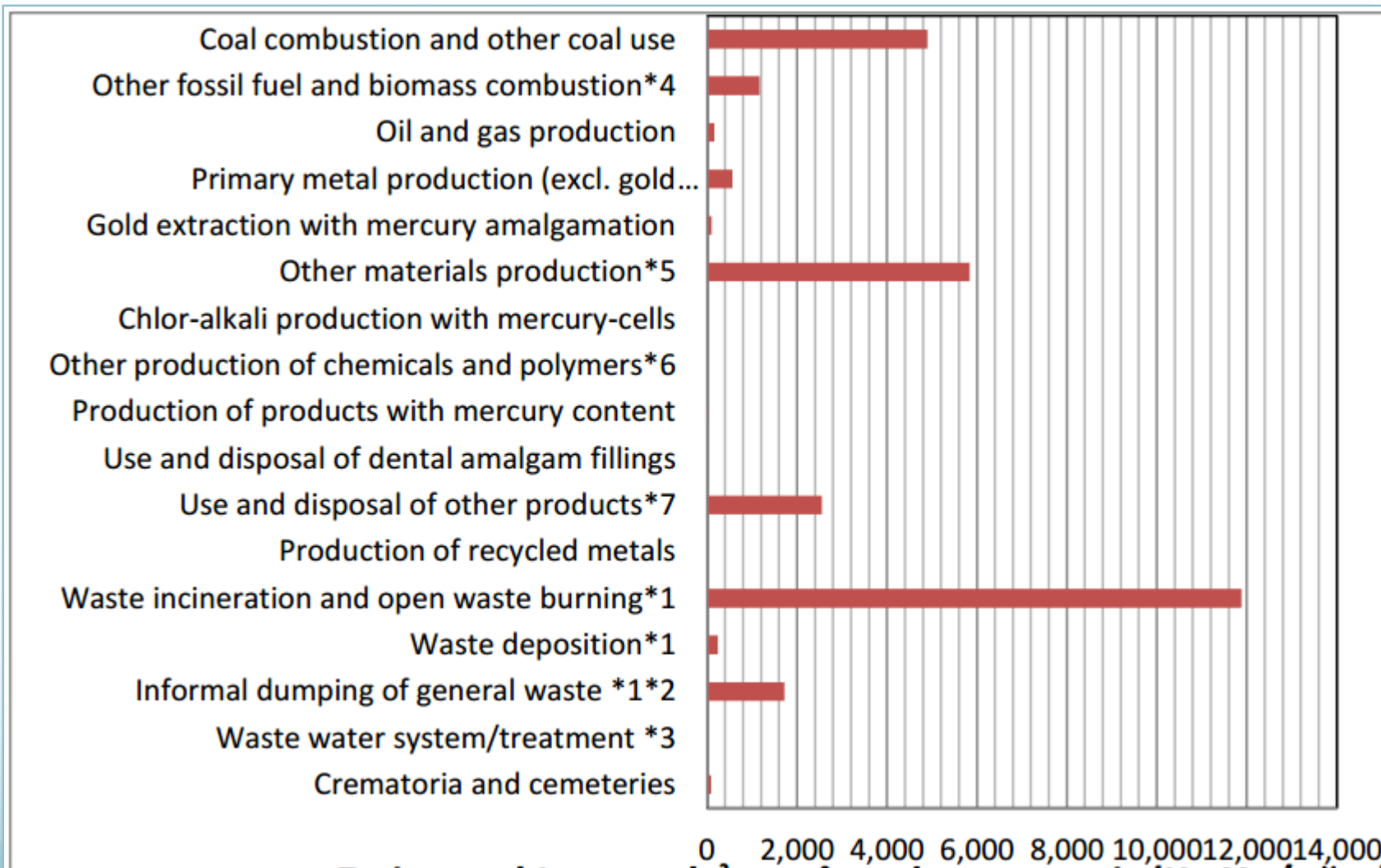




- Transportation
- Industrial sector
- Incinerator and waste open burning
- Construction
- Agriculture and craft villages
- Gold mining, thermometer, etc...
- Landfill



# Estimated mercury releases to air



Kg Hg/year

Source: Report on National Mercury Survey, MoIT -2016)

# UPDATE ON MERCURY MONITORING ACTIVITIES IN VIETNAM



Asia Pacific Mercury  
Monitoring Network

# Mercury monitoring activities in environment in Vietnam

- **2005:** Monitoring mercury in river and water, soil, sediment
- **2015:** Monitoring mercury in stack (cement, steel, power plant, incinerator).
  - Mercury Emission Inventory for power plant industrial (2017-2018)
  - Mercury Emission Inventory for steel and cement industrial (2017-2018)
  - Emission Survey Domestic Solid Waste Incinerator - including Mercury (2019)



# Mercury monitoring activities in atmosphere in Vietnam



- **2010:** Joint the 7-SEA program.
- **2012:** set up 01 automatic station for air quality monitoring in Hanoi (*including Hg parameter*).
- **2014:** Vietnam has joined the Asia-Pacific Mercury Monitoring Network (APMMN).

# Mercury monitoring activities in atmosphere in Vietnam



# Mercury monitoring activities in atmosphere in Vietnam

- **From 2016 - 2019:** participate in APMMN' s activities  
*(02 wet samplers, 01 dry sampling site for Hg analysis in gold trap)*



# Mercury monitoring in rain water

## Site Information

| Country     | Site ID                | Site Name       | County           | Latitude | Longitude | Elevation | Status | Type |
|-------------|------------------------|-----------------|------------------|----------|-----------|-----------|--------|------|
| Indonesia   | <a href="#">APID01</a> | MOEF            | Jakarta          | -6.2088  | 106.8455  |           | Active | Wet  |
| Philippines | <a href="#">APPH01</a> | Clark           | Pampanga         | 15.177   | 120.536   | 184       | Active | Wet  |
| Taiwan      | <a href="#">APTW01</a> | Lulin           | Nantou           | 23.4689  | 120.8729  | 2862      | Active | Both |
| Thailand    | <a href="#">APTH01</a> | ERTC            | Pathum Thani     | 14.0462  | 100.7143  | 6         | Active | Wet  |
| Sri Lanka   | <a href="#">APLK01</a> | U of Peradeniya | Central Province | 7.2518   | 80.5946   | 481       | Active | Wet  |
| Vietnam     | <a href="#">APVN01</a> | CEM             | Hanoi            | 21.0487  | 105.8829  |           | Active | Wet  |
| Vietnam     | <a href="#">APVN02</a> | Thai Nguyen     | Thai Nguyen      | 21.5987  | 105.8231  |           | Active | Wet  |



# Mercury monitoring in rain water

- Operating the wet deposition sampler in Hanoi, Vietnam from 2014;
- Taking sample every month and send the samples to NCU for Hg analysis



# Mercury monitoring in rain water

- Setting up the second wet deposition sampler in Thai Nguyen province from March 2019;
- Taking sample every month and send the to NCU for Hg analysis



## SAMPLING FOR GASEOUS MERCURY IN AMBIENT AIR

- Starting time: 2019
- Monitoring site: Hanoi, Vietnam
- Using tool kit from Japan (gold traps)
- Collected samples were sent to Japan for analysis Hg



## SAMPLING FOR PARTICULATE MERCURY IN AMBIENT AIR

- Starting time: 2017 (for research);
- Monitoring site: 5 provinces in Vietnam;
- Using medium volume instrument to take sample PM<sub>2.5</sub> (Comde Deredan) and analyse Hg and some other heavy metal in the filter.



## New instruments for mercury analysis in NCEM's laboratory

Mercury analyser  
**NIC WA-5F**



## New instruments for mercury analysis in NCEM's laboratory

### Mercury Analyser NIC RA-5A



## Update on instruments for mercury monitoring in NCEM - VEA

| Instrument                                                   | Method       | Quantity    | Note              |
|--------------------------------------------------------------|--------------|-------------|-------------------|
| Wet deposition sampler                                       | APMMN SOP    | 02 sampler  | 01 new instrument |
| Isokinetic sampler                                           | US EPA 29    | 03 sampler  | 01 new instrument |
| Mercury on-site sampling and analysis (Apex Airinstruments ) | US EPA 30A   | 01 module   |                   |
| Mercury analyzer (AAS)                                       | US EPA 29    | 01 analyzer |                   |
| Mercury analyzer (ICP-MS)                                    | US EPA 200.8 | 02 analyzer |                   |
| Mercury analyzer (SMS 100)                                   | US EPA 1631  | 01 analyzer |                   |
| Mercury analyzer (NIC WA-5F)                                 | US EPA 10-5  | 01 analyzer | New instrument    |
| Mercury analyzer (NIC RA-5A)                                 | US EPA 7470A | 01 analyzer | New instrument    |
| PM2.5 Sampler (Comde Deredan)                                | US EPA 10-5  | 03 sampler  | 02 new instrument |

# CHALLENGES



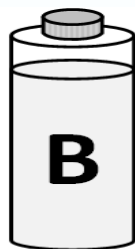
# Challenges

- Limitation on capacity (technical and finance resources)
- Limited mercury monitoring site
- Big gaps of mercury monitoring data
- Old and small area for the laboratory (difficult to control the lab's environment condition and avoid contamination...)
- Not easy to have the pure chemical for upper trace level analyse, cleaning mercury sampling tools



# Challenges

- QA/QC for sampling, reservation and deliver to NCU Taiwan



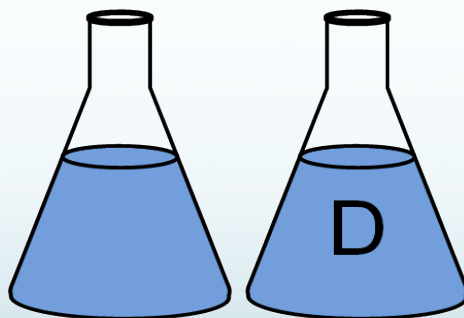
Field Blank



Travel Blank



Blank Spike



Lab Duplicate



Matrix Spike



# FUTURE PLAN



# Future plan

- Capacity building of mercury sampling and analyse
- Set up a mercury atmospheric monitoring program/network (dry and wet) in Vietnam
- Doing analyse the rain water and gold trap samples in NCEM laboratory
- Building the new office (big area and modern design for the laboratory)
- Enhancing the collaboration and sharing experience between APMM countries (for example: learning by doing in the lab in US, Japan, Taiwan, Thailand...)

**THANK YOU!**

**TERIMA KASIH!**