

UPDATE YEAR 2018:
MERCURY MONITORING
IN INDONESIA

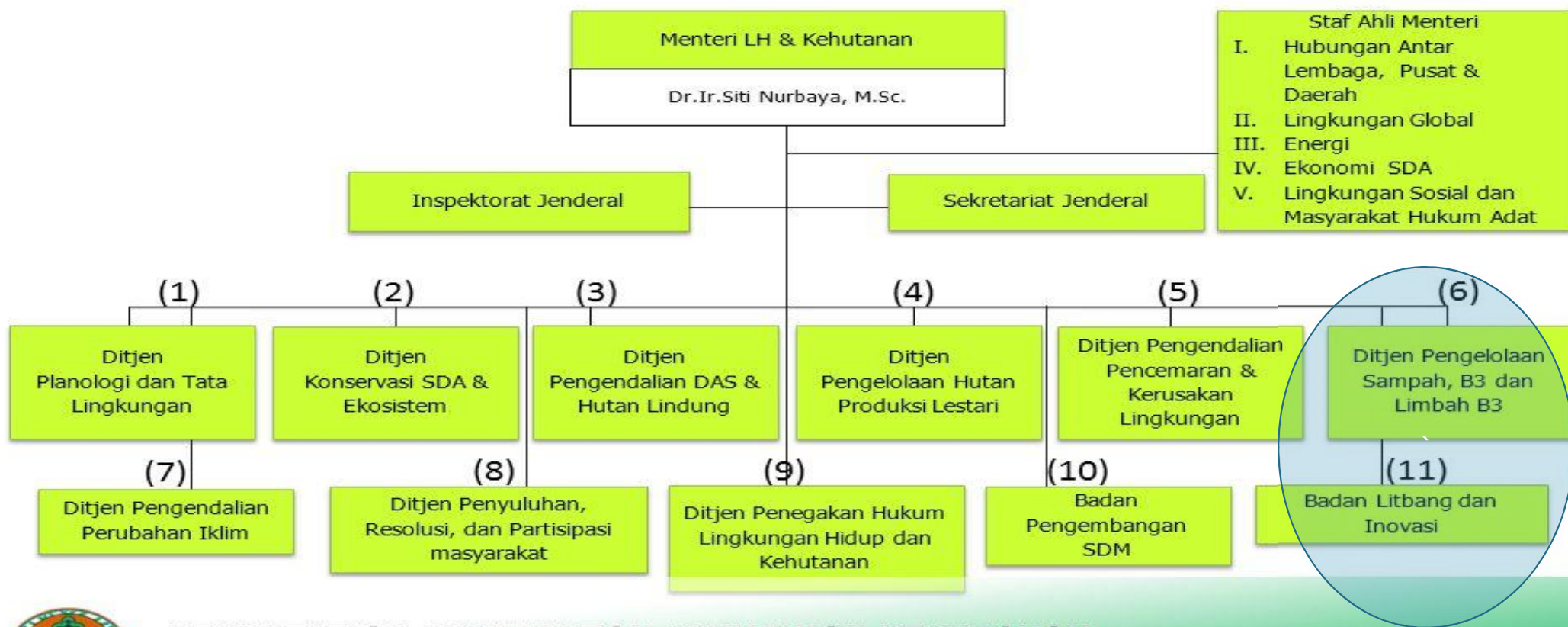
Presented by Rina Aprishanty

HERMAN HERMAWAN, RINA APRISHANTY AND FLORENTINUS BINSAR
TIM MoEF INDONESIA

INTRODUCTION

- Herman Hermawan, Director in Research and Development Center for Environmental Quality and Laboratory, Ministry of Environment and Forestry, P3KLL or **EMC**;
- Rina Aprishanty, Senior Technical Staff in EMC, MoEF;
- Florentinus Binsar Tumind, staff in Hazardous and Toxic Substances Management Department, MoEF, **PB3**.

STRUKTUR ORGANISASI KEMENTERIAN LINGKUNGAN HIDUP & KEHUTANAN



KEMENTERIAN LINGKUNGAN HIDUP DAN KEHUTANAN

OUTLINE

- Background
- Current status
- Progress Data
- Next Step



BACKGROUND

Hg Monitoring History of MoEF Indonesia

@EMC



1994-1995

Monitoring heavy metal in sea water and sediment also green muscle



1997 - 2000

Monitoring mercury in ASGM (Artisanal and Small-scale Gold Mining) in Rejang Lebong, Bengkulu; Sungai Rungan dan Sungai Kahayan, Kalimantan Tengah; Lampung dan Pongkor, Jawa Barat



2006 - 2008

Monitoring mercury in ASGM in Sulawesi Utara, Kalteng, Kalbar, Jambi, Sumbar

Monitoring activities running under the coordination from Hazardous Toxic Substance Management Department MoEF

- Mercury Monitoring in ASGM Hotspot for soil and surface water sample (2012 – 2014)
- Mercury Monitoring in Energy Sector for coal, fly ash, bottom ash and emission source in 2017 (UNEP Project with MoEF)

Mercury Monitoring in ASGM Hotspot

(conducted by MEMR, MoH, MOEF) (2012)

No	Lokasi		River	Sludge	Clean Water	Ambient	Fish
			BM: 0,002 mg/L	BM: 0,13 mg/Kg	BM: 0,001 mg/dL	BM: -	BM: 0,40 mg/Kg
1	South Solok District, West Sumatera	KESDM					
2	West Lombok District, West Nusa Tenggara	KESDM		0,13 mg/Kg			
3	Bolaang Mangondow District, North Sulawesi	KESDM		7,34 mg/Kg			
4	Palu City, Central Sulawesi	KESDM	0,0114 mg/L	9,09 mg/Kg			
5	Tasikmalaya District, West Java	KESDM	0,049 mg/L	5,54 mg/Kg			
6	Aceh Jaya District, Aceh	KLH					
7	Dharmasraya District, West Sumatera	KLH					
8	Palangkaraya District, Central Kalimantan	KLH					
9	Banyuwangi District, East Java	KLH					
10	Minahasa District, North Sulawesi	KLH					
11	Banyumas District, Central Java	KLH					
12	Lebak District, Banten	KLH					

Standards:

- River water : Government Regulation No. 82 Year 2001
- Clean Water : Ministry of Health Regulation No. 416 Year 1990
- Biota:
 - Provisional Standards for Mercury in Fish" (notification for Ministry of Health and Welfare, Japan in July of 1973)
- Sediment:
 - Canadian Sediment Quality Guidelines for Threshold Effect Level (TEL)
- Soil:
 - Canadian Soil Quality Guidelines for the Protection of Environment and Human Health (Residential/Parkland)

	Samples below the quality standard
	Samples over the quality standard
	Sample not taken

Mercury Monitoring in ASGM Hotspot

(conducted by MEMR, MoH, MOEF) (2013)

No	Lokasi		River	Sludge	Clean Water	Ambient	Soil	Fish
			BM: 0,002 mg/L	BM: 0,13 mg/Kg	BM: 0,001 mg/dL	BM: -	BM: 6,6 mg/Kg	BM: 0,40 mg/Kg
1	South Solok District, West Sumatera	KESDM						
2	West Lombok District, West Nusa Tenggara	KESDM						
3	Bolaang Mangondow District, North Sulawesi	KESDM						
4	Palu City, Central Sulawesi	KESDM						
5	Tasikmalaya District, West Java	KESDM						
6	Aceh Jaya District, Aceh	KLH		4,019 mg/Kg			10,368 mg/Kg	
7	Dharmasraya District, West Sumatera	KLH		86,669 mg/Kg				
8	Palangkaraya District, Central Kalimantan	KLH						
9	Banyuwangi District, East Java	KLH	0,002 mg/L					5,33 mg/Kg
10	Minahasa District, North Sulawesi	KLH		1 mg/Kg				
11	Banyumas District, Central Java	KLH						0,91 mg/Kg
12	Lebak District, Banten	KLH						

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4	Palu City, Central Sulawesi	KESDM						
5	Tasikmalaya District, West Java	KESDM						
6	Aceh Jaya District, Aceh	KLH						
7	Dharmasraya District, West Sumatera	KLH						
8	Palangkaraya District, Central Kalimantan	KLH						
9	Banyuwangi District, East Java	KLH						
10	Minahasa District, North Sulawesi	KLH						
11	Banyumas District, Central Java	KLH	0,0029 mg/L	0,28 mg/Kg				
12	Lebak District, Banten	KLH		7,00 mg/Kg				5,10 mg/Kg

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MERCURY MEASUREMENT FROM POWER PLANT

(concentration in $\mu\text{g}/\text{M}^3$)

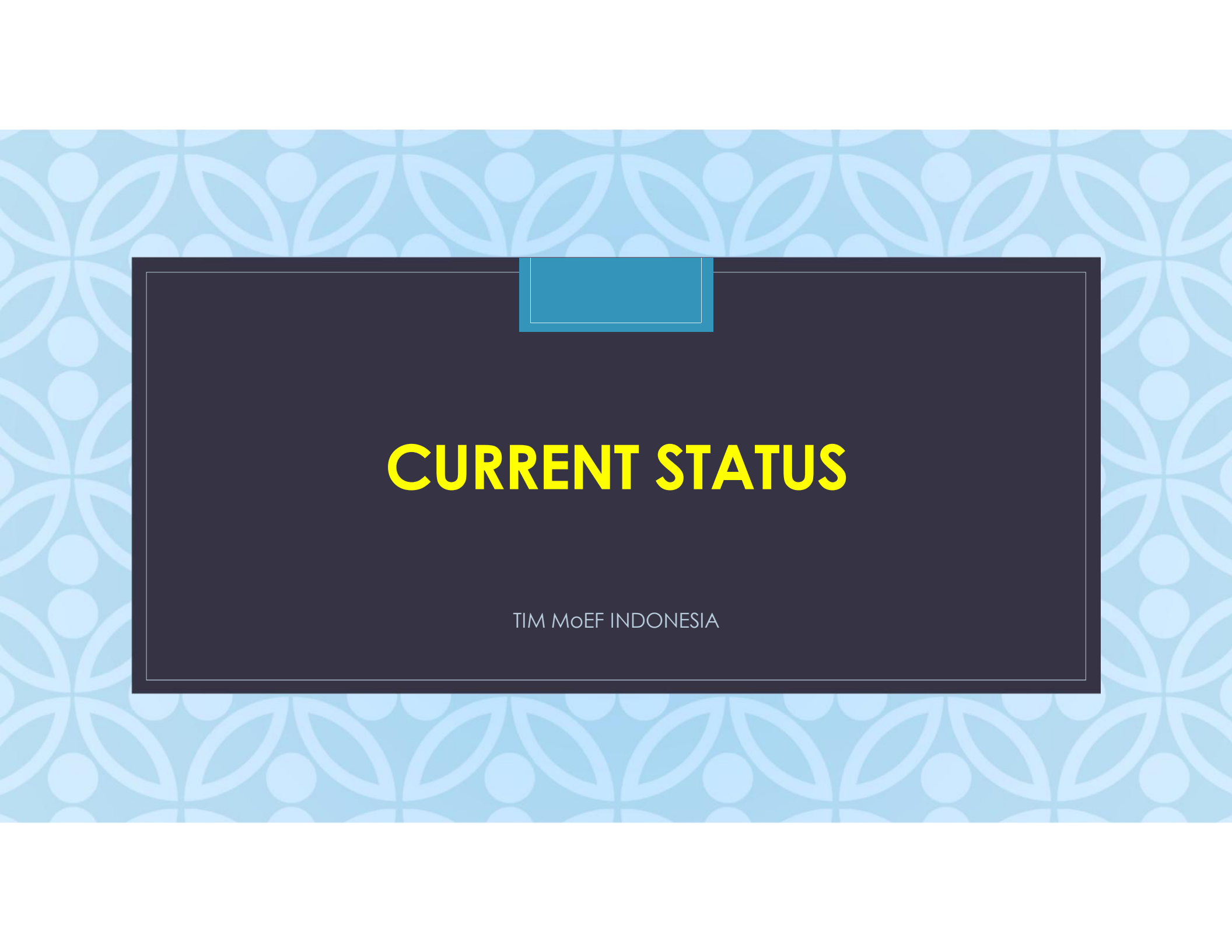
No	UNIT	ASTM METHOD D6784	USEPA METHOD 29
1	SURALAYA CFPP	1.07	1.00
2	CIREBON CFPP	0.60	0.57
3	INDRAMAYU CFPP	3.02	2.93

SOURCE: BCRC FOR SOUTH EAST ASIA, UNEP PROJECT 2017

There are a lot more...



Gambar 1.1 Peta Sebaran Pertambangan Emas Skala Kecil di Indonesia (Sumber: Kementerian ESDM, 2017)



CURRENT STATUS

TIM MoEF INDONESIA

INDONESIAN GOVERNMENT COMMITMENT

- Indonesia ratified Minamata Convention through Law No 11 year 2017;
- Indonesia established National Action Plan under President Regulation that would be applied later this year;
- Indonesia established Ministry Decree No 340 year 2018 about Committee for Research and Monitoring on Mercury;
- Pilot Project Plan for Non-Mercury Gold Processing in Lebak West Java.

Wet Deposition Sampler for Mercury in Rain Water in East Jakarta Station



Regular sampling done by Hazardous and Toxic Substance Management Department MoEF

Proposed EMC Station at Serpong Banten



RESOURCES

Environmental Management Center



Akagi Hg-500, 1993



Hiranuma. 2003



NIC MA-3000, 2015



MONITORING ACTIVITIES UPDATE

Sampling in ASGM for Total Mercury @ Sukabumi West Java in February 2018



Mercury Concentration in Indonesia

Kabupaten Sukabumi Desa Cisolok West Java Indonesia 2018

No	Location	Total Mercury Concentration			
		Water (mg/L)	Sediment (mg/Kg)	Soil (mg/Kg)	Paddy (mg/Kg)
1.	Ds.Cicadas	< 0,00005		1,8	< 0,03
2.	Dsn Langkop		196		
3.	Ds.Pasir Baru	< 0,00005		0,038	
	Quality Standard	0,002 ^a	75 ^b		0,03 ^d

Source: P3KLL-KLHK 2018

Mercury Concentration in Indonesia

Kabupaten Sukabumi Desa Simpenan West Java Indonesia 2018

No	Location	Total Mercury Concentration			
		Air (mg/L)	Sedimen/lumpur (mg/Kg)	Tanah (mg/Kg)	Padi (mg/Kg)
1	Ds.Cilantung	< 0,00005	101	0,58	
2	Ds.Loji	< 0,00005		0,036	< 0,03
	Quality Standard	0,002 ^a	75 ^b		0,03 ^d

Source: P3KLL-KLHK 2018

Mercury Concentration in Man Hair

Kabupaten Sukabumi Desa Cisolok West Java Indonesia 2018

No	Nama	Usia	Lokasi	Pekerjaan	Konsentrasi T-Hg (mg/Kg)	Standar normal WHO
1	Pak Pitra	38 tahun	Ds.Sukarame	Pemilik glundungan	2,4	1 – 2 mg/Kg
2	Pak Ikma	50 tahun	Ds.Cicadas	Karyawan kantor kecamatan, tetapi pernah bekerja tambang selama 20 tahun	3,4	
3	Pak Beni	29 tahun	Ds.Pasir Baru	Pekerja tambang	2,4	
4	Pak Sunandar	43 tahun	Ds.Sukarame	Sopir	3,6	
5	Pak Mahedin	60 tahun	Ds.Pasir Baru	Petani	5,02	
6	Fadhli (suspect)	10 tahun	Ds.Pasir Baru	Pelajar SD	2,8	

Source: P3KLL-KLHK 2018

Mercury Concentration in Woman Hair

Kabupaten Sukabumi Desa Cisolok West Java Indonesia 2018

No	Nama	Usia	Lokasi	Pekerjaan	Konsentrasi T-Hg (mg/Kg)	Standar normal WHO
1	Bu Juhaeni	52 tahun	Ds.Cicadas	Ibu Rumah tangga	2,8	1 – 2 mg/Kg
2	Bu neng	37 tahun	Ds.Cicadas	Ibu Rumah tangga	5,8	
3	Bu yayah (istri Pak Pitra)	36 tahun	Ds.Sukarame	Ikut bekerja bersama suami	17	
4	Bu Eny	37 tahun	Ds.Sukarame	Ibu rumah tangga	12	
5	Bu Euis	39 tahun	Ds.Sukarame	Ibu rumah tangga	12	
6	Amira	6 tahun	Ds.Sukarame	Pelajar SD	4,5	
7	Bu Reni (ibu fadhli)	35 tahun	Ds.Pasir Baru	Ibu rumah tangga	7,7	

Source: P3KLL-KLHK 2018

Mercury Concentration in Woman Hair

Kabupaten Sukabumi Desa Simpenan West Java Indonesia 2018

No	Nama	Usia	Pekerjaan	Konsentras i T-Hg (mg/Kg)	Standar normal WHO
1	Bu pumpur	47 tahun	Stone Crusher	4,2	1-2 mg/Kg
2	Bu ningsih	45 tahun	Stone Crusher	2,2	
3	Bu Sari	50 tahun	Stone Crusher	1,3	

Source: P3KLL-KLHK 2018

Mercury Concentration in Paddy

Kabupaten Sukabumi Desa Waluran West Java Indonesia 2018

No.	Lokasi	Konsentrasi T-Hg	Baku Mutu (mg/Kg)
		Padi (mg/Kg)	
1	Ds.waluran	0,14	0,03*

Source: P3KLL-KLHK 2018

Mercury Concentration in Fish

Kabupaten Sukabumi Desa Waluran West Java Indonesia 2018

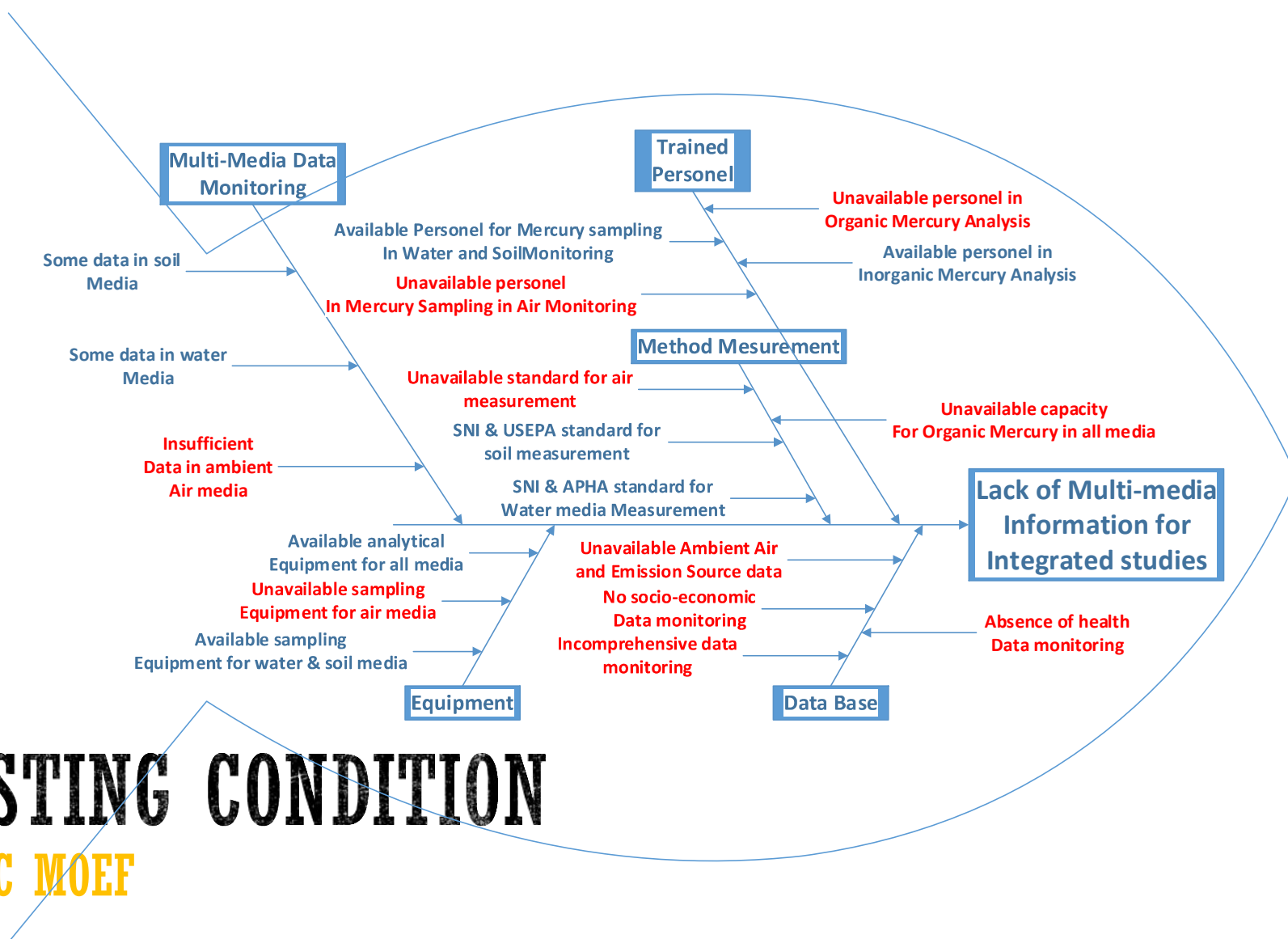
No	Nama Ikan	Konsentrasi T-Hg (mg/Kg)	Baku Mutu*
1	Ikan gondongan	0,13	0,5 mg/Kg
2	Ikan ekor kuning	0,064	
3	Ikan tuna	< 0,03	
4	Ikan kembung	0,27	

Source: P3KLL-KLHK 2018

SAMPLING WITH IDEA CONSULTANTS

Sampling in Land Fill at Bantar Gebang Bekasi West Java July 2018







PROGRESS AND REVIEW APMMN PROJECT IN INDONESIA

TIM MoEF INDONESIA

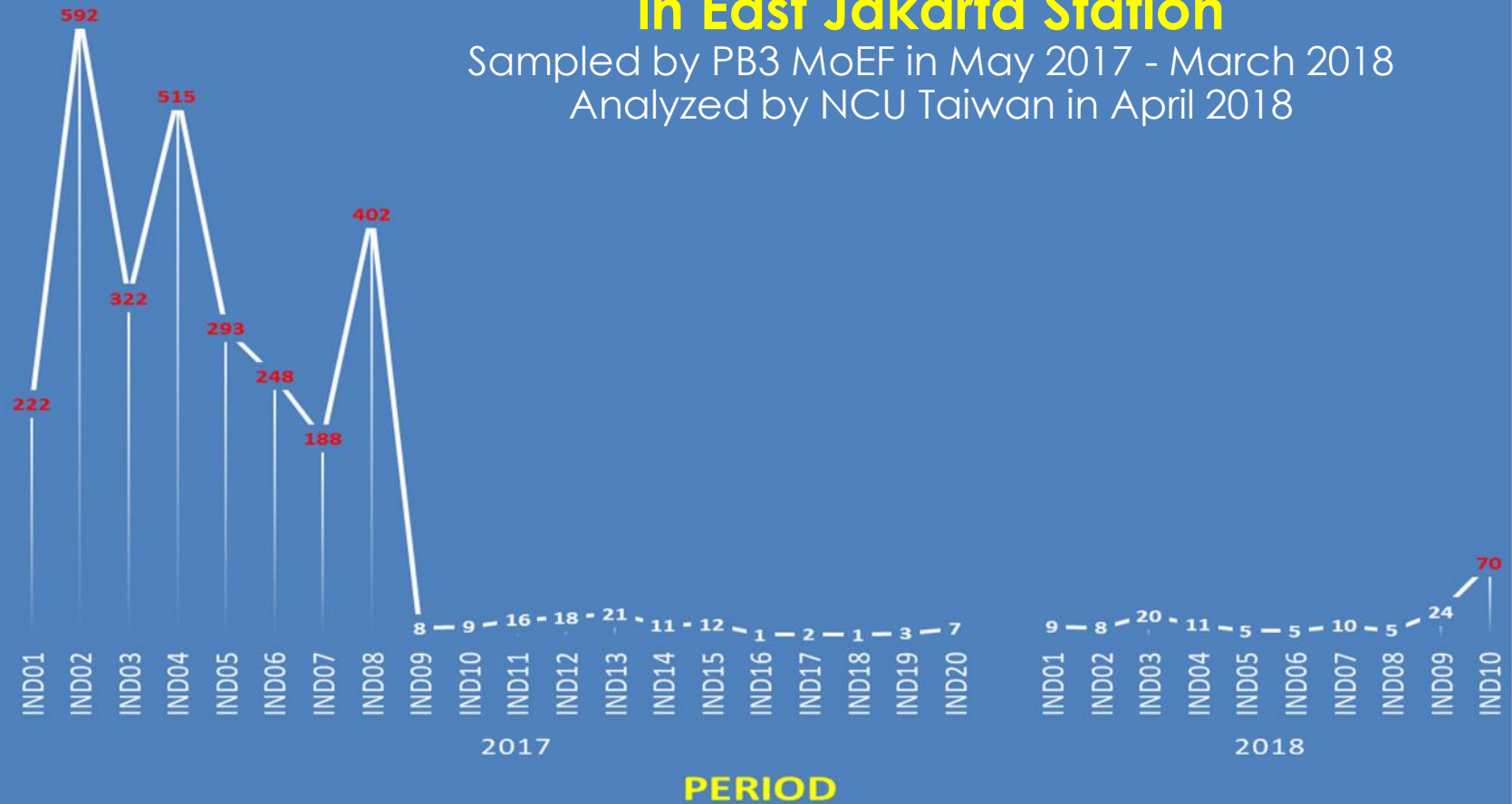


Source: Dir PB3 – KLHK 2017

Mercury in Wet Deposition Monitoring in East Jakarta Station

Sampled by PB3 MoEF in May 2017 - March 2018
Analyzed by NCU Taiwan in April 2018

Mercury Concentration in Wet Deposition
(ng/L)

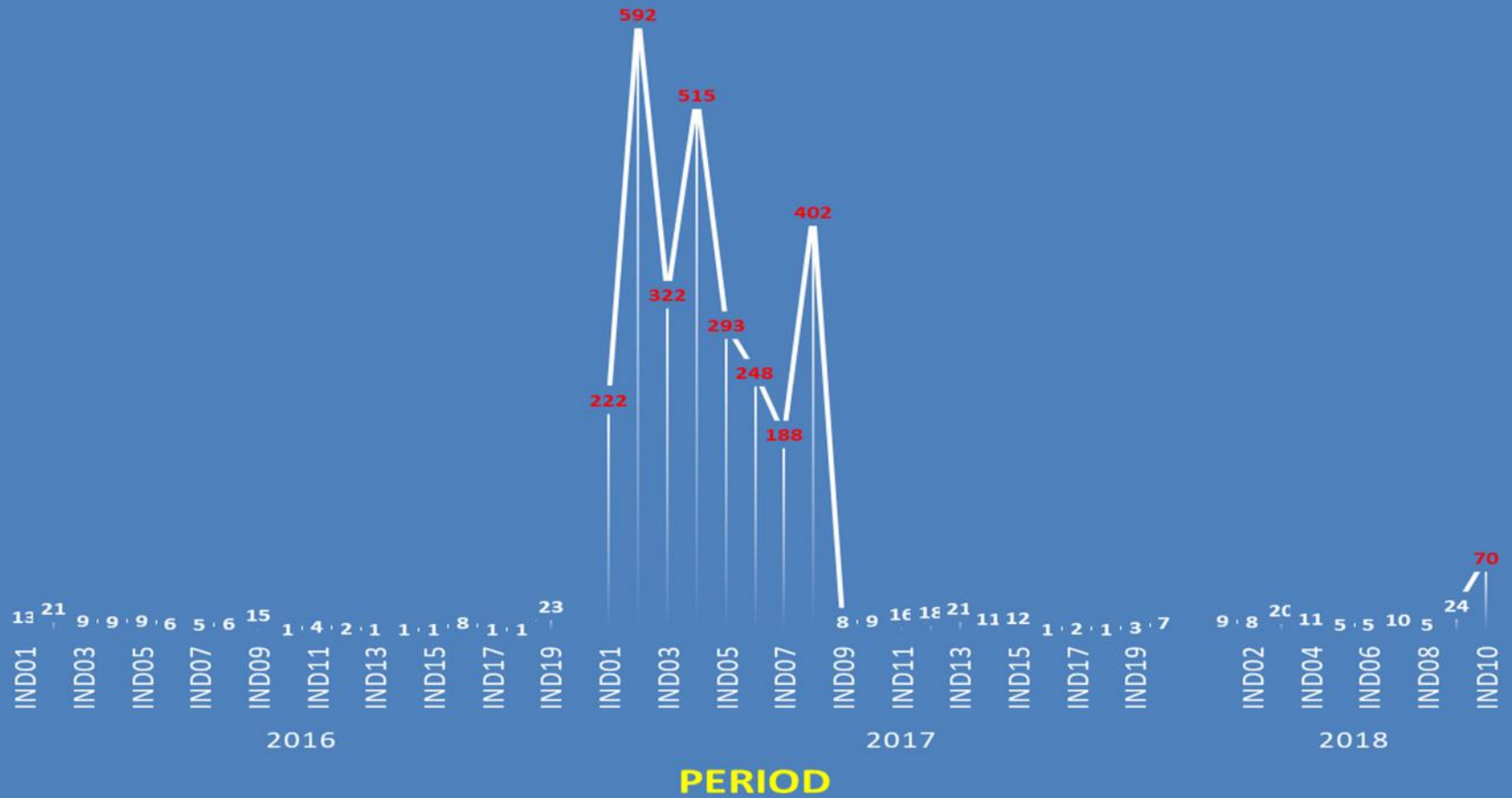


Mercury in Wet Deposition Monitoring in East Jakarta Station

Sampled by PB3 MoEF 2016-2018

Analyzed by NCU Taiwan

Mercury Concentration in Wet Deposition
(ng/L)



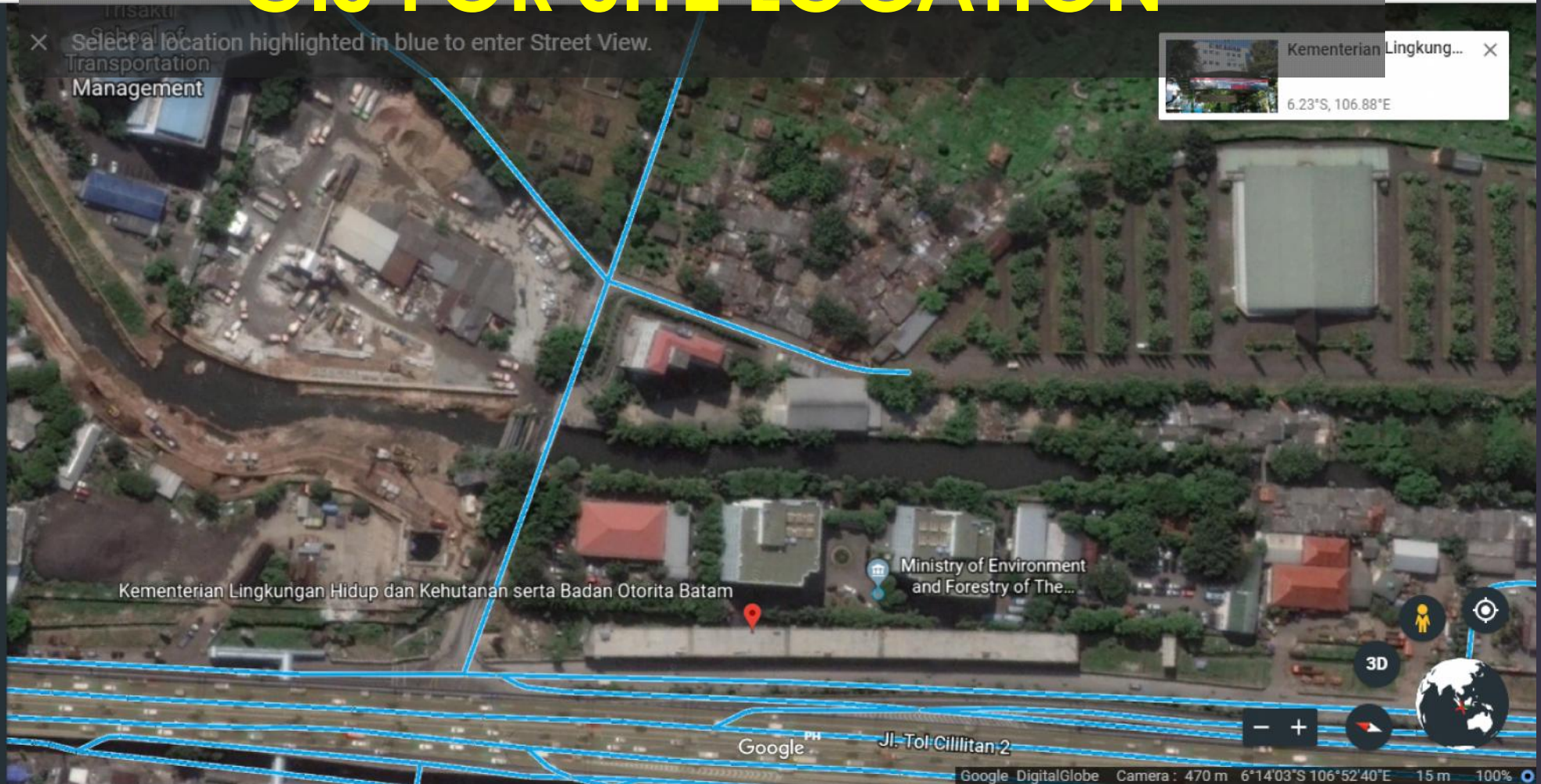
DATA EVALUATION

The presumption for high concentration data:

1. Sample contamination due to handling and exceeding holding time
2. Construction close to the sampling site, by means of mixing cement with fly ash (special permit)

There will be on going investigation for the increasing data during Mei-July 2017 by means of meteorological data and back trajectory

GIS FOR SITE LOCATION



Meteorological Data from Meteorological Station (Indonesia Meteorological Agency – BMKG) at Kemayoran Jakarta

Bulan : Mei	Halaman 2							
Tahun : 2017								
Tgl	TEKANAN UDARA (Dalam mb)	LEBAB NISBI DALAM %				ANGIN		ARAH
		07.00	13.00	18.00	RATA ²	KECEPATAN RATA ² (Km/Jam)	ARAH TERBANYAK	KECEPATAN TERBESAR (knots)
01	1009.6	91	61	71	78	1.1	150	3.1
02	1009.8	82	61	69	74	1.2	150	4.1
03	1010.6	85	65	73	77	1.9	100	4.1
04	1010.1	84	56	71	74	1.4	160	4.1
05	1011.0	84	63	63	73	0.8	180	3.1
06	1010.7	78	62	70	72	1.1	150	3.6
07	1010.7	81	62	68	73	0.9	0	4.1
08	1010.9	84	59	64	72	1.0	0	4.6
09	1010.8	74	61	73	70	1.0	0	3.1
10	1010.6	83	64	72	76	1.2	0	4.1
11	1011.1	88	67	73	79	1.1	0	5.1
12	1011.3	84	67	75	78	0.6	0	3.6
13	1010.2	89	62	70	78	0.8	0	2.6
14	1010.0	85	62	68	75	1.3	120	3.6

KECEPATAN RATA ² (Km/Jam)	ARAH TERBANYAK	KECEPATAN TERBESAR (knots)	ARAH
15	16	17	18
	0	5.1	N
	260	3.1	N
	110	3.1	N
	0	3.6	N
	0	3.6	N
	120	4.1	N
	0	3.6	N
	140	2.6	SE
	130	4.6	SE
	100	3.1	E
	110	5.1	N
	0	3.1	N
	100	3.6	E
	120	3.1	E
	0	2.6	N
	110	3.1	N
	120	3.1	SE

Tgl	TEKANAN UDARA (Dalam mb)	LEBAB NISBI DALAM %				ANGIN			
		07.00	13.00	18.00	RATA ²	KECEPATAN RATA ² (Km/Jam)	ARAH TERBANYAK	KECEPATAN TERBESAR (knots)	ARAH
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02	1009.8	82	61	69	74	1.2	150	4.1	N
03	1010.6	85	65	73	77	1.9	100	4.1	SE
04	1010.1	84	56	71	74	1.4	160	4.1	N
05	1011.0	84	63	63	73	0.8	180	3.1	N
06	1010.7	78	62	70	72	1.1	150	3.6	N
07	1010.7	81	62	68	73	0.9	0	4.1	N
08	1010.9	84	59	64	72	1.0	0	4.6	N
09	1010.8	74	61	73	70	1.0	0	3.1	N
10	1010.6	83	64	72	76	1.2	0	4.1	N
11	1011.1	88	67	73	79	1.1	0	5.1	N
12	1011.3	84	67	75	78	0.6	0	3.6	N
13	1010.2	89	62	70	78	0.8	0	2.6	N
14	1010.0	85	62	68	75	1.3	120	3.6	N

CALM

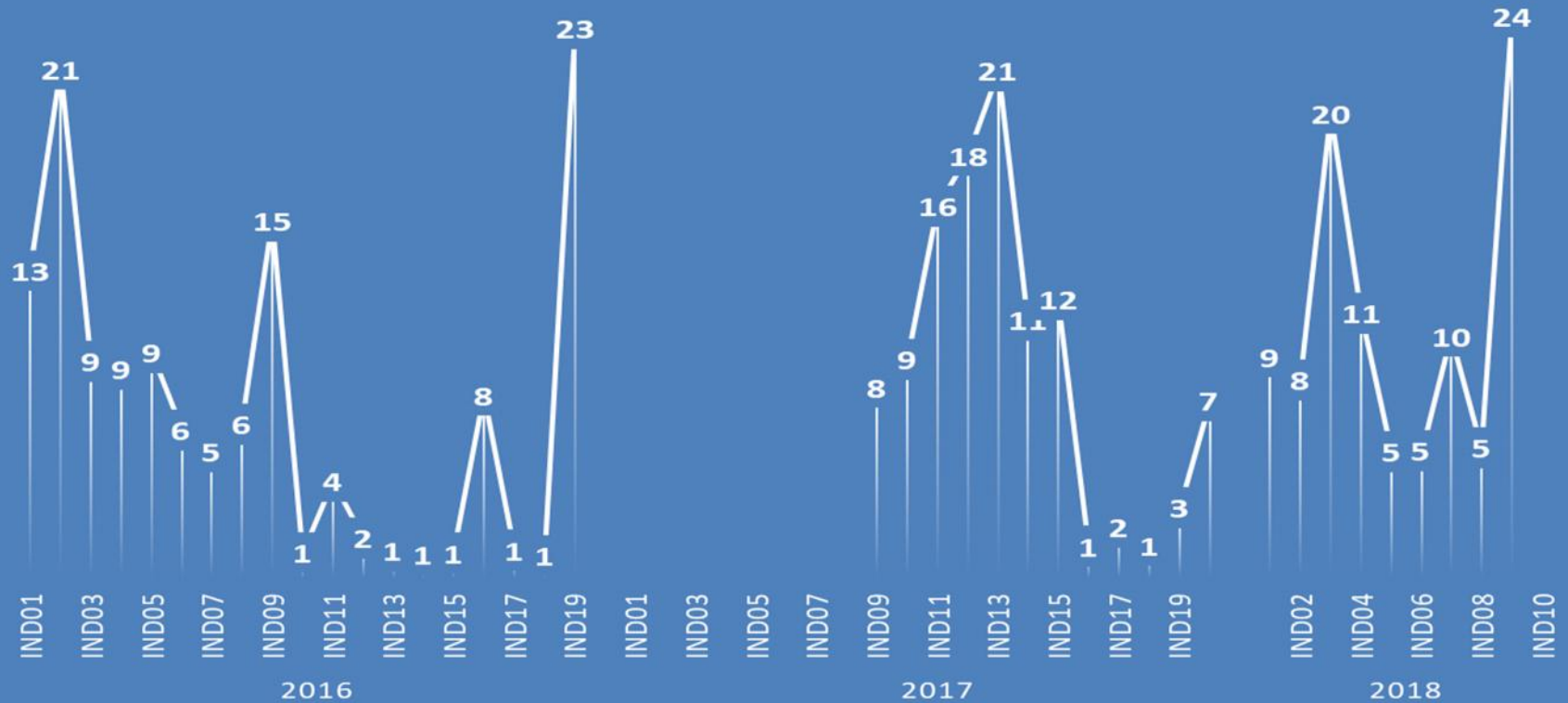
Source: BMKG 2018

Mercury in Wet Deposition Monitoring in East Jakarta Station

Sampled by PB3 MoEF 2016-2018

Analyzed by NCU Taiwan

Mercury Concentration in Wet Deposition
(ng/L)



mean 9
max 24
min 1

PERIOD



NEXT STEP APMMN IN INDONESIA

TIM MoEF INDONESIA

NEXT STEP

- Applying QA/QC in place for next monitoring
- Developing the system for mercury sampling from ambient air by means of gold-amalgamation
- Reestablish the sampling point for both mercury wet deposition and dry deposition

NEXT STEP EMC

- Developing Method standardization so that the monitoring could be applied widely in local laboratory in Indonesia
- Gathering information on existing mercury research studies to support Pilot Project Plan for Non-Mercury Gold Processing in Lebak West Java
- Strengthening the Committee in Research and Monitoring through coordination among sector involved:
 - Energy and mining sector
 - Health sector
 - Science and Technology sector
 - Academic sector

Regulation on mercury level standards

- Establishing criteria of mercury contaminated site
- Establishing quality standards in some media
- Method Standardization

Enhance community participation

- Campaigning of health risks from mercury exposure
- Campaigning for mercury free environment

Data and information management

- Conducting comprehensive study in contaminated site for **multi-media mercury monitoring**
- Regular and long term monitoring
- Establishing integrated data management



Committee of Mercury Research and Monitoring

