

**Thailand's The Second National Implementation Plan
under the Stockholm Convention on Persistent Organic Pollutants
(2023 – 2027)**

**Enabling Activities to Review and Update the National Implementation Plan for
the Stockholm Convention on Persistent Organic Pollutants (NIP/POPs Update)
supported by the Global Environment Facility.**



GOVERNMENT OF THE KINGDOM OF THAILAND
CABINET'S RESOLUTION

of 14th March 2023

NATIONAL ENVIRONMENT BOARD'S RESOLUTION

of 23th December 2022

**on the Approval of the Second National Implementation Plan
for the Stockholm Convention on Persistent Organic Pollutants**

In according with Article 7 of the Stockholm Convention (SC), each Party is required to develop its National Implementation Plan (NIP) under the SC, to transmit it to the Conference of the Parties (COP) within two years of the date on which the SC enters into force for such Party, and to review and update it as appropriate on a periodic basis.

In this regard, Thailand has developed the Second National Implementation Plan (NIP) 2023 - 2027 by reviewing and updating the NIP during 2018 – 2022. The scope of this 2nd NIP covers 31 POPs and includes 16 plans of action. Then, it has been approved by the National Environment Board at its meeting on 23rd December 2022 and by the Cabinet at its meeting on 14th March 2023 decides:

1. Approval of the Second National Implementation Plan for the Stockholm Convention on Persistent Organic Pollutants (2023 – 2027).
2. Assigned the related ministries and departments as well as all involved organizations to achieve the implementation of the plan in accordance with the obligations of a Party of the Stockholm Convention.

Acknowledgement

On behalf of the Royal Government of Thailand, Ministry of Natural Resources and Environment (MNRE) would like to extend the utmost gratitude to the United Nations Environment Programme (UNEP), Secretariat of the Stockholm Convention, and Global Environment Facility (GEF) as supported for the Enabling Activities to Review and Update the the National Implementation Plan for the Stockholm Convention on Persistent Organic Pollutants (NIP/POPs Update).

In addition, a great appreciation is expressed to the Stockholm Convention Sub-committee under the National Environmental Board. Also, I wish to convey the special thanks to all working groups on comments and suggestions to the develop this NIP;

- Working group on project supervision and coordination.
- Working group on the review and update of the national implementation plan and POPs pesticides inventory.
- Working group on the review and update of the national implementation plan and POPs industrial chemicals inventory.
- Working group on the review and update of the national implementation plan and unintentional production POPs inventory.
- Working group on socio-economic implications of POPs uses.

Thank you to the United Nations Industrial Development Organization (UNIDO) for cooperation in execution of the NIP/POPs Update as well as Dr. Roland Weber, and National Metal and Materials Technology Center (MTEC), National Science and Technology Development Agency (NSTDA) as the Project Management Consultant.

Finally, I would like to deliver the thanks to the relevant organizations, i.e., Ministry of Industry, Ministry of Agriculture and Cooperatives, Ministry of Interior, Ministry of Public Health, Ministry of Finance, Ministry of Higher Education, Science, Research and Innovation, Ministry of Foreign Affairs, Bureau of the Budget, Office of the National Economics and Social Development Council, Industrial Estate Authority of Thailand, The Federation of Thai Industries and Thai Health Promotion Foundation to mutually express the strong national collaborations for the successful achievement of the NIP according to the obligations under Article 7 of the Stockholm Convention.

Varawut Silpa-archa
Minister of Natural Resources and Environment

Abbreviations and Acronyms

3Rs	Reduce, Reuse, Recycle
ABS	Acrylonitrile Butadiene Styrene
AFFF	Aqueous Film Forming Foam
AIDS	Acquired Immune Deficiency Syndrome
ASEAN	The Association of Southeast Asian Nations
BAT	Best Available Technology
BDEs	Brominated diphenylethers
BEP	Best Environmental Practices
BFR	Brominated Flame Retardant
CAS	Chemical Abstracts Service
CiP	Chemical substances in Products
COP	Conference of Parties
CoP	Code of Practices
CRT	Cathode Rays Tube
CS	Capsule Suspension
DALY	Disability - Adjusted Life Years
DDT	Dichlorodiphenyltrichloroethane
DfE	Design for Environment
DM	Diabetes Mellitus
EEC	Eastern Economic Corridor
EEE	Electrical and Electronic Equipment
E - HIA	Environmental - Health Impact Assessment
EI	Energy Intensity
EIA	Environmental Impact Assessment
EMRL	Extraneous Maximum Residue Limits
EOL	End - of - Life
EPR	Extended Producer Responsibility
EPS	Expanded Polystyrene
ESEA	Eastern and Southeast Asia
FCPF	Forest Carbon Partnership Facility
GAP	Good Agricultural Practices
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHS	Global Harmonize System
GMS	Greater Mekong Subregion
GPP	Green Public Procurement
HALE	Health - Adjusted Life Expectancy
HBB	Hexabromobiphenyl
HBCD	Hexabromocyclododecane
HCB	Hexachlorobenzene
HCBD	Hexachlorobutadiene
HCH	Hexachlorocyclohexane
HIV	Human Immunodeficiency Viruses
ICSCs	International Chemical Safety Cards
IEE	Initial Environmental Examination
ISO	International Organization for Standardization

ktoe	kilotonne of oil equivalent
LGBTQI	Lesbian, Gay, Bisexual, Transgender, Queer, and Intersex
MAC	Maximum Allowable Concentrations
MRL	Maximum Residue Limits
MSW	Municipal Solid Waste
NCDs	Non - Communicable Diseases
NGOs	Non - governmental Organization
NIP	National Implementation Plan
PBBs	Polybrominated biphenyls
PBDEs	Polybrominated diphenylethers
PCB	Polychlorinated biphenyls
PCDD	Polychlorinated dibenzo - p-dioxins
PCDF	Polychlorinated dibenzofurans
PCNs	Polychlorinated naphthalenes
PCP	Pentachlorophenols
PeCB	Pentachlorobenzene
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctanesulfonic acid
PFOSF	Perfluorooctane sulfonyl fluoride
PM	Particulate Matters
POPs	Persistent Organic Pollutants
PPP	Polluter Pay Principle
PRTR	Pollutant Release and Transfer Registers
PS	Polystyrene
QSP	Quick Start Program (SAICM)
REDD+	Reducing Emissions from Deforestation and Forest Degradation
SAICM	Strategic Approach to International Chemicals Management
SC	Stockholm Convention
SCP	Sustainable Consumption and Production
SCCPs	Short - chain Chlorinated Paraffins
SCWRM	Strategic Committee for Water Resource Management
SDG	Sustainable Development Goals
SEA	Strategic Environmental Assessments
SEP	Sufficiency Economy Philosophy
SOP	Standard Operating Procedure
TBBPA	Tetrabromo bisphenol - A
TEQ	Toxic Equivalence
toe	ton oil equivalent
UNEP, UN Environment	The United Nations Environment Programme
UNIDO	United Nations Industrial Development Organization
uPOPs	unintentionally produced Persistent Organic Pollutants
VOC	Volatile Organic Compounds
WEEE	Waste of Electrical and Electronic Equipment
WHO	World Health Organization
WWTP	Wastewater Treatment Plant

Contents

Acknowledgement	iv
Abbreviations and Acronyms	v
Contents	vii
List of Figures	x
List of Table	x
Executive summary	xi
1. Introduction	1
1.1 The review and update of the National Implementation Plan	3
1.1.1 Establishment of working groups	4
1.1.2 Developed of the inventories of POPs under the Stockholm Convention	4
1.1.3 National capacities assessment and priority setting for implementation	5
1.1.4 Developed of the Second National Implementation Plan.	5
1.2 Component of the updated NIP	5
2. Country baseline	6
2.1 Country profile	6
2.1.1 Geographical location	6
2.1.2 Population	6
2.1.3 Politics and government	6
2.1.4 State of the economic	6
2.1.5 State of the environment	7
2.2 Institutional, Policy and Regulatory Framework	8
2.2.1 National policies and plans for chemicals management	8
2.2.2 Roles of related government agencies	10
2.2.3 Relevant international agreements and their obligations	11
2.2.4 Laws and regulations	12
2.2.5 National mechanism relating to Stockholm Convention	14
2.3 Assessment of the Status of POPs in Thailand	16
2.3.1 Assessment of POPs pesticides (Annex A, Part I)	16
2.3.2 Assessment of PCBs (Annex A, Part II)	19
2.3.3 Assessment of POP-PBDEs (Annex A, Part IV, V and IX) HBB (Annex A, Part I) and HBCD (Annex A Part VII)	20
2.3.4 Assessment of HCBD (Annex A, Part I)	23
2.3.5 Assessment of PCNs (Annex A, Part I)	23
2.3.6 Assessment of PeCB (Annex A, Part I)	24
2.3.7 Review and management of DDT (Annex B, Part II)	24
2.3.8 Assessment of PFOS, its salts and PFOSF (Annex B, Part III)	24
2.3.9 Assessment of Unintentional production POPs (Annex C)	25
2.3.10 Obsolete stockpiles, contaminated sites and waste	29
2.3.11 Registration for specific exemptions and acceptable purposes	33
2.3.12 POPs monitoring	35
2.3.13 Economic and Social Impacts of POPs	36
2.3.14 Gender-related issues	37
2.3.15 Public and stakeholder awareness, information and education	39
2.3.16 Reporting (Article 15)	40
2.3.17 Non Governmental Organizations	40
2.3.18 International collaborations	41

2.3.19	Overview of technical infrastructure for POPs assessment, measurement, analysis, alternatives and prevention measures, research and development – linkage to international programs and projects	42
2.3.20	Overview of technical infrastructure for management, treatment and safe disposal of POPs	43
2.3.21	Identification of impacted populations or environments	44
2.3.22	Relevant activity for the assessment and listing of new chemicals and to manage existing chemicals	46
2.4	Implementation of the 1st National Implementation Plan	46
3.	Action plan of the National Implementation Plan	53
3.1	Objective	53
3.2	Goal	53
3.3	Action Plans	53
3.3.1	Activity 1 Institutional and regulatory strengthening measures	53
3.3.2	Activity 2 Management of POPs pesticides (Annex A, Part I)	56
3.3.3	Activity 3 Management of PCB, HCB, PCN, and PeCB	56
3.3.4	Activity 4 Management of HexaBDE, HeptaBDE (Annex A, Part IV), TetraBDE, PentaBDE (Annex A, Part V), DecaBDE (Annex A, Part IX), HBB (Annex A, Part I) and HBCD (Annex A, Part VII)	57
3.3.5	Activity 5 Management of PFOS, its salts and PFOSF (Annex B, Part III)	58
3.3.6	Activity 6 Register for specific exemptions (Article 4)	59
3.3.7	Activity 7 Measures to reduce or eliminate releases from unintentional production	59
3.3.8	Activity 8 Measures to reduce or eliminate releases from stockpiles and waste	63
3.3.9	Activity 9 Information exchange (Article 9)	63
3.3.10	Activity 10 Identification of contaminated sites and, where feasible, remediation in an environmentally sound manner	63
3.3.11	Activity 11 Public information, awareness and education	65
3.3.12	Activity 12 Research, development and monitoring	65
3.3.13	Activity 13 Technical assistance and financial resources and mechanisms	67
3.3.14	Activity 14 National Report	67
3.3.15	Activity 15 Effectiveness evaluation	68
3.3.16	Activity 16 Gender-related issues	68
3.3.17	Summary and prioritization of activities under the National Implementation Plan	68
3.4	Detailed action plans	71
3.4.1	Activity 1 Institutional and regulatory strengthening measures	71
3.4.2	Activity 2 Management of POPs pesticides (Annex A, Part I)	77
3.4.3	Activity 3 Management of PCBs, HCB, PCNs, PeCB (Annex A, Part II) and other Legacy Industrial POPs	79
3.4.4	Activity 4 Management of HexaBDE, HeptaBDE (Annex A, Part IV), TetraBDE, PentaBDE (Annex A, Part V), HBB (Annex A, Part I), HBCD (Annex A, Part VII) and DecaBDE (Annex A, Part IX)	79
3.4.5	Activity 5 Management of PFOS, its salts and PFOSF (Annex B, Part III)	81
3.4.6	Activity 6 Register for specific exemptions (Article 4)	82
3.4.7	Activity 7 Measures to reduce or eliminate releases from unintentional production (Article 5)	83
3.4.8	Activity 8 Measures to reduce or eliminate releases from stockpiles and wastes (Article 6)	87
3.4.9	Activity 9 Information exchange (Article 9)	88
3.4.10	Activity 10 Identification of contaminated sites and, where feasible, remediation in an environmentally sound manner	89
3.4.11	Activity 11 Public information, awareness and education	90

3.4.12	Activity 12 Research, development and monitoring (Article 11)	93
3.4.13	Activity 13 Technical assistance and financial resources and mechanisms (Article 12 and 13)	99
3.4.14	Activity 14 Reporting (Article 15)	100
3.4.15	Activity 15 Effectiveness evaluation	100
3.4.16	Activity 16 Gender-related issues	101
3.5	Financial of Thailand's Updated National Implementation Plan under the Stockholm Convention on Persistent Organic Pollutants	103
Annexes		105
Annex 1.	Government and key stakeholders for the implementation of action plans	105
Annex 2.	List of working Groups	107

List of Figures

Figure 1: Overview of the listing of POPs substances under the Stockholm Convention from 2004 to 2022.....	1
Figure 2: Profile of the estimated PCDD/Fs emissions in Thailand in 2017.....	26
Figure 3: Thailand’s PCDD/Fs emission into air per industry \$GDP in comparison with 40 other countries based on income level.....	28

List of Table

Table 1: List of POPs substances under the Stockholm Convention.....	2
Table 2: HBB and PBDEs Control under Thai Hazardous Substance Act.....	22
Table 3: PFOS-related substances Control under Thai Hazardous Substance Act.....	25
Table 4: Table 5: Overview of the estimated PCDD/Fs emissions in Thailand in 2017	26
Table 6: Specific exemptions for POPs substances listed in Annex A.....	33
Table 7: List of public laboratories in Thailand with POPs analysis capability	36
Table 8: List of public laboratories with POPs analysis capabilities and their focused areas	42

Executive summary

The Stockholm Convention on Persistent Organic Pollutants (SC) is a global treaty with the objective to protect human health and the environment from persistent organic pollutants (POPs) by reduce and/or eliminate from the production, use and release of POPs, including disposal. POPs are organic compounds that are resist degradation, toxic properties to humans and animals, persistent, and bioaccumulation in the food-web and in the environment and long-range environmental transport. Thailand ratified SC on January 31 2005, enter into force since 1 May 2005 and with the Pollution Control Department (PCD) under the Ministry of Natural Resources and Environment (MNRE) assigned as the Official Contact Point.

Accordingly to Article 7, each Party has obligation to developed the National Implementation Plan on the Persistent Organic Pollutants (NIP/POPs) and transmit it to the COP within two years of the entry into force of the amendment for it by the Secretariat. Including, to review and update the NIP to ensure required updating for SC management of the added POPs to achieve the aim of the reduce and eliminate POPs. Thailand has developed and submitted its first National Implementation Plan (NIP) in 2008. Thailand's first NIP addressed 12 chemical substances listed in 3 Annexes; Annex A for elimination, Annex B for restriction and Annex C for the reduction of the unintentional production. The first NIP outlined strategies and action plans for the management of POPs pesticides, PCBs, unintentional production of POPs as well as action plans on social and economic management due to long-term use of POPs. Moreover, the National Environment Board established the SC sub-committee since 2004 as the coordination mechanism for the consideration on implementation of the Convention determines the country's position in meetings of the Parties; including giving opinions on the implementation of the national management plan. The Pollution Control Department is assigned as the secretary of the SC Sub-Committee.

Under the first NIP, legal measures were implemented to prohibit the use of the 12 initial POPs substances. These substances are controlled under the Hazardous Substance Act B.E. 2535 (HSA) by being classified as Hazardous Substance (HS) Category 4, meaning the production, import, export or possession is prohibited. Waste from devices or components containing Polychlorinated Biphenyls (PCBs), transformers and capacitors are classified as chemical waste and as HS Category 3. The production, import, export, transit or possession of HS Category 3 must be done under license from the Department of Industrial Works (DIW), Ministry of Industry (M-Industry). Those who possess waste containing PCBs are responsible for hazardous waste handling in accordance with the law. A notification was issued in 2008 requiring those in possession of PCBs to plan for using other alternatives and disposal of PCBs by 2012. In case of the need to relocate appliances or tools containing PCBs, notification must be submitted to the DIW beforehand.

For reduction and elimination of the release of unintentional production of POPs, Thailand has set a standard for the release of dioxins/furans from 5 sources, namely (1) solid waste incinerator (2) industrial waste incinerator (3) medical waste incinerator (4) industry that uses waste oil (which has passed quality adjustment process) and synthetic fuel and (5) cement plants that utilize waste as fuel or raw materials for their production. A project for using the best available techniques and best environmental practices (BAT/BEP) to reduce or eliminate the release of dioxins/furans from point sources (electricity and thermal energy production, crematoria and metal production) was implemented.

As set out by the first NIP, Thailand has monitored POPs in living organisms and the environment through national and international cooperation projects. This includes the "Environmental Monitoring of Persistent Organic Pollutants (POPs) in East Asian Countries (2004 to present)" project with technical and financial supports from the Japanese government, which aims to monitor 9 types of POPs pesticides in the atmosphere of East Asian countries. Another international project, funded by the Global Environment Facility (GEF), is "Implementation of POPs Monitoring Plan in Asian Region (2018-2020)"; this project

monitored POPs in various types of samples such as atmospheric air samples in clean areas, breast milk and some national samples (such as sediments, chicken eggs, duck eggs, fish and beef). For capacity-building of laboratories in Thailand, there is an ongoing efforts to strengthen the capabilities of relevant laboratories to be able to efficiently support the country's POPs monitoring activities in the long term.

The Conference of the Parties (COPs) of the SC between 2009 and 2022 is added 19 new POPs, there are currently 31 new POPs under the Stockholm Convention.

According to Article 7 of the Convention, Thailand has obligations to review and update the NIP periodically and when any amendment occurs in the SC. In this regard, POPs inventory assessment was carried out to provide current baseline information on sources, consumptions, disposal and the fate of the 12 initial POPs and new information on the 19 new POPs listed in Annexes A, B and C of the Convention. This preliminary POPs inventory assessment forms a basis for this updated NIP for Thailand.

The Second National Implementation Plan for the SC considered on the basis of national POPs inventory, POPs management status, capacity and potential of participation from government agencies, private sector and civil society. There are 16 main activity plans (classified according to the Guidance for Developing a NIP for the Stockholm Convention on POPs (2017)) as activities of equal importance and interrelatedness. These activities must be carried out simultaneously in order to achieve results in a timely manner to reduce and/or eliminate production, use and release of POPs, covering POPs in the group (1) P: POPs Pesticides (2) I : POPs Industrial Chemicals and (3) U: Unintentional Production POPs, therefore grouping the activities into 3 issues as follows:

1. Activity related to producing safe food, ensuring healthy life, and clean environment.

Activity	POPs			Implementing Body
	P	I	U	
Regulate new POPs, including candidate POPs substances as Hazardous Substances under the Hazardous Substance Act B.E. 2535	•	•	•	M-Industry/ MNRE/MOAC
Strengthening existing regulations, for example, elevating the control level of POPs substances as Hazardous Substances under the Hazardous Substance Act B.E. 2535, declaring and collecting data on POPs chemical substances in products (CiP) on products manufactured in Thailand and imported from other countries, reporting data on emission to the environment together with data according to the Pollutant Release and Transfer Register (PRTR)	•	•	•	M-Industry/ MOAC/MNRE
Establishing additional standard limits for POPs in environmental media and in food and drinking water	•	•	•	MNRE/ MOAC/MOPH
Establishing a monitoring and assessment system for products containing POPs in all kinds of recycling processes		•	•	M-Industry/ MNRE
Supporting safe agriculture practice or organic farming or biological cultivation or integrated pesticide management	•			MOAC

Activity	POPs			Implementing Body
	P	I	U	
Setting up measures to reduce uPOPs release for major uPOPs sources and enhance the efficiency of law enforcement and regulations are waste incinerators, infectious wastes incinerators, open burning, iron and metal industrial plants, crematoria and products. Waste incinerators , infectious wastes incinerators, open burning, iron and metal industrial plants, crematoria and product			•	MNRE/M-Industry/MOI

Note: P: POPs pesticides, I: POPs Industrial Chemicals and U: unintentional production POPs

2. Activities relating to capacity building of government agencies and local authority organizations in monitoring small and medium industrial firms that are related to products containing POPs, monitoring activities that release unintentionally produced POPs (uPOPs) and monitoring quality of the environment as well as emission standards at point sources of POPs.

Activity	POPs			Implementing Body
	P	I	U	
Empowering staffs of local authority organizations, together with providing budgets for operating and maintenance the waste incinerators under their supervision			•	MNRE/ MOI
Improving laboratories in terms of equipment and personnel, at the national, local, and the private sector levels. A guideline for managing recycle activities that prevent POPs contamination is also suggested, as well as research of new technologies for analyzing POPs.	•	•	•	MHESI/ MNRE/ MOAC/ MOPH
Establishing an accomplished data management system, which consists of data from various government and private agencies for evaluating the incidents or surveillance of POPs related activities which is accessible by all stakeholders	•	•	•	MHESI/ MNRE
Monitoring POPs in the environment (including surface water, ground water, sea water, soil, sediments, air) especially at locations with high risk of POPs contamination	•	•	•	MHESI/ MNRE
Establishing marking system or declaring information on materials/products containing industrial POPs, to facilitate separators to manage these materials/products discretely from other materials		•		M-Industry
Establishing a tracing system for products containing POPs, and data on stocks of POPs. POPs identification system should cover all the supply chain and consumer network (especially raw materials and substances used in the production process and in products) for the advantage of tracking POPs data	•	•	•	MHESI/ MOAC/ MNRE/ MOPH

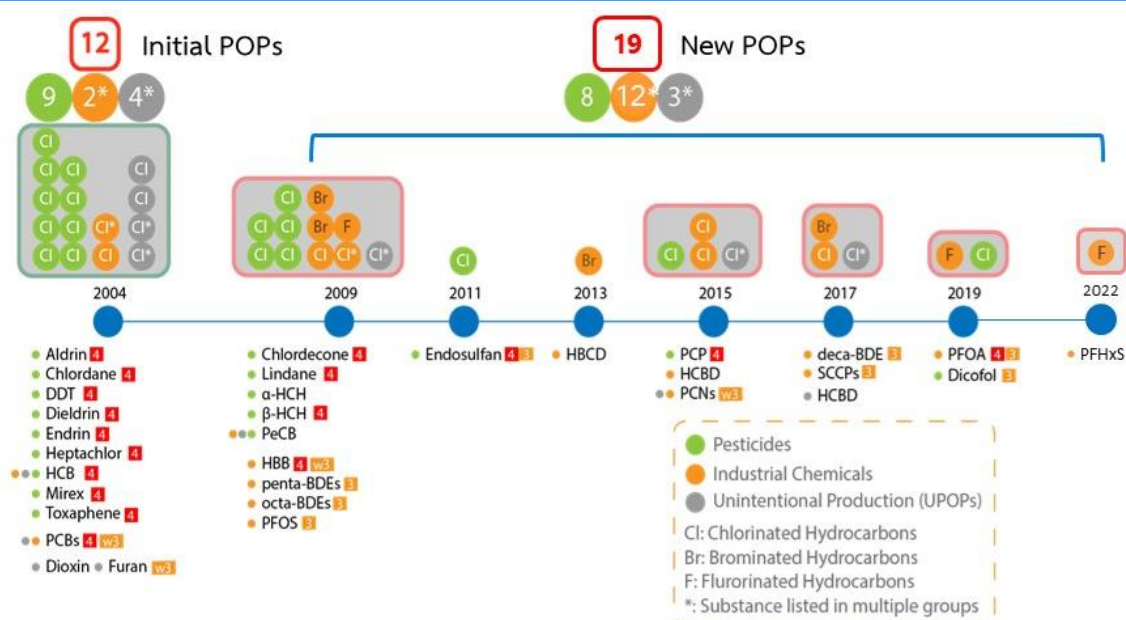
Note: P: POPs pesticides, I: POPs Industrial Chemicals and U: unintentional production POPs

1. Introduction

Thailand ratified the Stockholm Convention on Persistent Organic Pollutants (SC) on January 31, 2005, enter into force since 1 May 2005, the Stockholm Convention on Persistent Organic Pollutants aims to protect human health and the environment by reducing and/or eliminate form the production, use and release of POPs, including disposal. POPs are organic compounds that are resist degradation, toxic properties to humans and animals, persistent, much accumulate in the food chain and in the environment and long-range environmental transport.

The Covention has reviewed POPs to listed in listed in 3 Annexes; Annex A for elimination, Annex B for restriction, and Annex C for reduction of unintentional production. The Convention initially (2004) included 12 chemical substances or groups of substances (also known as initial POPs). The Conference of Parties (COPs) of the SC has gradually added 19 new POPs substances into the lists. As of 2022, the SC has added 31 more POPs substances; 17 substances to POPs Pesticides, 14 substance to POPs Industrail Chemicals, and 7 substances to Unintentional Production POPs, as visually summarized in and detailed in.

Figure 1: Overview of the listing of POPs substances under the Stockholm Convention from 2004 to 2022



Numbers in square brackets indicate the substances are listed as hazardous substances Act, B.E. 2535

Table 1: List of POPs substances under the Stockholm Convention

Substance name and CAS No.	Pesticide	Industrial Chemicals	Unintentional production
Initial POPs			
1. Aldrin (CAS No. 309-00-2 9)	A		
2. Chlordane (CAS No. 57-74-9)	A		
3. DDT (CAS No 50-29-3)	B		
4. Dieldrin (CAS No. 60-57-1)	A		
5. Endrin (Cas No. 72-20-8)	A		
6. Heptachlor (CAS No. 76 - 44 - 8)	A		
7. Hexachlorobenzene: HCB (CAS No. 118-74-1)	A	A	C
8. Mirex (Cas No. 2385-85-5)	A		
9. Toxaphene (CAS No. 8001-35-2)	A		
10. Polychlorinated Biphenyls: PCB (CAS No. 1336-36-3)		A (x)	C
11. Polychlorinated dibenzo - p - dioxins: PCDD			C
12. Polychlorinated dibenzofurans: PCDF			C
Newly POPs			
1. alpha hexachlorocyclohexane: α - HCH (CAS No. 319-84-6)	A (SC 4/10)		
2. beta hexachlorocyclohexane: β - HCH (CAS No. 319-85-7)	A (SC 4/11)		
3. Chlordecone (CAS No. 143-50-0)	A (SC 4/12)		
4. Hexabromobiphenyl: HBB (CAS No. 36355-01-8)		A (SC 4/13)	
5. Hexabromodiphenyl ether and heptabromodiphenyl ether (commercial octabromodiphenyl ether or c - OctaBDE) (CAS No. 68631-49-2, 207122-15-4, 446255-22-7, 207122-16- 5)		A (x) (SC 4/14)	
6. Lindane or gamma - HCH: γ - HCH (CAS No. 58-89-9)	A (x) (SC 4/15)		
7. Pentachlorobenzene: PeCB (CAS No. 608 - 93 - 5)	A (SC 4/16)	A (SC 4/16)	C (SC 4/16)
8. Perfluorooctane sulfonic acid (PFOS), its salts and perfluorooctane sulfonyl fluoride (PFOS - F) (CAS No. (for example) 1763 - 23 - 1, 2795 - 39 - 3, 70225 - 14 - 8, 29081 - 56 - 9, 29457 - 72 - 5)		B (x) (SC 4/17)	
9. Tetrabromodiphenyl ether and pentabromodiphenyl ether (or c - pentaBDE) (CAS No. 5436 - 43 - 1)		A (x) (SC 4/18)	
10. Technical Endosulfan and its related isomers (CAS No. 115-29-7, 959 - 98 - 8, 33213 - 65 - 9)	A (x) (SC 5/3)		
11. Hexabromocyclododecane: HBCD (CAS No. 25637 - 99 - 4, 3194 - 55 - 6)		A (x) (SC 6/13)	
12. Hexachlorobutadiene: HCB (CAS No. 87 - 68 - 3)		A (SC 7/12)	C (SC 8/12)
13. Pentachlorophenol and its salts and esters: PCP (CAS No. 87 - 86 - 5, 131 - 52 - 2, 27735 - 64 - 4, 3772 - 94 - 9, 1825 - 21 - 4)	A (x) (SC 7/13)		
14. Polychlorinated naphthalenes: PCNs (CAS No. 70776 - 03 - 3)		A (x) (SC 7/14)	C (SC 7/14)
15. Decabromodiphenyl ether (commercial mixture, c - decaBDE) (CAS No. 1163 - 19 - 5)		A (x) (SC 8/10)	
16. Short - chained chlorinated paraffins: SCCP (CAS No. (for example) 85535 - 84 - 8, 68920 - 70 - 7, 71011 - 12 - 6, 85536 - 22 - 7, 85681 - 73 - 8, 108171 - 26 - 2)		A (x) (SC 8/11)	
17. Dicofol (CAS No. 115 - 32 - 2)		A (SC 9/11)	

Substance name and CAS No.	Pesticide	Industrial Chemicals	Unintentional production
18. Perfluorooctanoic acid (PFOA), its salts and PFOA - related compounds (CAS No. 335-67-1)		A (x) (SC 9/12)	
19. Perfluorohexane sulfonic acid (PFHxS), its salts and PFHxS-related compounds (CAS No. 355-46-4)		A (SC 10/10)	

Note:

1. A=Substance listed in Annex A: Elimination (Parties must take measures to eliminate the production and use of the chemicals listed under Annex A. Specific exemptions for use or production are listed in the Annex and apply only to Parties that register for them),
B= Substance listed in Annex B: Restriction (Parties must take measures to restrict the production and use of the chemicals listed under Annex B in light of any applicable acceptable purposes and/or specific exemptions listed in the Annex),
C= Substance listed in Annex C: Unintentional production (Parties must take measures to reduce the unintentional releases of chemicals listed under Annex C with the goal of continuing minimization and, where feasible, ultimate elimination.),
2. (x)= with specific exemption and/or Acceptable purposes
3. SC n/ii = SC decision number

Accordingly to Article 7, each Party has obligated to develop the National Implementation Plan on the Persistent Organic Pollutants (NIP/POPs) and transmit it to the COP within two years of the entry into force of the amendment for it by the Secretariat including, to review and update the NIP to ensure required updating for SC management of the added POPs to achieve the aim of the reduce and eliminate POPs. Thailand has compiled its first NIP that covers plans to reduce and/or eliminate emissions and discharges of the 12 initial POPs as during 2008 to 2012.

Accordingly Article 7, Thailand had reviewed and updated the NIP to ensure that the NIP updating for SC management will be approved by the cabinet before transmit it to the next COP. In 2018, the Global Environment Facility (GEF), as the financial mechanism of the Stockholm Convention supported for NIP development and to develop POPs inventories. The project “Enabling Activities to Review and Update the National Implementation plan for the Stockholm Convention on Persistent Organic Pollutants (POPs)”, in collaboration with the United Nations Industrial Development Organization (UNIDO) was developed. After NIP had completed the SC Sub-committee and the National Environment Committee should review it before endorsed by the Cabinet.

1.1 The review and update of the National Implementation Plan

The process to review and update the NIP consists of four key components:

- 1) Establishment of working groups is 5 committees to consider and recommend for the developed POPs inventories and drafting the second of national implementation plan under the Stockholm Convention on Persistent Organic Pollutants.
- 2) Developed of the inventories of POPs under the Stockholm Convention as POPs Pesticides, POPs Industrial Chemicals, and Unintentional Production POPs
- 3) National capacities assessment and priority setting for management of POPs in accordance with the obligations of the Stockholm Convention.
- 4) Developed of the National Implementation Plan.

1.1.1 Establishment of working groups

The SC Sub-committee under the National Environmental Board established five working groups (WGs) as follows:

- Working Group 1 (WG1)** Working group on project supervision and coordination; consists of 14 members from 12 organizations with the PCD's Director General or representative as the chairperson.
- Working Group 2 (WG2)** Working group on the review and update of the national implementation plan and POPs pesticides inventory; consists of 12 members from 9 organizations with the DOA's Director General or representative as the chairperson.
- Working Group 3 (WG3)** Working group on the review and update of the national implementation plan and POPs industrial chemicals inventory; consists of 14 members from 11 organizations with the DIW's Director General or representative as the chairperson.
- Working Group 4 (WG4)** Working group on the review and update of the national implementation plan and unintentional production POPs inventory; consists of 13 members from 9 organizations with the PCD's Director General or representative as the chairperson.
- Working Group 5 (WG5)** Working group on socio-economic implications of POPs uses; consists of 12 members from 10 organizations with the Director of Office for the Promotion of Health Risks Controls, Thai Health Promotion Foundation or representative as the chairperson.

1.1.2 Developed of the inventories of POPs under the Stockholm Convention

In 2018-2019, Thailand launched its second POPs inventory assessment study to provide updated information on the initial POPs and new information on the new POPs listed in Annexes A, B and C of the Stockholm Convention. This inventory has been study from a basis for the update of the NIP, as obligated by Article 7 of the Convention.

In this POPs inventory assessment, individual POPs may vary depending on the mode of use and release of the substance which has included information on relevant issues as (1) the production and use of relevant POPs both present and in the past, (2) patterns and estimates of the use of POPs in products, (3) the amount of waste and end-of-life products generated and the management methods used, (4) the amount of leftover products in stock and (5) leakage into the environment including a risk point (Hotspot) that may be contaminated from the past to be continue in the present.

Thailand's POPs inventory, POPs substances are categorized into three groups based on their intended purposes as POPs pesticides, POPs industrial chemicals, and unintentional POPs. The collection of POPs was conducted in parallel with exploring chemical classification by focusing on key stakeholder groups for each chemical class. Data collection methods consisted of questionnaire surveys, interviews and on-site visits. The survey results were processed and reviewed for accuracy and completeness by each relevant working group prior to the public presentation in a workshop to consider each POPs (National Inventory Validation Workshop). Information provided by stakeholders and some expert reviews. Information and opinions gathered at the public hearings were processed and the POPs inventory for Thailand was developed in 2020.

1.1.3 National capacities assessment and priority setting for implementation

Assessment and prioritization of POPs operations in accordance with the obligations of the Stockholm Convention consist of an assessment of the country's POPs Inventory with potential of domestic agencies and the assessment of economic and social impacts from the implementation of the obligations. After that, the evaluation results are analyzed to determine options in operations and draft prioritization (setting prioritization) on various opinions to prepare the action plans. The public hearings from representatives of the government, private sector and civil society are identified.

1.1.4 Developed of the Second National Implementation Plan.

The processes to prepare the updated NIP mainly followed the Guidance for Developing a NIP for the Stockholm Convention on POPs (2017). Inputs for the developed of this NIP comprise the baseline information from POPs inventory assessments (including existing national capacities, gaps and areas for attention), areas that need national actions, and policy recommendations from public, private, and civil sectors policy recommendation workshops.

Action plans under the national implementation plan are 16 main activities, activity plans developed and refined from the experience and results of the implementation of the first national management plan, as well as information and recommendations gained from the implementation of the POPs directory, assessments, and prioritize the management of POPs. The action plan was circulated to all relevant government agencies for review and adjustment for draft Second National Implementation Plan (2021-2025). Then, a workshop was organized with stakeholders to give their opinions and agreements to the plan (endorsement workshop) in order to be presented to the Stockholm Convention Sub-Committee for consideration.

The Sub-Committee of the Stockholm Convention, at the 1/2022 meeting on 13 January 2022, resolved to improve the POPs management activities under all 16 action plans form 2023 – 2027, in accordance with the period of the 13th National Economic and Social Development Plan. The Stockholm Convention Subcommittee at the 3/2022 meeting on 22 August 2022, 2nd NIP was approved and delivered it to the National Environment Board and the Cabinet for approval before transmitting to the Conference of Parties to the Stockholm Convention in 2023

1.2 Component of the updated NIP

This updated NIP is following on the Guidance for Developing a NIP for the Stockholm Convention on POPs (2017) as consists of 3 chapters:

The 1st chapter presents on SC obligations for Thailand, including the obligation to review and update the NIP, and the processes taken to update the NIP as the compilation of Thailand's 2017 POPs inventory assessment study report;

The 2nd chapter presents on the national baseline information, legal frameworks and national mechanism relating to the SC, and the assessment of the POPs issues in Thailand including the implementation status of the first national management plan;

The 3rd chapter presents on objectives, goals of NIPs and action plans 16 plans by implemented during year 2023-2027 with priority activities under the plan and budget for the implementation.

2. Country baseline

2.1 Country profile

2.1.1 Geographical location

Thailand is located in a tropical region (5°37' N to 20°27' N and 97°22' E to 105°37' E). It has a total land area of 513,115 sq. km. (51.3 million hectares). The country shares borders with the Republic of the Union of Myanmar to the north and west, the Lao People's Democratic Republic to the north and east, the Kingdom of Cambodia to the east, and Malaysia to the south. Thailand has 77 provinces and 6 main regions: north, northeast, central, west, east, and south.

2.1.2 Population

According to registration records from the Department of Provincial Administration, the total population of Thailand in 2021 was 66.17 million, with 32.34 million males and 33.83 million females [National Statistical Office (2021)¹]

2.1.3 Politics and government

The public administration system in Thailand is divided into 3 levels: central, provincial, and local. The Ministry of Interior appoints provincial governors to administer government services in 76 provinces for Bangkok, the country's capital. There is an elected governor of Bangkok as the highest executive.

2.1.4 State of the economic

In 2021, the Thailand economy expanded by 1.6 percent, recovering from a 6.2 percent contraction in 2020. On expenditure side: export of goods and services and government expenditure accelerated. Private consumption and public investment returned to expansions, while private investment decreased. On the production side: the manufacturing sector, the transportation and storage sector, and the electricity, gas, steam, and air conditioning supply sector returned to expand, while the wholesale and retail trade sector continued to grow. On the contrary, the agricultural sector decelerated, while the accommodation and food services sector and construction sector decreased. The Thailand economy in 2022 is projected to expand in the range of 3.5 – 4.5 percent, mainly supported by; (i) the regaining in domestic demand; (ii) the recovery of domestic tourism; (iii) the continual expansion of export of goods; and (iv) the support from public investment. [National Economic and Social Development Council (2021)²]

¹ National Statistical Office, Number of Population from Registration by Sex, House, Region and Province: 2021, <http://statbbi.nso.go.th/staticreport/page/sector/en/01.aspx>, last accessed: August 16, 2021

² National Economic and National Economic and Social Development Council, Thai Economic Performance in Q4 and 2021 and Outlook for 2022, https://www.nesdc.go.th/ewt_dl_link.php?nid=12313, last accessed: August 19, 2021

2.1.5 State of the environment

1) *Air Quality* .

The overall air quality in Thailand 2021 has a tendency to improve, partly as a result of "Troubleshooting the problem of dust pollution" along with the measures against COVID-19, which the activities were reduced air pollution. However, there was air pollution in some areas where particulate matter and volatile organic compounds (VOCs) were still above the standard but tended to be better than the previous year, such as in the Bangkok Metropolitan Region, smog in the north area, the stone crushing plant, the Eastern Industrial Estate Area, transboundary smog, and peatland fires in the south. [Pollution Control Department³]

2) *Water Quality*

The overall surface water quality in Thailand 2021 has a tendency to slightly improve due to the control of sewage. However, water poor quality was found in some areas including the Kuang river, Sakae Krang river, Lop Buri river, Lower Tha Chin River, Lower Chao Phraya River, Lower Lam Takhong River, Upper Phangrad River, and Lower Rayong River. The groundwater quality is still good for consumption. The coastal water quality has declined from the previous year, especially in the inner Gulf of Thailand. which has been used for tourism, aquaculture, and industry.

3) *Solid Waste, Hazardous Waste and Hazardous substance*

The amount of municipal solid waste has decreased and it has been properly managed, but the amount of single use plastic has increased. Due to the COVID-19 epidemic, people have increased their online purchases. The operation to solve the problem of solid waste and plastic waste is to improve the waste disposal site and encourage people to reduce using and sorting of plastic waste for reuse.

The hazardous waste is likely to increase due to the increasing use of electronic devices, including technology that has changed rapidly, Electronic devices change frequency more often. At present, local administrative organizations are responsible for the separation, collecting, quarantining, and transportation with the disposal of academic principles. which has a continuous increase in the amount of proper disposal.

Hazardous substances in 2021 have increased import volume from the previous year, most of them are industrial hazardous substances. The most imported is methanol or methyl alcohol and harmful substances in agriculture are herbicides. The management of chemicals will be a legal measure to control as a hazardous substance under the Substances Act. B.E. 2535 (1992) and promoting the reduction and termination of the use of chemicals. However, during the epidemic situation of COVID-19, there is a higher volume of imported disinfection products.

³ Thailand State of Pollution 2021 (B.E. 2564) by Pollution Control Department, Ministry of Natural Resources and Environment.

2.2 Institutional, Policy and Regulatory Framework

2.2.1 National policies and plans for chemicals management

Policies, national plans and supporting mechanisms for chemical handlings in Thailand are as follows:

1) *National Strategic Plan (2018 -2037)*

Strategic related to chemical management as 1) Strategy 2 The National Strategy on Competitiveness Enhancement and 2) Strategy 5 The National Strategy on Eco-Friendly Development and Growth

Strategic 2 The National Strategy on Competitiveness Enhancement

Issue 1 Exploring value-added agriculture

- Safe Farming: focuses on creating awareness of the importance of food safety management system standard among both consumers and producers; providing incentives designed to influence farmers and producers to produce agricultural products in accordance with acceptable standards and to be part of agricultural product quality management systems accredited by trustworthy institutions; providing information and knowledge regarding agricultural productions that are adequate with international standards, aiming for chemical use reduction.

Strategic 5 The National Strategy on Eco-Friendly Development and Growth

Issue 4 Developing urban, rural, agricultural, and industrial areas with a key focus on a sustainable growth

- Eliminating pollution and damaging agricultural chemicals in line with international standard by developing standardized and pollution management systems in conjunction pollution elimination, and environmental restoration of soil, water, air, forests, wildlife, and biodiversity in areas affected by national development projects; improving national environmental standards in compliance with international standards and enforcing environmental standards on soil, water, air, forests, wildlife and biodiversity, with equal treatment of all parties involved.

2) *The 13th National Economic and Social Development Plan (2023-2027)*

Dimensions of sustainability of resources and the environment for environmental stewardship Connected to the operational goals in target 1, Thailand is a leading country in the field of high-value agricultural and processed agricultural products; and at target 10, Thailand has a circular economy and a low-carbon society as follows:

(1) Target 1: The goal is to grow a quality of life that is environmentally friendly. The goal of utilization and growth based on natural resources and the environment is to balance within the capacity of the ecosystem. The goal is to grow a quality of life that is environmentally friendly. The goal of utilization and growth based on natural resources and the environment is to balance within the capacity of the ecosystem. There is a master plan under the national strategy. Sustainable growth issues that focus on growth and emphasize the principles of use, conservation, preservation, restoration and rebuilding, a sustainability of the natural resource base and environment, do not use natural resources in excess, do not pollute the environment beyond the ability to support and heal the ecosystem, and include environmentally friendly production and consumption.

- Strategy 2: Promotion of production and market expansion of agricultural products and processed agricultural products with value-added, such as Good Agricultural Practice product, materials and biological chemicals, etc. which processed agricultural products will develop and do business to add value and have market potential in the future. A road map will create to develop and promote the production and use of biological products made from agricultural raw materials, agricultural waste and other by-products

- Strategy 3: The expansion of sustainable agriculture model that is environmentally friendly and with value-added from the success model in the country such as agriculture in economy, (BCG model), Good Agricultural Practice, agroforestry, organic agriculture, Agro- tourism, local fishing, legal fishing and proper treatment of workers, etc.

(2) Target 6: The goal is to restructure the manufacturing and service sectors to an innovation-based economy, which developing to smart electronics industry that focuses on the manufacture of key components in the global supply chain. It will be in high demand and worth a lot in the future, supporting the electrical and electronic industry in becoming a contract manufacturer and an advanced design and manufacturing contractor for Industry 4.0 and supporting the adoption of modern manufacturing innovations to speed up the development of the green electronics industry by using fiscal financial instruments or other motivating factors.

(3) Target 10: The goal is to add value through a circular economy and efficient use of resources that develop industries and services based on a circular economy and a low-carbon society. In addition, the goal of creating a low-carbon and sustainable society to reduce greenhouse gas emissions and pollution and improve people quality of life through the development of innovations and mechanisms to support a circular economy and a low-carbon society.

3) *The Fifth National Strategic Plan on Chemicals Management (B.E. 2561-2569 (2018-2026))*

Strategies related to chemical management, as follows: Strategy 2 Develop competence and role participation from all sectors. and Strategy 3 Reduce risk from chemicals.

Strategy 2 Develop competence and role participation from all sectors.

Develop a chemical database for each agency and related sector and link it to a central database. Develop data reporting systems and build a network of cooperation in data communication. Promote and support research and development that creates a body of scientific evidence and creates innovations for proper chemical management that are ready to be published and utilized.

Strategy 3 Reduce risk from chemicals.

Improve the efficiency of chemical management in order to reduce the risk of chemical hazards in all aspects. with the development of organization, law, and economics strengthening risk assessment and surveillance monitoring as well as accident prevention and emergency response. Promote international cooperation and compliance with international agreements on chemicals and waste. and reduce the risk of chemical hazards to consumers in the agricultural sector and industrial sector. health and transportation sectors.

4) *The Action Plan (B.E. 2562-2565 (2019-2022)) under The National Chemicals Management (B.E. 2565-2580 (2022-2037))*

Strategy 1 efficient for the monitoring and management of chemicals, as follows:

Work Plan 1 Laws development work plan into two main issues, as follows:

- Develop chemical laws. (Flagship project)
- Drafting legislation under ministerial regulations on management standards and the operation of safety, occupational health, and work environments with hazardous chemicals.

Work Plan 2 Increase efficiency for chemical Management work plan into two main issues, as follows:

- Develop public-private partnerships on chemical management and chemical law.
- Define preventive measures and solve chemical and hazardous substance problems.
- Linking data from toxicology centers and networks nationwide with databases of relevant agencies to study the connections between chemicals used in factories or sources of pollution. with the impact on public health and prepare a plan for chemical disasters, as well as prepare a reserve of medicines used to treat patients in hospitals in high-risk areas.

2.2.2 Roles of related government agencies

Government agencies with roles and responsibility relating to POPs and chemicals management are as followings

1. Ministry of Industry

The Department of Industrial Works and the Department of Primary Industries and Mines are responsible for the promotion and development of industry, supporting and overseeing industrial business operations in technology, production, environment, safety, energy conservation, hazardous substances, and chemicals. The ministry has a role in encouraging the potential of industrial businesses for sustainable development that is in line with laws and obligations under international agreements. It is carried out under the Hazardous Substance Act (B.E. 2535) to supervise the management of chemical waste and hazardous waste according to the obligations under international agreements and the management of used materials according to the Factory Act (B.E. 2535) (1992) and its amendments.

2. Ministry of Agriculture and Cooperatives (MOAC)

The Department of Agriculture (DOA) and the Department of Agricultural Extension (DOAE) have roles for managing and controlling production, import, export, and possession of chemicals in agriculture (pesticides) under the Hazardous Substance Act B.E. 2535 (1992).

3. Ministry of Public Health (MOPH)

The Food and Drug Administration has responsibility to manage and control import, export, and having in its possession hazardous substances for consumers and public health purposes under List 4 of the Hazardous Substance Act B.E. 2535 (1992), as well as having a duty to control business that is harmful to health and management of solid waste under the Public Health Act B.E. 2535 (1992).

4. Ministry of Finance (MOF)

The Customs Department The Customs Department is responsible for the prevention and control of smuggling of goods and other illegal products, including the import, export, and re-export of hazardous substances, chemical products, and hazardous waste, according to the Customs Act B.E. 2560 (2017), the Hazardous Substances Act B.E. 2535 (1992).

5. Ministry of Higher Education, Science, Research and Innovation (MHESI)

Has role and responsibility to promote, support, and regulate higher education affairs, sciences, research, and innovation for country development to cope with global changes, including research and development to reduce pollution and environmental issues for sustainable development.

6. Ministry of Foreign Affairs (MOFA)

The Department of International Organizations and the Department of Treaties and Legal Affairs have the role and responsibility to protect, preserve, and promote status and national interests by representing the government in international negotiations or by providing consultation, strategic recommendations, policy, and international strategies, as well as international instruments.

7. Ministry of Interior (MOI)

The Department of Local Administration and the Department of Provincial Administration have authority for local and provincial administration, respectively. MOI also has significant roles and responsibilities relevant to municipal waste management, municipal waste and hazardous waste incineration, and crematorium operations (all of which are major sources of unintentional production POPs according to the Public Health Act (B.E. 2535) (1992) and the Act on the Maintenance of the Cleanliness and Orderliness of the Country (B.E. 2535) (1992).

8. Ministry of Natural Resources and Environment

The Office of Natural Resources and Environmental Policy and Planning, Pollution Control Department, and Department of Environmental Quality Promotion roles include the development and mobilization of national strategies and measures to conserve, protect, rehabilitate, and properly use natural resources and the environment. MNRE responsibilities also include integration and collaboration with all relevant sectors to manage natural resources and the environment at both national and international levels as well as setting up environmental quality standards, including standards for emissions and effluents from pollution sources to control pollution and hazardous chemicals.

2.2.3 Relevant international agreements and their obligations

Thailand is a party to many international conventions and other international agreements. In addition to the Stockholm Convention, several of these conventions also aim to achieve environmentally sound management of chemicals, as follows

1) Sustainable Development Goals (SDGs)

- (1) **Goal 3:** Ensure healthy lives and promote well-being for all at all ages.
 - substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination by 2030.
- (2) **Goal 6:** Ensure availability and sustainable management of water and sanitation for all.
 - improve water quality by reducing pollution, eliminating dumping, and minimizing the release of hazardous chemicals and materials, halving the proportion of untreated wastewater, and substantially increasing recycling and safe reuse globally by 2030.
- (3) **Goal 12:** Ensure sustainable consumption and production patterns
 - achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water, and soil in order to minimize their adverse impacts on human health and the environment by 2020.

2) *Basel Convention on the Controlling of Transboundary Movements of Hazardous Wastes and their Disposals.*

Thailand has ratified the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal since 22 November 1997. The Cabinet has designated the DIW, Ministry of Industry to serve as the Competent Authority and the PCD to serve as the National Focal Point. The Basel Convention aims to protect human health and the environment against the adverse effects of hazardous wastes by reduction of hazardous waste generation in terms of quantities and hazards and the promotion of environmentally sound management of hazardous wastes, restriction of transboundary movements of hazardous wastes except where it is perceived to be in accordance with the principles of environmentally sound management, and a regulatory system applying to cases where transboundary movements are permissible.

3) *Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade*

Thailand has accessed to the Rotterdam Convention since 19 February 2002. The Convention has entered into force since 24 February 2004. The Cabinet has designated the DOA (MOAC) to serve as Designated National Authority (DNA) for pesticides, the DIW (M-Industry), to serve as DNA for industrial chemicals and the PCD (MNRE), to serve as DNA for other chemicals and as the National Contact Point. The objective of this Convention is to promote shared responsibility and cooperative efforts among Parties in the international trade of certain hazardous chemicals in order to protect human health and the environment from potential harm and to contribute to their environmentally sound use, by facilitating information exchange about their characteristics, by providing for a national decision-making process on their import and export and by disseminating these decisions to Parties.

4) *The Strategic Approach to International Chemicals Management (SAICM)*

The Strategic Approach to International Chemicals Management (SAICM) is a policy framework to foster the sound management of chemicals to achieve chemical management efficiency throughout their life cycle and the 2030 goal that chemicals are produced and used in ways that have the least impact on human health and the environment.

2.2.4 Laws and regulations

1) *Hazardous Substance Act B.E. 2535 (1992) and its Amendments*

Hazardous Substance Act of 1992 (HSA) prescribes criteria and procedures for control of hazardous substances in regard to production, import, export, transport, uses, storage, disposal and possession of hazardous substances, including to establish the administrative system to promote coordination among various agencies involved in the supervision of said hazardous substances in order to prevent and mitigate harms to individuals, animals, plants, property and the environment.

Hazardous substances under the HSA are defined as explosives, flammable substances, oxidizing agents and peroxides, toxic substances, substances causing diseases, radioactive substances, mutation causing substances, corrosive substances, irritating substances and other substances either chemical or otherwise which may cause injury to persons, animals, plants, property or the environment. They are classified into four categories for necessary control, as follows:

- Category 1 Hazardous Substance is that of which the production, import, export, or having in possession must comply with the specified criteria and procedures.

- Category 2 Hazardous Substance is that of which the production, import, export, or having in possession must firstly be notified to the authority and must also comply with specified criteria and procedures.

- Category 3 Hazardous Substance is that of which the production, import, export, or having in possession must obtain a permit.

- Category 4 Hazardous Substance is that of which the production, import, export or having in possession is prohibited.

2) *The Enhancement and Conservation of National Environment Quality Act B.E. 2535 (1992) and the 2nd Amendment B.E. 2561 (2018)*

This Act provides a legal basis for the management and control of environmental quality and emission/effluent standards, monitoring, policy development and requirements for Environmental Impact Assessment (EIA) as well as pollution control. With respect to the hazardous wastes and chemicals related to POPs and in case of no specific law thereto, the MNRE shall, with the advice of the Pollution Control Committee, have the power to issue ministerial regulation specifying the types and categories of hazardous wastes generated from the production and usage of chemicals or hazardous substances in the production process of industry, agriculture, sanitation and other activities which shall be brought under control.

3) *The Factory Act B.E. 2535 (1992) and its Amendment*

The Factory Act B.E. 2535 (1992) prescribes criteria and standards to control factory operations related to legal permission, disposal of wastes or contamination created by factory operations (for instance, disposal of wastes, hazardous wastes, refuses or garbage, discharge of wastewater and exhausted air), waste treatment system, emission standards and emission control, as well as the procedure for officers to exercise administrative orders to enforce the law.

4) *The Customs Act B.E. 2560 (2017)*

It is the import and export of goods that must perform customs formalities correctly and completely according to the customs law for submitting and supporting documents such as payment of duties and insurance for release, in accordance with other relevant laws.

5) *Notification of National Environment Board No.8 B.E.2537 (1994) under the Enhancement and Conservation of the National Environmental Quality Act B.E.2535 (1992) on Water Resource Quality Standard*

This Notification aims to control and maintain quality of water in various water resources for multi-purpose usage and for safety to public health, for natural resources and environment conservation.

6) *Notification of National Environment Board No.25 B.E.2547 (2004) under the Enhancement and Conservation of the National Environmental Quality Act B.E.2535 (1992) on Soil Quality Standard*

This Notification aims to control and maintain soil quality suitable for residential, agricultural, and other purposes and to provide protection for public health and safety. Four categories of soil quality standards are defined, namely, Volatile Organic Compound, Heavy Metals, Pesticides and other chemicals including POPs.

7) Notification of the Ministry of Industry

- (1) Stack Emission Standard from Industrial Hazardous Waste Incinerators B.E. 2545 (2002)

This Notification, issued under the Factory Act B.E. 2535 (1992), limits concentration of 9 air pollutants in the stack air exhausted from industrial hazardous waste incinerators. Standard values for dioxin compounds (PCDD/PCDFs) and heavy metals are defined. The Notification came into force on 31 October 2002.

- (2) Notification of Ministry of Industry on Air Emission Standard for Factory using Processed Used-oil and Synthetic Fuel as Fuel in Industrial Furnaces B.E. 2548 (2005)

This Notification, issued under the Factory Act B.E. 2535 (1992), limits concentration of 9 air pollutants in the air exhausted from factories that use processed used-oil and synthetic fuel as fuel in industrial furnaces. The standard values of dioxin compounds (PCDD/PCDFs), volatile compounds and heavy metals are defined. The Notification came into force on 15 July 2005.

8) Notification of Ministry of Natural Resources and Environment

- (1) Emission Standard for Infectious Waste Incinerators B.E. 2546 (2003)

This Notification, issued under the Enhancement and Conservation of the National Environmental Quality Act B.E.2535 (1992), prescribes emission standards for infectious waste incinerators. Standard values of dioxin compounds (PCDD/PCDFs) are defined. The Notification came into force on 26 December 2003.

- (2) Air Emission Standard for Cement Plant Using Waste as Fuel or Raw Materials for Production B.E. 2549 (2006)

This Notification, issued under the Enhancement and Conservation of the National Environmental Quality Act B.E.2535 (1992), defines emission standards for cement plants that use wastes as fuel or as raw material for production. Standard values for stack air emissions of dioxin compounds (PCDD/PCDFs) are defined. The Notification came into force on 16 December 2006.

- (3) Emission Standard for Waste Incinerators B.E. 2553 (2010)

This Notification, issued under the Enhancement and Conservation of the National Environmental Quality Act B.E.2535 (1992), defines emission standards for new waste incinerators or its extensions (approved after July 2010) and existing waste incinerators (in operation before July 2010). For each case, standard values of stack air emission dioxin compounds (PCDD/PCDFs) are defined. The Notification came into force on 17 July 2010.

2.2.5 National mechanism relating to Stockholm Convention

The national implementation and collaboration mechanism comprised of the National Environment Board and the National Environmental Sub-Committee: Stockholm Convention on POPs, as follows:

1) The National Environment Board

was established by the Enhancement and Conservation of National Environment Quality Act B.E. 2535(1992). It consists of the Prime Minister as Chairperson, a Deputy Prime Minister entrusted by the Prime Minister as First Vice-Chairperson, the Minister of Natural Resources and the Environment as Second Vice-Chairperson, relevant Ministers and related agencies, and experts in various fields, including environmental law, public health, and wellness in the field of forest resources and ecology, environmental economics, conservation of art, landscape architecture, and urban environment Natural Resources and Environment Management social and political participation, and environmental pollution no more than eight experts, with the Permanent Secretary of the

Ministry of Natural Resources and the Environment acting as a member and the Secretary. The NEB has the following powers and duties:

- (1) to submit policies and plans for the enhancement and conservation of national environmental quality to the Cabinet for approval.
- (2) to prescribe Environmental Quality Standards
- (3) to consider and approve the Environmental Quality Management Plan proposed by the Minister.
- (4) to consider and approve the Provincial Action Plan for environmental quality management.
- (5) to suggest to the Cabinet in respect to financial, fiscal, taxation, and investment promotion measures for the implementation of the policies and plans for the enhancement and conservation of national environmental quality.
- (6) to propose for amendment or improvement of laws relating to the enhancement and conservation of environmental quality to the Cabinet.
- (7) to consider and approve the Action Plan for the prevention or remediation of danger caused by the contamination of pollutants or spread of pollution proposed by the Pollution Control Committee.
- (8) to consider and approve the setting of emission or effluent standards proposed by the Minister.
- (9) to supervise, oversee and expedite the enactment of royal decrees and the issuance of ministerial regulations, rules, local ordinances, notifications, rules and orders which are necessary to ensure systematic operation of the laws relating to the enhancement and conservation of environmental quality to the fullest extent possible.
- (10) to submit recommendations to the Prime Minister for his/her consideration in the case where it appears that any government agency or a state enterprise infringes or refrains from complying with the laws, rules and regulations relating to the conservation of environmental quality, which may cause severe damage to the environment.
- (11) to specify measures for strengthening and fostering of cooperation and coordination among government agencies, state enterprises, and the private sector in matters concerning the enhancement and conservation of environmental quality.
- (12) to supervise the management and administration of the Environmental Fund.
- (13) to submit reports on the state of national environmental quality to the Cabinet at least once a year.
- (14) to perform other functions as prescribed by this Act or by other laws to be within the authorities and duties of the National Environment Board.

2) National Environmental Sub-Committee: Stockholm Convention on Persistent Organic Pollutants

National Environmental Sub-Committee: Stockholm Convention is established by the order of the National Environmental Board No. 1/2003 dated 19 May 2003. The components and mandates of the sub-committee have been updated 4 times according to orders of National Environmental Board No. 18/2004 dated 12 July 2004, No. 23/2009 dated 28 September 2009, No. 5/2018 dated 3 May 2018. and No. 28/2021 dated 31 October 2021.

At the present, the national environmental sub-committee on the Stockholm Convention is chaired by a senior expert of the National Environment Board, and the Director-General of the Pollution Control Department is vice-chairperson. There are 17 members from related agencies, namely,

the Office of National Economic and Social Development Board, Customs Department, Department of Treaties and Legal Affairs, Department of International Organizations, Department of Agriculture, Department of Environmental Quality Promotion, Department of International Trade, Department of Local Administration, Department of Health, Department of Industrial Work, Food and Drug Administration, Division of Foreign Affairs (Office of the Permanent Secretary for Ministry of Natural Resources and Environment), Bangkok Metropolitan Authority, Industrial Estate Authority of Thailand, Federal Trade Institute, National Metal and Materials Technology Center (MTEC) as well as an external expert. and the Pollution Control Department serves as its secretariat. The national environmental sub-committee on the Stockholm Convention has the following powers and duties:

(1) to consider and give the approval for ratification of the SC and prepare the country's position during COP meetings, review POPs and other meetings.

(2) to support and provide suggestions on carrying out the National Implementation Plan (NIP) for implementation of the Stockholm convention on POPs.

(3) to propose the coordination with all relevant agencies to fulfill obligations under the SC.

(4) to supervise the collaboration with the Secretariat of the SC

(5) to appoint working groups as appropriate.

2.3 Assessment of the Status of POPs in Thailand

Thailand provided the assessment of the chemicals listed in Annex A, Annex B and Annex C of Stockholm Convention in order to facilitate implementation for effectiveness evaluation and to consider as a production and use specific exemption for purposes. The national assessment reported to identify, characterize and address the production, the use, the import, the export and the environmentally sound management of stockpiles and wastes that contain or may contain in the present and the part time. The activities are such as the monitoring programme, the educational and public awareness programmes, the reporting in accordance with Article 15, the impacted of socio-economic or environments and gender-related issues following Guidance for Developing a NIP for the Stockholm Convention on POPs (2017)

2.3.1 Assessment of POPs pesticides (Annex A, Part I)

The POPs pesticides of chemicals listed in Annex A, Part 1 are 17 POPs pesticides listed. There were 9 POPs pesticides listed in the Convention at the initial stage of the SC as aldrin, chlordane, DDT, dieldrin, endrin, heptachlor, hexachlorobenzene (HCB), mirex and toxaphene and 8 POPs pesticides listed in the Convention at the newly stage as α -HCH, (β -HCH), lindane, Chlordecone, endosulfan, Pentachlorobenzene (PeCB), pentachlorophenol (PCP) and dicofal.

1) Assessment of POPs pesticides

(1) Initial SC POPs pesticides

Thailand has never produced any of the 9 POPs pesticides. Most initial SC POPs pesticides (except HCB and mirex) had been imported into the country in the past, but their total import amounts were not specified. A survey of DOA's annual records of imports of hazardous agricultural substances during 2007-2017 found no import data for the classified POPs. Additionally, a search in FDA's hazardous substance registration database found no record of any of the classified POPs pesticides.

Based on Thailand's first POPs inventory assessment report, there were about 220 kg of obsolete initial SC POPs pesticide stockpiles in the country in 2004. During 2010-2013, the PCD conducted a follow-up inventory of obsolete SC POPs pesticides and found a combined 54 kg of chlordane in DOA's and DOAE's custodies, and 7 liters of dieldrin in DOA's custody. A subsequent survey in 2018 found about 31 kg of chlordane remained in DOAE's custody, pending final disposal. All of the obsolete SC POPs pesticides previously held in DOA's custody had been collected and destroyed in an environmentally sound manner by industrial waste incineration.

(2) Newly listed POPs pesticides

Thailand has never produced any of the 8 newly listed POPs pesticides. Six of these pesticides (except chlordecone and PeCB) had been imported into the country in the past. However, during 1993-2012, 6 of these 8 newly listed pesticides, including α -HCH, β -HCH, γ -HCH (lindane), chlordecone, technical endosulfan, and PCPs, were banned by all three HSA enforcement agencies (DOA, FDA, and DIW). For dicofol, it was banned by FDA and classified as Category 3 HS under the DOA (for their production, import, export, and possession).

a) α -HCH, β -HCH and γ -HCH (lindane)

α -HCH and β -HCH were banned since 2001 by the DOA, the DIW and FDA. Because Thailand has never produced SC POPs pesticides and because α -HCH and β -HCH are by-products from the production of lindane, it can be concluded that these 2 substances have never been individually produced or imported.

Lindane (γ -HCH) has been banned by the DOA since 2001 and by the FDA since 2012, with an exception for medical use as a second-line treatment for scabies and lice in humans. FDA had granted an import license for lindane to a pharmaceutical company in 1984. After lindane was removed from the National List of Essential Medicines for treatment of scabies and lice in humans in 2012, this firm voluntarily withdrew its import license in 2015.

b) Chlordecone

Chlordecone was classified as a Category 4 HS under the control of the FDA since 1995 and later under the supervision of the DOA since 2000. From PRTR on pesticide, there is no outstanding stock of chlordecone. Thailand's food and agricultural commodity standards require that food and feed are free of chlordecone. However, chlordecone has never received any request or granted any licence for chlordecone imports. There is no evidence to suggest that chlordecone has been imported into or used in Thailand. It doesn't necessary to establish relevant standards and monitoring programme.

c) Technical endosulfan

Technical endosulfan (except capsule suspension (CS) type) has been banned since 2004 by the DOA and the FDA. In 2002, α -endosulfan and β -endosulfan were classified as Category 3 HS under the DOA, which means prior authorization is mandatory for their production, import, export, and possession. Prior to the ban by the DOA, approximately 8,700 tonnes of technical endosulfan were imported during 1996-2003. After 2004, the import ceased. As for α - and β -endosulfan, the DOA's annual records of imports of hazardous agricultural substances show no import during 1996-2017.

d) Pentachlorophenol and its salts and esters (PCP)

Globally, PCP has been produced commercially and used as a wood preservative and as herbicides in paddy fields in some country. In Thailand, PCP was banned by the DOA in 1993 and later by the FDA and the DIW in 2000 and 2003, respectively. PCP has never been approved for agricultural uses in Thailand. There is no information to suggest that PCP has ever been imported into the country. It did not find any record of registration, import or export of PCP granted by any of the three enforcement agencies (DOA, FDA and DIW). Also, there is no information to suggest the use of PCP in wood products, such as utility poles, fences, railway sleepers, etc., in Thailand.

(3) Environmental monitoring of SC POPs pesticides

Thailand has published guidelines on maximum allowable concentrations (MAC) for SC POPs pesticides in surface water, groundwater, soil and maximum residue limits (MRL) or extraneous maximum residue limits (EMRL) for agricultural products. The publication of these guidelines led to a mandate to monitor levels of relevant SC POPs pesticides in food and feed and in the environment.

Most monitoring efforts conducted by DOA, PCD, Metropolitan Waterworks Authority (MWA), Provincial Waterworks Authority (PWA) and Department of Medical Sciences (DMS) showed that the levels of SC POPs pesticides residues were within the standard limits. Especially, in 2017 the DMS assessed the population's exposure to toxic substances in cooked food. The results showed that POPs Pesticide residues in all of the sampled food groups were below the detection limits.

2) POPs pesticides management

Most POPs pesticides are regulated as hazardous substances under the Hazardous Substance Act B.E. 2535 (1992), as follows:

(1) Control as Category 4 Hazardous Substances with prohibition on production, import, export or possession of 15 POPs pesticides; namely (1) endrin in 1981; (2) DDT was banned for uses in agriculture in 1983 and for uses in public health in 2003; (3) toxaphene in 1983; (4) aldrin, (5) dieldrin and (6) heptachlor in 1988; (7) pentachlorophenol and its salts and esters were banned for uses in agriculture in 1993; (8) chlordane and (9) chlordecone were banned for uses in public health in 1995 and for uses in agriculture in 2000; (10) mirex in 2001 (11) HCB, (12) α -HCH and (13) β -HCH in 2001; (14) lindane was banned for uses in agriculture in 2001 and for public health uses in 2012 and (15) hexa bromobiphenyl in 2003

(2) Endosulfan except capsule suspension formulae in 2004 and α - and β - endosulfan with in specific formulae of capsule suspension being classified as Category 3 Hazardous Substance for agriculture uses in 2002.

(3) PeCB is the only relevant SC POPs pesticide currently pending a decision to control as a hazardous substance under HSA.

(4) In Thailand, MRLs/EMRLs in food have been issued to prevent harmful effects from consumption of food containing pesticide residues, i.e., aldrin, dieldrin, chlordane, DDT, endrin and heptachlor, in different types of food by the FDA, MOPH, according to the Notification of Ministry of Public Health No. 387 B.E. 2560 (2017) on pesticide residues in food.

2.3.2 Assessment of PCBs (Annex A, Part II)

1) *Review of PCBs assessment*

PCBs were included in the initial list of POPs under the SC and, hence, had been addressed in Thailand's first NIP. The PCD has periodically submitted reports to the Secretariat in accordance to its obligation under Article 15 of the convention.

2) *Management actions for PCBs*

(1) The control of PCBs and equipment containing PCBs and elimination of PCBs usages are as follows:

- In 2004, there was a notification for reclassification of PCBs to be Category 4 of HS according to the HAS, meaning that it is banned to produce, import, export or have PCBs in possession, including equipment contain PCBs compounds.

- In 2004, the DIW designated end-of-life devices, transformers and power capacitors that contain PCBs a chemical waste, classified as Category 3 of HS. Any production, import, export, or possession of these devices requires prior approval from DIW.

- In 2008, the DIW issued a notification to totally phase-out PCBs by 2012. The notification obligated device holders to prepare and implement a plan to phase-out and completely dispose of PCBs by 2012. Any movement of affected devices also needed prior approval from the DIW. Since PCB oils was not one of the wastes or discarded materials that were allowed to be treated or disposed of by waste management processors, industrial waste incinerators in Thailand were not allowed by law to incinerate PCB oils. All PCB oils, therefore, were collected and exported to the third countries for final destruction. In particular, as reported in Thailand's National Reporting of the Stockholm Convention (Fourth Reporting Cycle), 761 tonnes of PCB wastes were exported to, the United Kingdom (452 t) and other countries (309 t) for final destruction during 1992-2002. Moreover, in 2012, 110 tonnes of transformers contaminated with PCBs and 100 tonnes of waste containing PCB oils were exported to the Netherlands and France for final disposal.

(2) In terms of the awareness of the environmentally sound management of PCBs, the Ministry of Industry, through the DIW, published documentation related to the legal obligations and guidance on the management of PCBs. The Ministry of Natural Resources and Environment, through the PCD, published PCBs management handbooks, guidelines for the management of PCB-contaminated devices, monographs, as well as general documents to raise awareness about PCBs and their environmental and health impacts.

(3) PCBs have been monitoring and study through several activities as follows:

- In 2006-2007, the Department of Environmental Quality Promotion (DEQP) studied PCBs in sediments in Chao Praya River, estuaries and the upper Gulf of Thailand. The study found the highest accumulations in areas around Klong Toey District (Bangkok) and Amphoe Prapradang (Samut Prakarn Province). The level of PCBs, though, was in pg/g (dw) range. This level of contamination was considered low in comparison to similar areas in other countries. The study found no PCB accumulation in sediments in central areas from Nontaburi Province upward.

- From 2004 to 2009, the Ministry of Education, in collaboration with the Inter-University Program on Environmental Toxicology, Technology and Management of Chulabhorn Research Institute, Asian Institute of Technology, and Mahidol University's Center for Environmental Health, Toxicology and Management of Chemical, conducted research under the project "The evaluation of PCBs and dioxin-like PCBs contaminated coast of Thailand by using chemical and biological techniques" to assess the accumulation of PCBs in seafood from the eastern coast of Thailand. The study found PCB contaminations in mussels, oysters, and shrimps ranging between 19-1,100 ng/g (lipid-adjusted weight), and the levels of PCBs in shrimp was higher than those in mussels and oysters.

2.3.3 Assessment of POP-PBDEs (Annex A, Part IV, V and IX) HBB (Annex A, Part I) and HBCD (Annex A Part VII)

1) Assessment of POP-PBDEs HBB and HBCD

a) Tetrabromodiphenyl ether and pentabromodiphenyl ether (c-pentaBDE)

Tetrabromodiphenyl ether and pentabromodiphenyl ether (or commercial pentabromodiphenyl ether, c-pentaBDE) is considered a historical substance of which production has ceased over 15 years ago. Thailand has never produced this substance. There is no record of c-pentaBDE ever being imported into or used in Thailand. C-pentaBDE was listed as Category 3 HS in 2017. As of 2019, no firm filed any request to process or to handle this substance.

Since worldwide production of c-pentaBDE was ceased more than 15 years ago, stockpile of c-pentaBDE in Thailand is believed to be zero. Thailand's only involvement with c-pentaBDE is believed to be through imports of transport vehicles that may contain c-pentaBDE (produced before 2005), possibly in their seats and interior fabrics. The cumulative amount of c-pentaBDE imported into Thailand via these vehicles is estimated at 1.5 tonnes. These contaminated materials are believed to have reached end-of-life and have been replaced with locally produced parts. The removed materials are believed to be discarded as municipal solid waste (MSW), which could have been landfilled, incinerated, or openly dumped depending on the MSW management system available to the relevant communities.

b) Hexabromodiphenyl ether and heptabromodiphenyl ether (c-octaBDE)

Polybrominated diphenylethers (PBDEs) were imported into Thailand in the 1990s to produce UL 94 V0 grade acrylonitrile butadiene styrene (ABS) resins. However, due to the lack of supplier data disclosure in the past, the type of these PBDEs could not be confirmed. Since these ABS resins were produced 20-30 years ago (before the widespread uses of computers and database management systems to store industrial transactions), information related to the types of the end-use products or the final market destinations are no longer traceable. C-octaBDE was listed as Category 3 HS in 2017. As of 2019, no firm has filed any request to process or to handle this substance.

Since worldwide production of c-octaBDE was ceased more than 15 years ago, stockpile of c-octaBDE in Thailand is believed to be zero. Due to the lack of historical data, Thailand's inventory team developed a predictive model to estimate the levels of octaBDE based on results from a product survey for the types of BFR used in everyday products and the corresponding wastes found at waste management sites. Based on the developed model, the total amount of c-octaBDE in the affected ABS is estimated at 12 tonnes. Most of these products are believed to have reached end-of-life, leaving about 1,000 monitors, with about 300 kg of c-octaBDE remaining in hibernation. ABS resins extracted from end-of-life (EOL) monitors are shredded and sold as recycled ABS chips, with ABS-V0 grade commanding a higher price than general grade. Most of the ABS-V0 chips found in Thailand were flame-retarded with tetrabromo bisphenol-A (TBBPA). Nevertheless, ABS-V0 chips with c-octaBDE may still be found, especially those from recycling shops located in the central part of the country.

c) Decabromodiphenyl ether (c-decaBDE)

Before being listed in Annex A of the SC, decaBDE was a popular flame retardant. Unlike the other SC industrial POPs, worldwide production and sale of decaBDE have not yet ceased. C-decaBDE may have been imported into Thailand in the past but due to the non-unique import classification code, the total amount of decaBDE ever imported into the country is unknown. C-decaBDE was recently listed as Category 3 HS in 2019. In 2018, the DIW received (voluntary) notifications for the intentions to import about 70 tonnes of decaBDE. However, since decaBDE was not a controlled substance at the time, it was uncertain whether or not the notified activities actually took place. Results from a questionnaire survey indicated that producers along the electrical and electronic (EEE) supply chain had phased-out the use of c-decaBDE since 2006, as a result of the enforcement of the EU RoHS Directive. Nevertheless, since the phase-out was commenced more than 10 years ago, stock of decaBDE for these historic uses (if they existed) may already be exhausted.

Results from field survey suggested that decaBDE may find other uses in applications that faced lower restriction such as upholstery and drapery textiles, rubbers and silicone parts. Also, the survey found BFR in interior textiles and underhood parts in several passenger cars. It is not known whether these flame-retarded materials were imported or locally produced. With limited responses from stakeholders and limited access to material samples, the type of the BFR cannot be confirmed at this time.

The uses of decaBDE were confirmed for polystyrene (PS) housings of CRT TVs produced before 2006. The number of the affected TVs is estimated at 5 million sets. The corresponding amount of PS resins that contained decaBDE is estimated at 10,000 tonnes and the total amount of decaBDE is estimated at 920-1,500 tonnes. About half of this amount is believed to have already been disposed of; leaving about 500-820 tonnes remaining 'in-stock' in the use and hibernation phases of products. Apart from PS from CRT TVs, Thailand's 2019 POPs Industrial Chemicals Inventory Assessment reported traces of decaBDE in shredded PS chips from other applications. Unfortunately, the source of these chips could not be confirmed. The assessment also found TBBPA to be the most popular BFR for casings of computer CRT monitors found in Thailand. As for decaBDE in other WEEE components, the study did not yet find decaBDE in other rigid polymeric resins other than PS.

For decaBDE uses in textile applications, the average amount of decaBDE in flame retarded fabrics is estimated at 300 kg per year and the cumulative amount of decaBDE in impregnated fabrics that are in use phase is estimated at 3 tonnes. DecaBDE can be released from the affected products at any stage throughout products' life-cycle. Results from an emission model suggested the releases from EEE in the form of dust are now shifting from the use phase to the dismantling and recycling facilities.

d) Hexabromobiphenyl (HBB)

Hexabromobiphenyl (HBB, CAS No 36355-01-8) can be considered a legacy chemical, with no new production for decades. Thailand has never produced this substance and there is no data to suggest that HBB has ever been imported into or used in Thailand. HBB was totally banned as a Category 4 substance under HSA since 2013. In the same year, wastes, substances and articles containing, consisting of or contaminated with HBB at a concentration level of 50 mg/kg or more were classified as chemical wastes which were also classified as Category 3 HS that required prior approval from the DIW. No report of any detection of HBB in the food chain or in any of Thailand's environmental media was found.

e) Hexabromocyclododecane (HBCD)

HBCD is not manufactured in Thailand but imported by producers of expanded polystyrene (EPS) foams beads for use as a flame retardant in self-extinguish grade EPS (SE-grade EPS) in order to produce EPS-core sandwich panels for applications such as cold storages and cleanrooms, etc. There are two local EPS bead producers, producing about 12,000 tonnes of SE-grade EPS beads per year. Based on local EPS bead production capacity and EPS bead import/export statistics, the total amount of HBCD-contaminated SE-grade EPS is estimated at 175,000 tonnes, with the corresponding amount of HBCD of about 1,300 tonnes [890-1,770 tonnes]. Most of the relevant amounts of HBCD are believed to remain within SE-grade EPS foams which are currently in the use phase. No report of any detection of HBCD in other relevant products or in any of Thailand's environmental medias were found.

HBCD was no longer imported into Thailand after key global manufacturers terminated their production, though HBCD may still be available from certain areas. Local EPS bead producers have ceased to use HBCD and have instead switched to Polymeric FR (CAS No 1195978-93-8) – a novel substance offered by the same suppliers as a drop-in substitute for HBCD. Because EPS beads have a limited useful life of about 6 months, the affected EPS beads are expected to remain in the market only for a relatively short time after the phase-out of HBCD.

2) *Legal Status of POP-PBDE, HBB and HBCD*

PBBs were banned (Category 4) in 2013 while 7 PBDE homologs (penta-, octa-, deca-BDE) were listed as Category 3 of Hazardous Substances in Thailand in 2017 and 2019 (Table). Any production, import, export, or having in possession of any of the Category 3 of HS in Thailand requires prior authorization from the DIW, Ministry of Industry.

Table 2: HBB and PBDEs Control under Thai Hazardous Substance Act

No.	Substance	CAS No. (Thai HSA)	Category	Started	CAS No. (SC)
1	hexaBB	36355-01-8	4	2013	36355-01-8
2	octaBB	27858-07-7	4	2013	
3	decaBB	13654-09-6	4	2013	
4	Wastes, substances and articles containing, consisting of or contaminated PCB, PCT, or PBB, or any other polybrominated analogues of these compounds, at a concentration level of 50 mg/kg or more	-	3	2013	[Basel Y10]
5	tetraBDE (BDE-47)	40088-47-9*	3	2017	5436-43-1
6	pentaBDE (BDE-99)	32534-81-9*	3	2017	60348-60-9
7	hexaBDE (BDE-153)	68631-49-2	3	2017	68631-49-2
8	hexaBDE (BDE-154)	207122-15-4	3	2017	207122-15-4
9	heptaBDE (BDE-175)	446255-22-7	3	2017	446255-22-7
10	heptaBDE (BDE-183)	207122-16-5	3	2017	207122-16-5
11	decaBDE (BDE-209)	1163-19-5	3	2019	1163-19-5

Note: (*) CAS number differs from those listed in SC Annex A

HBCD is not yet a 'classified' substance under the HSA. Consequently the low POPs content for HBCD has not been established and, hence, waste containing HBCD is not yet classified as hazardous waste. Nevertheless, HBCD's inherent hazards meet the requirements for voluntary declaration under DIW's 'list 5.6' which is reported to DIW. In 2016, a local distributor filed an intention to import about 8 tonnes of HBCD for EPS foam application. This is presumed to be the final import.

2.3.4 Assessment of HCBD (Annex A, Part I)

1) *The status of HCBD*

There is no information related to production and use of hexachlorobutadiene (HCBD) in Thailand. Since Thailand has no chlorinated solvent production plant, there is no major source for HCBD. However, HCBD may be unintentionally generated as a by-product of chemical and thermal processes. EDC/VCM, allyl chloride and epichlorhydrin production processes, and municipal waste incinerators may be sources of the unintentionally produced HCBD in Thailand, and there is no analytical data for the emissions from these sources.

2) *The management of HCBD*

Nevertheless, emissions from incineration from these plants are under regulatory control for PCDD/F emission (with limits of 0.5 ng TEQ/m³ (7% O₂) for industrial waste incinerators and 0.1 ng TEQ/m³ (7% O₂) for municipal waste incinerators). Waste related to the EDC/VCM, allyl chloride and epichlorhydrin production processes are also incinerated with regulatory control for dioxin emission (limit 0.5 ng TEQ/m³ (7% O₂)). These facilities are operated according to BAT. With appropriate technology/practices that the industry put in place to control the generation and emission of PCDD/F, the generation and emission of HCBD should simultaneously be minimized. However, the PCD had monitored HCBD in ambient air in Bangkok and Rayong Province during 2006-2009 and found annual average between 0.14 – 0.22 µg/m³.

HCBD is listed in DIW's 2016 soil and groundwater standards. Relevant factories are required by the Ministry of Industry's Ministerial Regulation on the Control of Contamination within Factory into Soil and Groundwater B.E. 2559 (2016) to periodically monitor and report their soil and groundwater quality. As of 2019, none of the listed factories was required to monitor and report levels of HCBD contamination in their soil and groundwater. Finally, a search for information in international journals did not yield any report on the detection of HCBD in environmental media in Thailand.

2.3.5 Assessment of PCNs (Annex A, Part I)

PCNs is not yet a 'classified' substance under the HSA. It is not known whether PCNs (as chemical substances) have ever been imported into Thailand. In 2013, DIW designated wastes, substances and articles containing, consisting of or contaminated with polychlorinated biphenyls (PCBs), polychlorinated terphenyls (PCTs), polychlorinated naphthalenes (PCNs) or polybrominated biphenyls (PBBs), or any other polybrominated analogues of these compounds, at a concentration level of 50 mg/kg or more as chemical wastes which are also classified as Category 3 HS that require prior approval from the DIW. A search in DIW database found no record that could be linked to PCNs. Apart from this filing, the 2019 POPs Industrial Chemical Inventory Assessment study did not find any other data related to PCNs in Thailand.

2.3.6 Assessment of PeCB (Annex A, Part I)

PeCB is not yet classified as a Hazardous Substance under HSA. There is no record that PeCB was ever produced in Thailand. Except for small amounts imported for research/laboratory purposes, there is no information as to whether PeCB has ever been imported into Thailand. There is no data to suggest that PeCB had ever been used as an intermediate chemical to produce other chemical substances in Thailand.

2.3.7 Review and management of DDT (Annex B, Part II)

1) *The status of DDT*

DDT is listed as Category 4 Hazardous Substance under the HSA. There is no stockpile of DDT in the possession of any government or private agency.

2) *The management of DDT*

Production, import, export and having possession of DDT for agricultural use and for health and medical use was prohibited in 1983 and 2003 respectively.

2.3.8 Assessment of PFOS, its salts and PFOSE (Annex B, Part III)

1) *Assessment of PFOS, its salts and PFOSE*

PFOS is a surfactant that may be used in textile (possibly mainly for export-oriented products), paper (food packaging), metal plating, and firefighting foam applications. Information from stakeholder interviews indicated that most export-oriented firms had phased out PFOS since 2009 as a result of the publication of the EU's PFOS Directive. Information from local chemical distributors indicates that some small plating companies still prefer to use PFOS.

Nine PFOS-related substances were recently listed as Category 3 HSs in 2013 and 2017. Based on import statistics, the remaining demand for PFOS for plating applications is estimated at 300-400 kg per year. PFOS was detected in several products sold in Thailand including textiles, sun screen cream, and bottled water. There were also reports of detecting PFOS in effluent of industrial wastewater treatment plants, groundwater, surface water, and tap water, with the concentration levels appearing to be associated with the areas where PFOS may have been used.

Results from a survey of PFOS in firefighting foams in 2019 found possible stockpiles of PFOS-containing foams in foams stored in petroleum refineries and oil depots that were imported before 2009. Based on the amount of firefighting stock required by law, the amount of PFOS relevant firefighting foams is estimated at 925,000 liters, with the corresponding amount of PFOS of about 3,700 – 5,500 kg.

For firefighting training, which is considered the largest PFOS release source that leads to contamination of groundwater, the survey found that most fire trainings in Thailand do not use actual foams, due to the high price of firefighting foams. However, expired foams may be used in firefighting trainings in certain high-risk areas, such as petroleum complexes and nearby industrial estates. Effluent water both from firefighting trainings and real fire extinguishing within industrial estates are required to be collected and treated at the source before they are allowed to be released to the industrial estate's central wastewater treatment plant. However, the level of PFOS in the effluents has never been monitoring because of not in the list of effluent's parameters.

Based on Thailand's 2019 POPs Industrial Chemicals Inventory report, the following areas may be contaminated with PFOS but have not been checked and/or controlled:

- Wastewater treatment plants that receive wastewater from factories that use or have used PFOS and/or central WWTP that cannot separate incoming water
- WWTP effluent water, effluent from plating plants, sewage sludge and landfill leachate
- Areas that receive contaminated biosolids, particularly areas where these biosolids are used as soil conditioners
- Soil and groundwater in the affected areas
- Landfills, particularly industrial waste landfills

Additionally, as PFOS-containing firefighting foams will become expired over the next 10 years or so, Thailand will need to develop a plan/measure to ensure that these foams are contained (including fire-water runoff) and dispose of in an environmentally sound and efficient manner.

2) Implementation status on PFOS, its salts and PFOSF

Thailand has classified 1 and 8 substances among PFOS, its salts and PFOSF group as Category 3 of Hazardous Substances under the HSA in 2013 and 2017, respectively (3). Any production, import, export and possession of these substances requires prior authorization from the DIW, Ministry of Industry. In addition, a project, funded by the Global Environment Facility (GEF), on "Application of Industry-Urban Symbiosis and Green Chemistry to reduce releases of POPs and hazardous chemicals as well as GHG emissions, to support inclusive and sustainable growth" is ongoing from 2019 to 2023. This project also includes a pilot study on the management of PFOS, its salts and PFOSF.

Table 3: PFOS-related substances Control under Thai Hazardous Substance Act

No.	Substance Name	CAS No	Category	Started
1.	Sulfluramid	4151-50-2	3	2013
2.	Perfluorooctane sulfonic acid (PFOS)	1763-23-1	3	2017
3.	Didecyltrimethylammonium perfluorooctane sulfonate	251099-16-8	3	2017
4.	Diethanolammonium perfluorooctane sulfonate	70225-14-8	3	2017
5.	Tetraethylammonium perfluorooctane sulfonate	56773-42-3	3	2017
6.	Perfluorooctane sulfonyl fluoride	307-35-7	3	2017
7.	Potassium perfluorooctane sulfonate	2795-39-3	3	2017
8.	Lithium perfluorooctane sulfonate	29457-72-5	3	2017
9.	Ammonium perfluorooctane sulfonate	29081-56-9	3	2017

Source: Ministry of Industry's Notification on List of Hazardous Substances B.E. 2556 and B.E. 2560

2.3.9 Assessment of Unintentional production POPs (Annex C)

1) Assessment of unintentional production POPs (uPOPs)

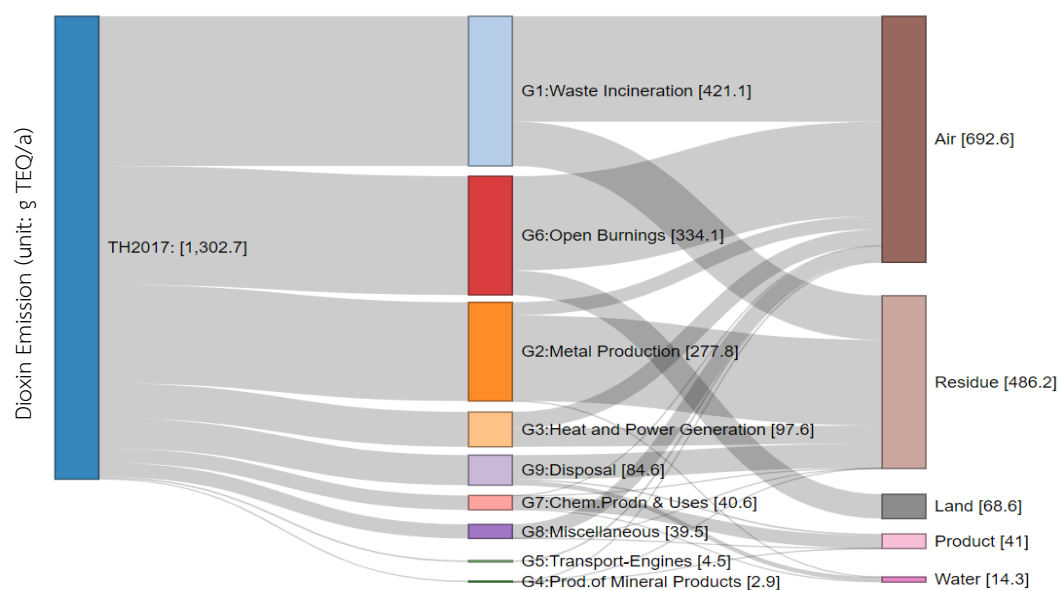
In 2020, Thailand conducted a uPOPs inventory assessment covering relevant activities that took place in Thailand during the baseline year 2017. The assessment closely followed the methodology and emission factors (EFs) as given in the latest version (2013) of the UNEP Toolkit, which covers 4 uPOPs (PCDDs/PCDFs, PCBs, and HCB). This 2017 uPOPs study covers the assessment of all 9 of UNEP-identified potential source groups, which are further divided into 74 source categories and 237 technology/activity classes. An overview of the estimated PCDD/Fs emissions in Thailand for the baseline year 2017 is shown numerically in Table and visually in Figure 1, where emissions into air, water, land, products, and residues are 692.6, 14.3, 68.6, 41.0, and 486.2 g TEQ/a, respectively – totaling to an overall emission of 1,303 gTEQ/a.

Table 4: Table 5: Overview of the estimated PCDD/Fs emissions in Thailand in 2017

Source Groups		Annual Releases (g TEQ/a)					Subtotal	Destruction (g TEQ/a)
		Air	Water	Land	Product	Residue		
G1	Waste Incineration	296.8	0.0	0.0	0.0	124.3	421.1	-
G2	Ferrous and Non-Ferrous Metal Production	37.0	0.2	0.0	0.0	240.7	277.8	-21.59
G3	Heat and Power Generation	46.4	0.0	0.0	0.0	51.2	97.6	-
G4	Production of Mineral Products	2.9	0.0	0.0	0.1	0.0	2.9	-
G5	Transportation	4.5	0.0	0.0	0.0	0.0	4.5	-
G6	Open Burning Processes	265.5	0.0	68.6	0.0	0.0	334.1	-
G7	Production of Chemicals and Consumer Goods	0.2	2.2	0.0	36.4	1.8	40.6	-
G8	Miscellaneous	39.3	0.0	0.0	0.0	0.2	39.5	-
G9	Disposal	0.0	11.9	0.0	4.6	68.0	84.6	-
Total		692.6	14.3	68.6	41.0	486.2	1302.7	-21.59
Grand Total		1,303					1,281	

Source: Thailand's 2017 uPOPs Inventory, March 2020

Note: Figures in this table have been rounded to increase their legibility. Some subtotals may not correspond to the sums of the separate figures.

Figure 2: Profile of the estimated PCDD/Fs emissions in Thailand in 2017

Source: Thailand's 2017 uPOPs Inventory, March 2020

The three highest emission source groups are G1: Waste Incineration (421.1 gTEQ/a), G6: Open Burning Processes (334.1 gTEQ/a) and G2: Ferrous and Non-Ferrous Metal Production (277.8 gTEQ/a). These source groups contribute to 32%, 26% and 21% of Thailand's total PCDD/Fs emission in 2017, respectively.

a) G1: Waste incineration

Major releases from MSW incinerators were mostly (63% of all emission from G1) contributed by 57 small and inefficient incinerators. While these incinerators helped dispose of only about 0.3% of Thailand's MSW in 2017, they were responsible for 20% of the country's total PCDD/Fs release.

b) G6: Open burning processes

The burning of agricultural residues in paddy and maize fields is the main contributor for this source group, responsible for about 20% of country's total PCDD/Fs release. The high level of PCDD/Fs released resulted from the combination of the high activity rates, the relatively poor combustion efficiency, and the involvement of chlorinated herbicides.

c) G2: Ferrous and Non-Ferrous Metal Production

The main PCDD/Fs emissions from metal production is the release into residues, which accounts for about 87% of the total release from this source group in 2017. Emission from metal production ranks third in the 2017 uPOPs inventory, with about 241 gTEQ/a released into residues; the transfer and management of which was controlled by Thai law. With an improved waste transfer reporting system, a large portion of residues from metal production plants could be traced. Some (21.6 gTEQ/a) of the PCDD/Fs embedded in these residues were destroyed via incineration in cement kilns.

d) G3: Heat and Power Generation

Heat and power generation contributed 98 gTEQ/a (7.5%) of total PCDD/Fs emission in 2017, with about 48% and 52% released into air and residues, respectively.

For combustion, uPOPs is majority released into air, with the less about 20% released into ash and soil. Note, however, that PCDD/F in ashes from biomass is normally low and can be brought back to soil as fertilizer. However different processes and different biomass have different PCDD/F formation potential and different types of residues: bottom ash, boiler and fly ash. For facility with efficient air pollution control system (APCs), dioxins and heavy metals are most likely captured in fly ash. Therefore, research into PCDD/F in fly ashes and their use should be conducted.

2) Comparison to emissions in 2004

In 2006, Thailand reported total emission of 1,096.7 g TEQ/a for the 2004 reference year, using the 2005 version of UNEP Toolkit's methodology and EFs. The 2006 report was Thailand's first attempt to assess its national PCDD/Fs emissions, covering 8 source groups with 31 source categories and 53 unique activity entries. The same set of activities leads to a total emission of 336.5 g TEQ/a when recalculated using the latest (2013) UNEP Toolkit's EFs.

Since the current uPOPs inventory study assesses PCDD/Fs from 9 source groups with 74 source categories and 237 technology/activity classes, the net results from these two baseline years (2004 and 2017) cannot be directly compared. However, when comparing similar sources per unit activity, the emissions per unit activity from several source categories are declining.

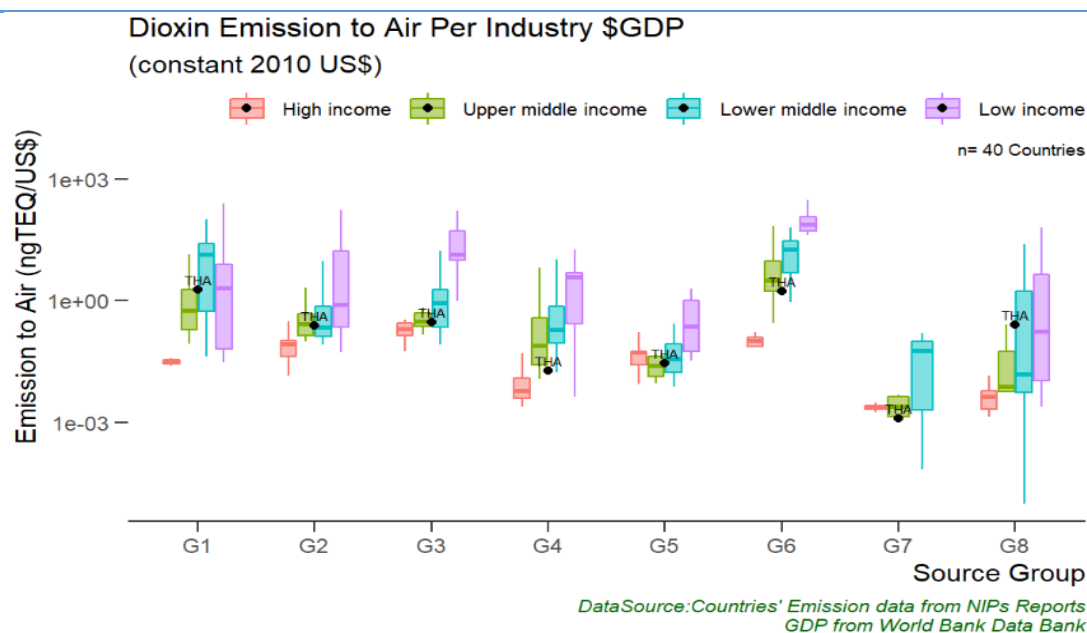
Activities that were identified with high releases potential were improved and, hence, received better class allocations. Unfortunately, new activities with poor technologies also have concurrently been taking place, leading to only a moderate improvement in the overall national performance. It is, therefore, important to lay down measures to prevent installation of new plants/activities with inferior technology and, instead, to promote the adoption of BAT & BEP.

3) Comparison with emissions from other countries

Figure 3 compares Thailand's dioxin emission by air per unit to industry GDP with 40 other countries based on income level. Thailand's overall results compare well with those from other upper-middle income countries.

Thailand's emissions from Source Groups 4, 6 and 7 were on the lower range among the upper-middle income group, while emissions from Source Groups 1 and 8 were on the high range. As previously stated, the main emission from Source Group 1 was from the improper MSW incineration, while crematoria were responsible for the high emission from Source Group 8.

Figure 3: Thailand's PCDD/Fs emission into air per industry \$GDP in comparison with 40 other countries based on income level



Source: Thailand's 2017 uPOPs Inventory, March 2020

4) uPOPs Management

In Thailand, there are five measures for uPOPs management as follows:

(1) Five air emission standards for dioxins/furans from different sources were established, as follows⁴:

- A maximum of 0.1 ng I-TEQ/Nm³ for new waste incinerators with capacities over 50 tonnes per day, and a maximum of 0.5 ng I-TEQ/Nm³ for older waste incinerators (any size) and new incinerators with capacities of 1-50 tonnes per day.
- A maximum of 0.5 ng I-TEQ/Nm³ for industrial hazardous waste incinerators.
- A maximum of 0.5 ng I-TEQ/Nm³ for infectious waste incinerators.

⁴ Note that all air emission standards in Thailand are prescribed on dry air basis at 7% excess O₂ and 25°C, while the UNEP Toolkit quotes emission concentrations at 11% excess O₂ and 0°C. Concentrations in air expressed at 7% O₂ will be approximately 1.4 times the values expressed at 11% O₂. Similarly, limit values expressed at 7% O₂ will be lowered by a factor of 1.4 times when expressed at 11% O₂. Unless otherwise indicated, all air emission values in this report are based on the Thai standard condition: 7% O₂, 25°C, and 1 atm.

- A maximum of 0.5 ng I-TEQ/Nm³ for industrial incinerators fueled with processed used oils or synthetic fuels.

- A maximum of 0.5 ng I-TEQ/Nm³ for cement plants using waste as fuel or raw materials for production.

(2) Additionally, the PCD issued the Notification on Guidance on Efficient Management of Municipal Waste via Incinerators, dated 26 September 2018, to provide guidelines for the reduction of dioxins/furans from municipal waste incinerators.

(3) On the implementation of Best Available Techniques and Best Environmental Practices (BAT/BEP), Thailand participates in the Eastern and Southeast Asia Regional BAT/BEP Forum (ESEA Regional BAT/BEP Forum) and has joined the following programs:

- Demonstration of BAT and BEP in fossil fuel-fired utility and industrial boilers in response to the SC on POPs in ESEA region, with United Nations Industrial Development Organization (UNIDO), during 2010-2016.

- Regional plan for introduction of BAT/BEP strategies to industrial clusters of Annex C of Article 5 sectors 2 in ESEA region, with UNIDO, during 2010-2016 .

- Greening the scrap metal value chain through promotion of BAT/BEP to reduce U-POPs releases from recycling facilities, with UNIDO, during 2018-2023. In addition, the translation of BAT/BEP manuals was carried out for emission sources including industrial boilers, steel and metal plants, and crematoria, for distribution to business operators and the public.

(4) On dioxins/furans awareness-raising, Thailand has organized campaigns on relevant issues and disseminated information on the impacts of dioxins/furans to human health and the environment, as well as on how to reduce their emissions, so that the youth, business operators, and the public are aware of their hazards. Educational modules have been designed for graduate study, while short training courses are held by Chulabhorn Research Institute and the Ministry of Education. Campaigns on reduction of these pollutants are carried out regularly together with other media campaigns by the PCD and the DEQP, under MNRE.

(5) On the capability of dioxins/furans analysis, there are public and private laboratories in Thailand with dioxins/furans testing capacity. Among these are the 3 government facilities:

- the National Dioxin Laboratory, established in 2012 and run by the DEQP (MNRE), has scientific equipment and readiness for analyzing dioxins/furans in the environment.

- the Dioxin Laboratory, established in 2010 and run by the Department of Medical Services, MOPH, has capacity to analyze dioxins/furans in food and living samples.

- the Bureau of Quality control of Livestock Products, DLD (MOAC), has capacity to analyze dioxin/furans and PCBs in feed and fats.

2.3.10 Obsolete stockpiles, contaminated sites and waste

1) Stockpile of POPs pesticides

A subsequent survey in 2018 found about 31 kg of chlordane remained in DOAE's custody, pending final disposal. All of the obsolete SC POPs pesticides previously held in DOA's custody have been collected and destroyed in an environmentally sound manner by industrial waste incineration.

In 2017, approximately 0.9 tonnes of lindane remained in the custody of a pharmaceutical company (pending final disposal) as a result of the firm's voluntary withdrawal of license as a result of the removal of the substance from the National List of Essential Medicines for treatment of scabies and lice in humans in 2015. All of the obsolete pesticides in previous NIP report were disposed in incinerator by DOA.

2) *Stockpile of POPs Industrial Chemicals*

(1) c-pentaBDE and c-octaBDE

Stockpiles of c-pentaBDE and c-octaBDE in Thailand are assumed to be zero because the worldwide production was ceased more than 15 years ago. There is no record of these substances ever being imported into the country. Thailand's only involvement with c-pentaBDE is believed to be through imports of transport vehicles that may have contained c-pentaBDE, possibly in their seats and interior fabrics. These contaminated materials are believed to have reached their end-of-life and been discarded as municipal solid waste.

Based on Thailand's 2020 POPs Industrial Chemicals Inventory report, c-octaBDE was found in some ABS housing of high-end computer monitors produced during the 1990s. The total amount of octaBDE in the affected ABS is estimated at 12 tonnes, of which about 300 kg are believed to still remain in hibernation.

(2) c-decaBDE

Stockpiles of c-pentaBDE and c-octaBDE in Thailand are assumed to be zero because the worldwide production was ceased more than 15 years ago. There is no record of these substances ever being imported into the country. Thailand's only involvement with c-pentaBDE is believed to be through imports of transport vehicles that may have contained c-pentaBDE, possibly in their seats and interior fabrics. These contaminated materials are believed to have reached their end-of-life and been discarded as municipal solid waste.

Based on Thailand's 2020 POPs Industrial Chemicals Inventory report, c-octaBDE was found in some ABS housing of high-end computer monitors produced during the 1990s. The total amount of octaBDE in the affected ABS is estimated at 12 tonnes, of which about 300 kg are believed to still remain in hibernation.

Housings of end-of-life (EOL) TV CRTs that arrive at e-waste dismantling shops are mostly recycled. Shredded chips and plastic pellets obtained from these recycling activities are returned back to the material cycle. The affected materials are mostly black flame-retarded (also known as V0 grade) PS. Based on the inventory, most of the recovered materials are believed to be exported – previously as shredded chips, and currently as plastic pellets.

Based on the 2020 inventory assessment, decaBDE finds other uses in upholstery and drapery textiles, rubber and silicone parts, including interior textiles and underhood parts in passenger cars. It is not known whether these flame-retarded materials were imported or locally produced, and their sources should be investigated. If these decaBDE-affected materials were locally produced, the sites of production should be assessed for contamination. Based on the inventory, cumulative amount of c-decaBDE in impregnated fabrics that are in use-phase is estimated at 3 tonnes. However, c-decaBDE in motor vehicles is not yet included in this figure, and should be assessed.

(3) HBCD

HBCD was no longer imported into Thailand since 2017. Before the phase-out of HBCD, the shipments of the imported HBCD were transported from the port directly to the customers, resulting in zero stockpile of HBCD at distributor's warehouse. HBCD may be indirectly imported in SE-grade EPS beads. However, due to the absence of a unique product tariff code, the import/export amount of SE-grade EPS beads cannot be determined. The total amount of HBCD-contaminated SE-grade EPS is estimated at 175,000 tonnes, with the corresponding amount of HBCD of about 1,300 tonnes [890-1,770 tonnes]. Most of the relevant amounts of HBCD are believed to remain within SE-grade EPS foams, which are currently in the use phase.

(4) HCBD

HCBD in transformer oils and hydraulic fluids in Thailand has related testing studied. Since HCBD can be screen-tested in a cost-effective manner, potentially contaminated oil and fluids can be checked for HCBD. Indeed, high-chlorine oils that were previously checked for PCB contaminations are considered to also have been checked for HCBD contamination.

(5) PCBs

Thailand banned PCBs by listing them as Category 4 substances under the HSA in 2004. The ban covers all activities, including the production, import, export, or possession of PCBs. The ban also covers devices that contain PCBs. PCB containing transformers were collected and exported to capable countries (France, the Netherlands, etc.) for final destruction. Therefore, PCB-containing devices should be randomly checked at electricity generation sites for evaluation of the effectiveness.

(6) PCNs

The former uses of PCNs in closed and open applications were identical to the uses of PCBs. In 2013, DIW designated wastes, substances and articles containing, consisting of or contaminated with polychlorinated biphenyl (PCBs), polychlorinated terphenyls (PCTs), polychlorinated naphthalenes (PCNs) or polybrominated biphenyls (PBBs), or any other polybrominated analogues of these compounds, at a concentration level of 50 mg/kg or more, as chemical wastes which are also classified as Category 3 hazardous substances that require prior approval from the DIW. There is no record or data related to the use of PCNs in Thailand.

For PCNs in closed applications: since former uses of PCNs in closed applications are identical to the uses of PCBs, measures taken to address PCBs in closed applications should have also covered PCNs. Also, since the methods recommended to electricity authorities to identify PCB-containing transformers and capacitors (year of manufacture, the word “Non-inflammable Oil”, the density, the chlorine contents, etc.) are not specific to PCBs, devices with PCNs should also have been collected and submitted to final destruction as PCBs.

For PCNs in open applications: since the major use of PCNs was almost 100 years ago, products that might have PCNs are most likely to have reached their end-of-life. Unlike the situation in developed countries, the mass production and consumption of electricity and electric machines/equipment in Thailand did not start until after World War II. It is unlikely to find houses with electric cables produced during 1920s to 1960s in Thailand. On the other hand, corrosion protection paints for metal constructions such as bridges, towers, ships, pressure pipes, etc. may have contained PCNs. The UNEP guidance suggests that metal construction built before 1980 should be compiled. Therefore, information on anti-corrosion paints should be documented, including whether the constructions have been (partly) sand blasted to remove paints.

Note that former uses of PCNs are also identical to the uses of short-chain chlorinated paraffins (SCCPs) and PCBs. The inventory assessment study for PCNs (as well as PCBs uses in open applications) should be conducted together with the study for SCCPs.

(7) PeCB

There is no record to suggest that PeCB was ever produced in Thailand. Except for small amounts imported for research/laboratory purposes in 2018, there is no information to whether PeCB has ever been imported into Thailand. PeCB may have been indirectly imported in the past as an impurity in PCBs oils. However, since PCBs oils as well as PCB-containing devices were required by the DIW’s 2008 notification to be properly disposed by 2012, PeCB from this source is therefore presumed to be zero.

(8) PFOS, its salt and PFOSF

PFOS may have been previously used in Thailand in textiles (possibly mainly for export-oriented products), paper (food packaging), metal plating, and firefighting foams applications. Most export-oriented firms have phased-out PFOS since 2009 as a result of the publication of EU's PFOS Directive. However, some small plating companies still cannot phase-out the use of PFOS; the remaining demand for PFOS for plating application is estimated at 300-400 kg per year. Stockpiles of PFOS-containing foams are in petroleum refineries and oil depots that imported them before 2009. Based on the amount of firefighting stock required by law, the amount of PFOS remaining in relevant firefighting foams is estimated at 3,700 – 5,500 kg.

3) *Contaminated sites and waste*

(1) Emission of industrial POPs occurs throughout the life cycles of relevant products: all sites where the manufacture products and articles containing industrial POPs (or the use of POPs-containing process chemicals), the use of these products, recycling, and the end-of-life treatment of these products have taken place are potentially contaminated. Based on the 2020 POPs Industrial Chemicals Inventory report, the lack of data on the flow of POPs BFR-affected materials/parts along supply chain has made it impossible to identify possible contaminated sites along the pre-consumer value chain. Emissions from other unconfirmed sources and uPOPs are also possible. If these activities exist, emissions from these facilities (particularly residues, WWTP sludge and effluent water) can be significant as seen in other countries.

In addition, residues and effluent water from treatment plants from the following activities may be contaminated with PFOS: metal plating, textile finishing, paper finishing, and central wastewater treatment plants in relevant industrial estates. Effluent from these relevant sites should be analyzed for potential contamination with PFOS.

Regarding PCBs, PCB-containing devices were decommissioned and all PCBs oils were reportedly disposed of according to the UNEP's POPs waste guidance. However, since PCBs are highly persistent, areas where PCB-containing transformers and capacitors were installed, repaired and/or reconditioned, stored, and decommissioned may be contaminated with PCBs. These areas should be assessed and levels of PCBs contaminations should be appropriately evaluated and documented. Moreover, since former uses of PCNs in closed applications are identical to the uses of PCBs, measures taken to address PCBs in closed applications should also cover PCNs.

(2) Regarding pesticides, most POPs pesticides have been banned as Category 4 HSs under the HSA. During 1981-2004, all of the 9 POPs pesticides were successively banned, and during 1993-2012, 6 of the 7 new SC POPs pesticides (except PeCB) were banned by all three HSA enforcement agencies (DOA, FDA, and DIW). The ban covers all activities, including the production, import, export or possession thereof. And since Thailand has never produced these POPs pesticides, potential sites that may still be contaminated are associated with historical post-import activities.

(3) In terms of uPOPs, the current (2013) UNEP Toolkit suggests 13 potential categories (10a to 10m) of "Contaminated Sites and Hotspots" in its Source Group 10. According to the findings of Thailand's 2017 uPOPs Inventory Assessment, potentially relevant contaminated sites and activities in Thailand include: chlorine (chlor-alkali) and chlorinated organics (chlorinated paraffins) production sites, application sites of PCDD/F-containing chemicals (dyes and pigments) and pesticides, textile and leather factories, sites of former PCB use and storage, production (pulp & paper) using elemental chlorine, waste incinerators, metal production sites (including cable/e-waste burning), fire accidents, dredging of sediments, landfills and dump sites, and ball clay & kaolin clay sites. Beyond the above UNEP Toolkit-listed sites and activities, other potential uPOPs contaminated sites also described here are associated with other key uPOPs emission sources that have been established by Thailand's 2017 uPOPs Inventory.

The followings are potential activities that may have contributed to POPs contaminated sites in Thailand:

- 1) E-waste dismantling, plastic shredding and recycling
- 2) Pesticides-related contamination sites
- 3) Textile and leather production
- 4) Landfills and waste dumps
- 5) Additional activities that generate uPOPs-contaminated residues not destined to landfills
- 6) Production of chlorine (chlor-alkali, CAK) and chlorinated organics (chlorinated paraffins, CPs and ethylene dichloride, EDC)
- 7) Wastewater treatment
- 8) Other relevant activities

Sites contaminated with POPs substances represent important sources of potential human exposure. While relevant activities may have been commenced years ago and the relevant areas/sites may have already been repurposed, and/or covered with other structures/constructions, due to the persistent nature of POPs, these areas/sites may still act as sources for POPs.

However, except for power transformers/capacitors installation sites, relevant industrial activities were historically clustered in/around industrial areas in 2-3 provinces nearby Bangkok. These areas should be investigated for possible contamination with all relevant POPs (as well as other pollutants, such as mercury and other toxic metals). This area-based approach to identify contaminated sites could effectively facilitate efforts to simultaneously address all relevant POPs toward better understanding of the problems, mitigating the risks, and eventual rehabilitation. Subsequently, POPs substances that are found relevant will then be further investigated in detail to reduce risk and to rehab contamination.

2.3.11 Registration for specific exemptions and acceptable purposes

The SC prescribed obligations to eliminate and restrict chemicals under Annexes A and B of the Convention, specifically on production and uses, including import and export. However, Annexes A and B to the Convention also set forth a number of specific exemptions for which Parties may register in accordance with Articles 3 and 4 of the Convention. If at any time there are no Parties registered for a given specific exemption, no new registrations may be made in respect of that exemption. As of the end of June 2022, there are specific exemptions for 8 substances for which Parties may register, as summarized in Table 6.

Table 6: Specific exemptions for POPs substances listed in Annex A

	POPs Substances	Activity	Specific exemptions
1.	c-decaBDE (Decabromodiphenyl ether (BDE - 209))	Production	As allowed for the Parties listed in the Register of Specific Exemptions
		Use	In accordance with the provisions of Part IX of Annex A
2.	c - octaBDE (Hexabromo - and heptabromodiphenyl ether)	Use	In accordance with the provisions of Part IV of Annex A
3.	Perfluorooctanoic acid (PFOA), its salts and PFOA - related compounds	Production	Fire-fighting foam: None. For other production, as allowed for the Parties listed in the Register in accordance with the provisions of Part X of Annex A
		Use	In accordance with the provisions of Part X of Annex A

	POPs Substances	Activity	Specific exemptions
4.	Polychlorinated biphenyls (PCB)	Use	Articles in use in accordance with the provisions of Part II of Annex A
5.	Polychlorinated naphthalenes, including dichlorinated naphthalenes, trichlorinated naphthalenes, tetrachlorinated naphthalenes, pentachlorinated naphthalenes, hexachlorinated naphthalenes, heptachlorinated naphthalenes, octachlorinated naphthalene)	Production Use	Intermediates in production of polyfluorinated naphthalenes, including octafluoronaphthalene Production of polyfluorinated naphthalenes, including octafluoronaphthalene
6.	Short - chain chlorinated paraffins (Alkanes, C10 - 13, chloro))	Production Use	As allowed for the Parties listed in the Register <ul style="list-style-type: none"> • Additives in the production of transmission belts in the natural and synthetic rubber industry • Spare parts of rubber conveyor belts in the mining and forestry industries • Leather industry, in particular fat-liquoring in leather • Lubricant additives, in particular for engines of automobiles, electric generators and wind power facilities, and for drilling in oil and gas exploration, petroleum refinery to produce diesel oil • Tubes for outdoor decoration bulbs • Waterproofing and fire-retardant paints • Adhesives • Metal processing • Secondary plasticizers in flexible polyvinyl chloride, except in toys and children's products
7.	c - pentaBDE (Tetra - and penta - bromodiphenyl ether)	Use	Articles in use in accordance with the provisions of Part V of Annex A
8.	Perfluorooctane sulfonic acid (PFOS), its salts and perfluorooctane sulfonyl fluoride (PFOSF) [SC 4/17 & SC 9/4]	Production Use	None <ul style="list-style-type: none"> • Metal plating (hard-metal plating) only in closed-loop systems • fire-fighting foam for liquid fuel vapour suppression and liquid fuel fires (Class B fires) in installed systems, including both mobile and fixed systems. Articles in use in accordance with the provisions in paragraph 10 of Part III of Annex B.

Four relevant POPs, technical endosulfan, DDT, lindane, and PCBs, were banned as Category 4 HSs under the HSA in Thailand. Accordingly, there is no need for specific exemptions for these entries. (Note that specific exemptions for DDT and lindane have already expired.)

Thailand is in the process of making decisions on registrations for specific exemptions for (1) c-decaBDE (2) c-octaBDE (3) PCNs (4) SCCPs (5) c-pentaBDE (6) PFOS, its salts and PFOSF. Most of POPs are also classified as Category 3 HS under the HSA that require prior approval from the DIW or DOA. There is no record of these substances ever being imported into the country. Thailand's only involvement with c-pentaBDE is believed to be through imports of transport vehicles that may have contained c-pentaBDE, possibly in their seats and interior fabrics. However, Thailand is in the process of making decisions to category 4 HS under the HSA. Moreover, Thailand classified PFOA, its salts and PFOA – related compounds as category 3 on specific exceptions under SC and classified as category 4 under the HAS in 2022.

2.3.12 POPs monitoring

In Thailand, the monitoring of POPs is carried out both domestically and through international collaboration as follows:

1) Environmental Monitoring of Persistent Organic Pollutants (POPs) Project in East Asian Countries (POPsEA project), since 2004 until present, with technical and financial supports from the Government of Japan, for the monitoring of 9 POPs pesticides in the atmosphere of East Asian countries⁵.

2) A capacity building project on PCDDs/PCDFs sampling and analysis of POPs in key media; e.g., ambient air, breast milk and blood, with technical and financial supports from the Japanese Government's SAICM Quick Start Program (QSP) during 2009 – 2010⁶.

3) A project entitled "Implementation of the POPs Monitoring Plan in the Asian Region", funded by GEF during 2018 – 2020, is carried out to monitor POPs in various media, such as undisturbed ambient air, breast milk, sediments, chicken eggs, duck eggs, fish, and beef, etc.

On laboratory capacity, there are private and public laboratories in Thailand with POPs analysis capability such as (1) National Dioxin Laboratory at the Research and Training Center, Department of Environmental Quality Promotion, MNRE, is capable of sample collections and analysis of dioxins/furans, PFOS, PBDE, etc. in environmental media; (2) Dioxin Laboratory at the Department of Medical Services, MOPH, is capable of sample collection and analysis of dioxins/furans, pesticides, and other brominated POPs in food and living samples, (3) Trace Element Analysis Laboratory at the National Metal and Materials Technology Center, National Sciences and Technology Development Agency, is capable of sample collection and analysis of POPs industrial chemicals in manufactured products, (4) various multinational laboratories specialized in analysis of POPs in environmental media and manufactured products.

⁵Ministry of the Environment Government of Japan, " POPs Monitoring Project in East Asian Countries, 2006: Background Air Monitoring of in East Asian Countries 2004-2006", <https://www.env.go.jp/en/chemi/pops/eaws/background04-06.pdf>, last accessed April 27, 2020

⁶UN Environment, "POPs GMP Projects National Capacity Building", <https://www.unenvironment.org/explore-topics/chemicals-waste/what-we-do/persistent-organic-pollutants/pops-gmp-projects-national>, last accessed: April 27, 2020

Table 7: List of public laboratories in Thailand with POPs analysis capability

Organization	Analytical Capability
Agricultural Production Sciences Research and Development Division, Department of Agriculture	OCPs in environmental media (water and sediments)
Bureau of Quality and Safety of Food, Department of medical sciences	OCPs, PCBs, PCDDs/PCDFs in food and drinking water
National Institute of DIOXIN, Department of Environment Quality Promotion	PCBs, PCDDs/PCDFs in environmental media (air and ambient air) PFOS/PFOA in surface water, PBDEs in environmental media (sediments, surface water)
National Institute of Health, Department of medical sciences	OCPs in human serum
Faculty of Engineering, Mahidol University	PFOS in environmental media (air, soil, water), drinking water, and in products (cosmetics, textiles, food packaging)
Trace Element Analysis Laboratory, National metal and materials technology center	PBBs, PFOS, HBCD, and PBDEs in manufactured products (plastics, textiles, e-waste, and dust/abrasion from material) and environmental media (soil, surface water, groundwater)

2.3.13 Economic and Social Impacts of POPs

Relevant economic and social impacts of POPs can be qualitatively assessed as follows:

1) In case of POPs pesticides, with Thailand's pre-market control of agricultural chemicals, economic impacts from the restriction of POPs pesticides are, so far, perceived as minimal. Traditionally, the DOA has been leading the efforts to ensure the viability and availability of alternatives to highly hazardous pesticides, including those listed in SC Annex A and B. Such alternatives include direct drop-in substitution with other synthetic pesticides, substitution with natural reagents and organisms, as well as good agricultural management practices. DOA also provides technical and technological assistants to farmers, private firms and other agencies in areas of plant protections.

2) In the case of POPs industrial chemicals, there is no study to quantify the economic impacts of these substances in Thailand. For economic impacts from the restriction of POPs industrial chemicals, since most of the 'legacy' POPs industrial chemicals were phased-out years ago, only the switching costs of the 'non-legacy' substances (decaBDE, HBCD, and PFOS) are considered relevant. Since alternatives to these substances had been made available and industry-wide restriction had been commenced globally, economic impacts to industrial users as results from introducing measures to phase out the uses of these substances are perceived as minimal. Besides, global supplies of HBCD and PFOS have already been limited for several years. Nevertheless, for PFOS, it is estimated that there are about 925,000 litres of PFOS contaminated AFFF foams remaining in stock. The cost for replacing these foams with PFOS/PFOA-free foams before their expiration is estimated at 140-190 million THB⁷. The costs for irreversible destruction of these contaminated foams as such can be high but cannot be estimated at this time.

3) In controlling unintentional releases of POPs, there are economic impacts to private and public operators to minimize the generation and the release of uPOPs. This includes replacing improper MSW incinerators with better alternatives, installing appropriate pollution control systems, changing to best available technology to minimize or avoid the generation of uPOPs, finding alternatives to open burning in agricultural fields, and adopting best environmental practices, etc.

⁷ Assume replacement costs of about 150-200 THB per liter

4) Social impacts of POPs may be associated with health effects of POPs substances which include the prevalence of type 2 diabetes [Magliano, et.al. (2014)⁸, Zong et.al. 2018⁹], cancer of various organs, cardiovascular diseases (including hypertension), inflammatory diseases, dementia, birth defects, learning disability, obesity, as well as increased susceptibility to infectious diseases [please see for example WHO (2010)¹⁰, Ruzzin (2012)¹¹, Wahlang (2018)¹², Alharbi (2018)¹³, Rylander (2005)¹⁴, and Fry and Power (2017)¹⁵]. Several of these POPs-related diseases coincide with or are closely related to the growing NCDs observed in many countries including Thailand [please see for example: Juntarawijit & Juntarawijit (2018)].

POPs may impact different groups of people differently [please see section 0]. However, there are several vulnerable groups such as: i) informal agricultural and waste management workers and their family members who are exposed via occupational and para-occupational exposure, ii) people living in or near areas with frequent/recurring open burning who may be at risk of exposure to dioxin and other uPOPs, iii) people living near improperly operated incineration sites and/or landfills who may be impacted from long-term exposures to many types of POPs. Since these vulnerable groups are usually low-income earners, they generally have a lower chance/leverage to mitigate the impacts. Although these vulnerable people can access public health services or “the universal health coverage” scheme, this is still not without costs to the society. For informal workers, there is also “opportunity cost” of sick leaves and other indirect costs as a result of their sickness, such as care services often provided by their own relatives.

5) Implementing POPs measures complying with the SC would provide at least three benefits to Thailand. First, it would promote healthy and high living standards for the population. Banning or reducing application of POPs would prevent POPs contamination to the environment

2.3.14 Gender-related issues

There is growing evidence of differing health effects of POPs for male and female. These differences may arise from socio-economic, cultural, physiological, as well as biological factors. Possible differences that may lead to different exposures are the follows.

⁸ D.J. Magliano, V.H.Y. Loh, J.L, Harding, J.Botton, J.E.Shaw, Persistent organic pollutants and diabetes: A review of the epidemiological evidence, *Diabetes & Metabolism* 40 (2014) 1-14

⁹ Geng Zong, Damaskini Valvi, Brent Coull, Thomas Göen, Frank B. Hu, Flemming Nielsen, Philippe Grandjean, Qi Suna, Persistent organic pollutants and risk of type 2 diabetes: A prospective investigation among middle-aged women in Nurses' Health Study II, *Environment International* 114 (2018) 334–342, <https://doi.org/10.1016/j.envint.2017.12.010>

¹⁰ World Health Organization, *Persistent Organic Pollutants: Impact on Child Health*, World Health Organization, 2010

¹¹ Jérôme Ruzzin, Public health concern behind the exposure to persistent organic pollutants and the risk of metabolic diseases, *BMC Public Health* 2012, 12:298

¹² Banrida Wahlang, Exposure to persistent organic pollutants: impact on women's health, *Rev Environ Health* 2018; 33(4): 331–348

¹³ Omar M.L. Alharbi, Al Arsh Basheer, Rafat A. Khatta, Imran Ali, Health and environmental effects of persistent organic pollutants, *Journal of Molecular Liquids* 263 (2018) 442–453

¹⁴ Lars Rylander, Anna Rignell-Hydbom and Lars Hagmar, A cross-sectional study of the association between persistent organochlorine pollutants and diabetes, *Environmental Health: A Global Access Science Source* 2005, 4:28

¹⁵ Kristiann Fry and Melinda C. Power, Persistent organic pollutants and mortality in the United States, NHANES 1999–2011, *Environmental Health* (2017) 16:105

1) Exposure at workplaces

Due to difference in their roles in the society, male, female, children, and elderly are exposed differently to POPs in their daily life. Male or the more muscular population are more likely to be directly exposed to POPs in their workplaces while female or the more feminine population are more likely to be indirectly or unknowingly exposed to residues left on ground and/or in products. For example, in agriculture, men usually take the role of pesticides applications while women (also children and elderly) take the role of planting and harvesting. As a result, men are at higher risk of pesticides poisoning as evident in the DDC's annual epidemiological surveillance reports, where the number of men who suffered from pesticide poisoning was typically about 1.6 times that of women [please see for example DDC (2015)¹⁶]. Unfortunately, unlike the acute effects of pesticide poisoning, data on the chronic effects from long-term, low-dose, indirect exposure to pesticides are not readily available.

Similarly, in informal e-waste dismantling and plastic recycling, men are more likely to be in charge of heavy machinery/power tools (such as shredder, grinders, etc.) while women take care of the detailed disassembly, housekeeping and/or disposal the unwanted residues. Moreover, due to the informal nature of these works, women with small/preschool children also tend to bring or carry their children along to their work sites. Again, due to their chronic effects, data related to health effect from exposure to POPs in the workplaces in Thailand are currently not available.

Moreover, for workers in the informal sector, data from the 2019 National Informal Employment Survey indicates a much larger number of men who have been hurt from exposure to harmful chemicals than women (82% to 18%, respectively) [NSO (2019)¹⁷].

2) Exposure at home

Females are more likely to allocate their time (before and after work) to housework than males. In 2019, Thailand's contributing family workers were 22.4% and 11.7% for female and male workers, respectively [World Bank (2019)¹⁸]. Like most countries, irrespective of income, it was found that women bear a disproportionate responsibility for housework and care (unpaid works), while men are responsible mostly for market works (paid works) [World Bank 2012¹⁹]. As a result, female (and also children) are at higher risk than male from exposure to POPs industrial chemicals (such as PBDEs) and uPOPs at home. In addition, female (due to their higher proportion of body fat) and children (due to their developmental needs) are typically more susceptible to health damage from exposure to POPs than male.

Females are more likely to take parts in cooking for their family more than males counter part. For those households in rural areas that use biomass-fired stoves, female's risks from exposure to dioxin and other uPOPs can be escalated. Moreover, if they get sick, female workers with health problem from POPs are likely to affect their family circumstances more than the case of male workers. Apart from female workers' contribution to the family income, women tend to have more responsibility in taking care of other family members (e.g. children and the elderly).

¹⁶ DDC 2015, "Annual Epidemiological Surveillance Report 2015: Pesticide Poisoning", Bureau of Occupational and Environmental Diseases, Department of Disease Control, Ministry of Public Health.

¹⁷ NSO 2019c, The informal employment survey 2019, Labor Statistics Group, Social Statistics Division, National Statistical Office, Ministry of Digital Economy and Society, 2019

¹⁸ World Bank 2019, World Bank Data Bank: Indicators, The World Bank, <https://data.worldbank.org/indicator/>, last access: April 29, 2020

¹⁹ World Bank 2012, World Development Report 2012: Gender Equality and Development, World Bank. <https://openknowledge.worldbank.org/handle/10986/4391>, last accessed: April 29, 2020

3) *Exposure through food and environment*

There is no information to suggest different exposure to POPs substances through food and the environment between male and female. However, due to their higher proportion of body fat, women are typically more susceptible to health damage from exposure to POPs than men.

2.3.15 Public and stakeholder awareness, information and education

Thailand has continually established public awareness measures to promote POPs understanding with participation from several agencies as follows:

1) MNRE, by the PCD, from 2007 to the present. Publications of various communication materials, i.e. folders and posters have been widely distributed, for instance the PCBs management manual²⁰, an awareness-raising document entitled “the silent threats of dioxins and furans”²¹, the launching of a project for public awareness on the danger of dioxins and furans and how to avoid exposure. Meetings and seminars were also organized to promote POPs awareness and capacity development for all concerned agencies under the SC obligations.

2) MOPH, by the Food and Drug Administration (FDA), has continually provided information on hazardous pesticide formulations for human health and the environment to the public with the publication of International Chemical Safety Cards (ICSCs) in Thai language for further development into computer programs and databases on chemicals data. The FDA also worked on projects to enhance knowledge on chemicals safety. The FDA also authored a chemicals profile to inform people about the meaning of the GHS labels, toxicity, good practices when handling/using chemicals, as well as emergency responses such as PFOA and PFOS (<http://thaipc.fda.moph.go.th>).

3) MOAC, by the DOA, has provided regular training courses on chemicals storage and hazardous wastes management to provide general knowledge to concerned parties, as well as training courses for the general public and owners of agricultural supply stores on the following legally binding activities: pesticide fumigations, selling of hazardous agricultural chemicals.

4) Ministry of Industry, by the Department of Primary Industries and Mines - DPIM, has continually working on the project “Greening the Scrap Metal Value Chain through Promotion of BAT/BEP to Reduce U - POPs Releases from Recycling Facilities” to promote awareness and knowledge to the related stakeholder concerning the proper management of the scrap metal recycling supply chain by preparing courses and training for government agencies, scrap metal recycling industries, institutes and public, through websites and various publications.

5) Ministry of Education, through various academic institutes, e.g., 1) Chulabhorn Research Institute has launched a project entitled “Regional Chem Helpdesk to Strength(en) the Sound Management of Chemicals”²² with publication on chemical management supported by Q&A between experts and chemicals users. It has established a graduate program and short courses on toxicity, mechanism of toxicity, impacts to human health and environment, sources, and (combined) exposures to multiple chemicals and 2) Institute for the Study of Natural Resource and Environmental Management, Mae Fah Luang University conducted a study on levels of knowledge and farmers’ chemical use practices to study chemical types, amounts and farmers’ behavior and compiled a knowledgebase on chemical uses in agriculture.

²⁰Pollution Control Department, PCBs Management Handbook, www.pcd.go.th/public/Publications/print_haz.cfm?task=PCB08, last accessed: April 27, 2020

²¹Pollution Control Department, “the silent threats of dioxins and furans” (in Thai), http://www.pcd.go.th/info_serv/haz_dioxin.html, last accessed: April 27, 2020

²²World Health Organization, “Chem HelpDesk”, <http://www.chemhelpdesk.org/>, last accessed: April 27, 2020

2.3.16 Reporting (Article 15)

Thailand has periodically submitted National Reports according to its obligation under Article 15 of the Convention as follows: 1) the 1st National Report in 2007; 2) the 2nd National Report in December 2010; 3) the 3rd National Report in August 2014 and 4) the 4th National Report in August 2018.

2.3.17 Non Governmental Organizations

1) *Thai Health Promotion Foundation (ThaiHealth)*

ThaiHealth was established in 2001 under the Health Promotion Foundation Act, as an autonomous government agency, aiming to develop well-being in society by mitigating the risk factors for non-communicable diseases. ThaiHealth operates by a multisectoral approach that emphasizes the coordination among stakeholders based on three key factors – scientific evidence, policy decisions, and citizen and civil society organizations. Examples of chemical risk-related activities sponsored by ThaiHealth include reducing pesticide use in paddy fields and promoting organic alternatives, and estimating the quantity and investigating the disposal route of polyurethane foam waste in Thailand and making recommendation for the disposal technology.

2) *The Royal Project Foundation*

The Royal Project is an initiative of the late His Majesty, King Bhumibol Adulyadej of Thailand. It was founded in 1969 to solve the problems of deforestation, poverty, and opium production by promoting alternative crops. It was the world's first project to replace drug crops with legal crops, and is one of the most successful projects of this type.

As one of its several developmental missions, the Royal Project Foundation produces agricultural products in accordance with 3 types of standard protocols, namely GAP, McDonald's GAP, and organic standards (IFOAM and Organic Thailand). As its first priority, the foundation's Plant Protection Center advises and regulates the use pesticides by its affiliated farmers. The center prohibits the use of more substances (14, as of June 2018) in addition to all the agricultural substances already banned by the DOA (which include all relevant POPs pesticides). The center also monitors pesticide residues in products received from all farmers using rapid test kits, and also has its own ISO/IEC 17025-accredited facility for randomized monitoring analyses via GC, GC-MS, and LC-MS-MS. Furthermore, the Royal Project conducts research aimed at reducing reliance on harmful synthetic pesticides, including biological pest control methods and alternative chemicals from natural sources. It also conducts educational activities (including learning centers and demonstration farms), and organizes collection of contaminated/hazardous waste from affiliated farms/laboratory for proper disposal.

3) *Ecological Alert and Recovery - Thailand (EARTH)*

EARTH serves as a watchdog group, monitoring the Thai government's industrial-related policies, and hotspots with activities/practices that potentially impact human health and the environment, e.g. e-waste recycling, municipal waste management, etc. EARTH aims to provide academic work, enabling the communities who are affected by industrial pollutants to demand government accountability. For POPs-related activities, EARTH partnered with Arnika (a Czech non-governmental organization and an IPEN participant) and released monitoring reports for POPs in several areas in Thailand.

4) *International Pollutants Elimination Network (IPEN)*

IPEN is a global network of public interest organizations for improving chemical policies and raising public awareness to ensure that hazardous substances are no longer produced, used, or disposed of in ways that harm human health and the environment. An IPEN participating organization, the Czech non-governmental organization Arnika Association, conducted a joint project with the Thai partner, Ecological Alert and Recovery-Thailand (EARTH) to sample POPs contamination in four hotspots areas in Thailand (2015 – 2017).

5) *Thai-PAN*

Thai-PAN is an NGO that brings together stakeholders and experts from various organizations and fields, who share common awareness and concern regarding the hazards of pesticides and related issues, such as the registration, import, advertisement, sale, and regulation of these chemicals. Thai-PAN's mission are: to assemble knowledge base on the hazards of agricultural chemicals; to communicate and alert these issues to the general public; and to drive towards more stringent pesticide management and control policies along the pesticide life cycle. Their ultimate goals are pesticide safety for farmers, consumers, and the environment, as well as sustainable development.

2.3.18 International collaborations

Thailand has participated in several international collaborative activities as follows:

1) *International collaborations to reduce unintentional releases of POPs under SC Article 5:*

(1) The National Inventory of Crematoria and Feasibility Study on the Establishment of Cremation Center in Thailand, in collaboration with the World Bank in 2009.

(2) Two projects under the East and South East Asia Regional Forum on Best Available Techniques and Best Environmental Practices: ESEA Regional Forum on BAT/BEP, namely: 1) Demonstration of BAT and BEP in fossil fuel-fired utility and industrial boilers in response to the SC on POPs in ESEA region, in collaboration with the United Nations Industrial Development Organization (UNIDO), in 2010-2016; 2) Regional plan for introduction of BAT/BEP strategies to industrial clusters of Annex of Article 5 sectors in ESEA region in collaboration with UNIDO, in 2010-2016.

(3) The project entitled "Greening the Scrap Metal Value Chain through Promotion of BAT/BEP to Reduce U-POPs Releases from Recycling Facilities", in collaboration with UNIDO, with the financial support from the Global Environment Facility, 2018-2022.

(4) The project entitled "Applications of Industry-Urban Symbiosis and Green Chemistry for Low Emission and Persistent Organic Pollutants (POPs)-Free Industrial Development in Thailand", in collaboration with UNIDO, with the financial support from the Global Environment Facility in, 2019-2023.

2) *International collaborations to support the evaluation of the effectiveness according to Article 16 of the SC:*

(1) Environmental Monitoring of Persistent Organic Pollutants (POPs) in East Asian Countries since 2004 until present, with financial and technical supports from the Japanese government to monitor 9 pesticide POPs in the atmosphere of member countries in East Asian Region, and to gather baseline data for the effectiveness evaluation.

(2) Capacity building on PCDDs/PCDFs sampling and analysis to promote analyses of POPs monitoring in air, breast milk and blood, with financial and technical supports from the Japan SAICM Quick Start Program (QSP) by the Japanese government, in 2009-2010.

(3) Implementation of the POPs Monitoring Plan in the Asian Region to enhance capability of the Asian Region countries to monitor 23 POPs, with financial support from Global Environment Facility, in 2018-2020.

2.3.19 Overview of technical infrastructure for POPs assessment, measurement, analysis, alternatives and prevention measures, research and development – linkage to international programs and projects

Thailand carries certain technical capacity for POPs assessment, measurement and analysis. Sophisticated instruments such as GC-MS, HRGC/HRMS, GC-MS/MS and LC-MS/MS are available from several private and public laboratories for the determination of POPs substances. Particularly, with a growing number of scientific equipment centers in academic and research institutes, Thailand has established Thailand Scientific Equipment Center Network (TSEN), currently with 20 members from the country's leading universities, national institutes, and a forensic science department²³. However, depending on the POPs substance and the purpose of testing, the determination of POPs contamination in different media also requires sophisticated sample collection and treatment as well as skillful laboratory experts, which typically focuses on specific areas namely POPs pesticides, POPs industrial chemicals, uPOPs and POPs in environmental media. Examples of public laboratories with POPs analysis capabilities in specific areas are shown in Table 8.

Table 8: List of public laboratories with POPs analysis capabilities and their focused areas

Organization	POPs analysis capability and focused areas
Agricultural Production Sciences Research and Development Division, DOA	OCPs in fruits, vegetables, soils and water
Food Industry Laboratory Service Center	<ul style="list-style-type: none"> OCPs in cereals, vegetables, starches, fruits, juices, oil and fats, and their products PCBs and DL PCBs in oil and fats, seafood and seafood products
Bureau of Quality and Safety of Food, DMSC	<ul style="list-style-type: none"> OCPs, PCBs, PCDDs/PCDFs in food and feed, drinking water
The Central Laboratory (Thailand) Company Limited, MOAC	<ul style="list-style-type: none"> OCPs in vegetables, fruits, rice, water (surface water, drinking water, tap water, groundwater, wastewater)
Bureau of Quality Control of Livestock Products, DLD	<ul style="list-style-type: none"> OCPs and PCBs in feed and raw materials PCBs and dioxins in feed and fats
National Dioxin Institute, DEQP	<ul style="list-style-type: none"> PCDDs/PCDFs, PCB and DL-PCBs in stack exhaust air, ambient air, soil, sediments and water PBDEs, PFOS and PFOA in water, leachates, sediment

1) POPs pesticides in food and feeds:

Due to the relatively more stringent regulation, national infrastructures established for the assessment of POPs pesticides in food and feed (including surface water) are considered more extensive than those for other POPs and/or other media. There are laboratories established throughout the value chain of food and feed production, from farm to food products and market-places. Particularly, most private and public laboratories can offer organochlorine pesticide (OCPs) testing services for almost every relevant medium. Large private firms/farms also have established their own OCPs analysis capability.

Additionally, test kits (based on thin layer chromatography) have also been developed and widely employed for the detection of OCP residues (screening test) in fruits and vegetables²⁴. There is also a TRM (Thailand Reference Material) developed and certified for OCP in soil (endosulfan)²⁵.

²³ <http://tsen.in.th/>

²⁴ Y. Putson, "GPO-TM kit", Government Pharmaceutical Organization (GPO), <http://blqs.dmcs.moph.go.th/assets/qsd/PPTGPOTMKIT.pdf>

²⁵ TRM-E-5001, <http://www.nimt.or.th/etrm/index.php?menu=product&trmcode=TRM-E-5001>

2) *POPs Industrial Chemicals*

Due to high demand for certification/declaration of RoHS-compliant products along the EEE supply chain, many laboratories in Thailand (both private & public, and both national & multi-national) can offer PBBs, PBDEs and PFOS analysis services based on IEC 62321 (for PBBs/PBDEs) and CEN/TS 15968:2010 and ISO 25101:2009 (for PFOS) standards. Moreover, to save cost and to reduce risk (from legal violation), most large OEM firms employ ED-XRF and FT-IR for random checking of incoming materials. Nevertheless, due to the lack of demand for the determination of other POPs industrial chemicals (PCNs, PCP, PeCB, HBCD, and HCBD), there is currently no laboratory accredited for these substances.

Since the required analytical instruments for the determination of POPs industrial chemicals in food & feed and in environmental media are similar to those for OCPs and other pesticides, it is believed that the basic infrastructures exists. However, due to the apparent lack of regulatory/commercial demand for testing/monitoring of POPs industrial chemicals in these media, no laboratory offer these services on a commercial basis. Nevertheless, at least one private laboratory has been accredited for their ability to determine PFOS, PFOA, PBBs, PBDEs, and HBCD in wastewater.

It should be noted that existing infrastructure for testing of POPs industrial chemicals in manufactured products aim towards pre-order/pre-market approval of the products/materials. For POPs in manufactured products that are already in use phase and/or have reached EOL management sites, the cost for testing a wide variety of ‘uncontrolled’ products/parts will be prohibitive. Therefore, different intelligence-based infrastructure and testing strategies will be needed.

3) *uPOPs*

As part of the previous NIPs, infrastructure for the determination of PCDD/Fs, PCBs and DL-PCBs in food and feed, in human serum and tissues, as well as in environmental media (ambient air, water, soil, sediments) had been established and the presence of these uPOPs had been monitored. Nevertheless, because uPOPs require highly sensitive testing techniques and sample collection can often be difficult to conduct, the costs for the monitoring of uPOPs in all media remain very high.

As for the newly listed uPOPs (PeCB, PCNs and HCBD), existing infrastructure for the determination of VOCs, OCPs and PCDD/Fs can be applied to analyze HCBD, PeCB, and PCNs, respectively, in media of interest.

2.3.20 Overview of technical infrastructure for management, treatment and safe disposal of POPs

Thailand has a state-of-the-art industrial waste incinerator capable of irreversible destruction of OCPs and chlorinated compound other than PCB-contaminated oil. The incineration of industrial HW is regulated by MOI’s B.E. 2545 (2002) Notification on the Air Emission Standards for Incinerators of Hazardous Industrial Waste, which sets an upper PCDD/F air emission limit of 0.5 ng TEQ/m³ (7% O₂ and 25°C).

1) *POPs pesticides*

Regarding national infrastructure for the management of POPs pesticides, the DOA, under the MOAC, which is the responsible agency, operates a system for POPs pesticides collections for final disposal by the approved industrial waste incinerators.

2) *POPs industrial chemicals*

(1) PCBs and PCNs:

For PCBs in closed applications, the DIW issued a notification to totally phase out PCBs by 2012. End-of-life devices, transformers and power capacitors that contain PCBs were collected and exported to the third countries for final destruction.

Since former uses of PCNs in closed applications are identical to the uses of PCBs, measures taken to address PCBs in closed applications should have also covered PCNs. Also, since the methods recommended to electricity authorities to identify PCB-containing transformers and capacitors (year of manufacture, the word “Non-inflammable Oil”, the density, the chlorine contents, etc.) are not specific to PCBs, devices with PCNs should also have been collected and submitted to final destruction as PCBs.

For PCBs/PCNs in open applications, (polymeric) materials contaminated with PCBs/PCNs may have been disposed of in industrial waste incinerators or cement kilns.

(2) PFOS and PFOS-related substances:

AFFF foams deployed in industrial settings are required by law to be collected and properly treated before discharge. Similarly, wastewater from plating factories is also required to be properly treated before discharge. The sludge from the wastewater treatment may be incinerated in hazardous waste incinerators or sent to secure landfill. However, with no regulatory limits for PFOS in the effluent exhausts or leachates, the effectiveness of these treatment systems cannot be confirmed.

As for PFOS currently stocked in AFFF foams, there is currently no technical infrastructure to address these unused materials when they expire and become waste in the near future.

(3) PBDEs and HBCD:

There are several options available for irreversible disposal of relevant materials (PBDEs, HBCD, and contaminated resins, plastics, and textiles), namely, solid waste incineration, hazardous waste incineration, thermal and metallurgical production of metals, and cement kiln co-incineration. However, there is currently no system to identify and separate the contaminated materials both at the source and at waste collection sites. There is also no system to reduce the volume of the contaminated wastes.

3) *uPOPs*

Regarding the management of unintentional production POPs, industrial waste containing uPOPs is disposed of at either cement plants or secure landfills.

2.3.21 Identification of impacted populations or environments

Citizens may be impacted by POPs directly via occupational exposure and indirectly via contacts with contaminated indoor and outdoor environment (such as soil, water, and air) and the consumption of contaminated food and water. The pathway to and the scale of the impact, however, may be different depending on the type of POPs.

1) For POPs pesticides, the scale of the impact can be large even though Thailand does not produce any pesticide. As an agricultural country, agriculture in Thailand uses about 34% of the total work forces and occupies about 47% of the country’s land area. Farmers who mix and/or apply POPs pesticides may be directly exposed. Due to the persistency of POPs pesticides, family members or other farm workers who perform subsequent works may be indirectly exposed during planting and harvesting, while children of farmers who use parents’ workplace as playground may also be indirectly exposed. On the consumer side, citizens may be indirectly exposed via consumption of contaminated food and water.

2) For POPs industrial chemicals, certain groups of industrial workers (plastic compounders, plastic parts converters, EPS foams converters, textile finishers, e-waste processors and plastic recyclers, etc.) may encounter high level of POPs substances such as PBDEs, PFOS and HBCD in their workplaces. While formal industrial workers can protect themselves via the use of personal protective equipment (PPE), informal workers such as e-waste dismantlers are unlikely to have access to proper PPE in their workplace. Moreover, due to the informal nature of most e-waste processors in Thailand, children and family members of e-waste workers may also be indirectly exposed.

Additionally, POPs industrial substances that are embedded in products/materials can be continuously released from the products during use phase and accumulated in indoor dusts. Consequently, the general public, particularly children and toddlers, may be repeatedly and chronically exposed to low doses of multiple POPs industrial chemicals via ingestion of the contaminated indoor dusts.

Finally, people who live near uncontrolled landfill, waste incinerators, or areas where contaminated devices are improperly disposed of may be exposed to the substances that continue to leach out. Moreover, since POPs have a tendency to out-last landfill liners, groundwater and areas around landfills where contaminated materials have been deposited may be at risk of contamination.

3) For uPOPs, people living near areas where there are activities that release high amount of uPOPs may be at risk. As summarized in section 0, these include areas where wastes are improperly incinerated, areas with repeated open burning activities (both open burning of MSW and agricultural wastes), areas downwind of busy crematoria, and areas where contaminated residues are disposed of, etc.

Thailand has not yet imposed a mandate to require periodic monitoring of hazardous chemicals, especially POPs, in human and the environment. With the lack of monitoring data, the scale of the impacts and magnitude of threats to public health and environmental quality and social implications for workers and local communities cannot be assessed at this time. Through the country's early restrictions of POPs pesticides in the original list and PCBs as well as the prescription of the maximum level of residues of POPs pesticides in food and feed, it is anticipated that health impacts from the initial SC POPs pesticides and PCBs have been minimized.

Nevertheless, Thailand has participated in the UNEP project "Implementation of the POPs Monitoring Plan in the Asian Region" (also known as "GMP2 Asia") which includes monitoring of level of relevant POPs in abiotic and biotic matrices. The preliminary results from a pooled sample taken from 60 young mothers indicated that the average Thai population has the following levels of OCPs and POPs industrial chemicals:

- Non-detectable levels of the following OCPs and POPs industrial chemicals: pentachlorophenol, pentachloroanisole, PBB 153, PeCB, HBCD, and HCBD.
- Relatively low levels of chlordane, dieldrin, HCB, beta-HCH, PBDEs, PCBs, NDL-PCBs, and mirex.
- Relatively low levels of p,p'-DDE (the predominant environmental breakdown product of DDT) and PCDD/Fs with respect to the levels in WHO/UNEP human milk global surveys.

2.3.22 Relevant activity for the assessment and listing of new chemicals and to manage existing chemicals

Assessment of new chemicals can proceed under the HSA by issuing notifications to control new chemicals as hazardous substances. The notifications specify chemical names or chemical properties to be controlled, Category level to be assigned to, timeframe for enforcement and the responsible agencies. The procedures for listing a new hazardous substance are to (1) collect relevant information on the substance (toxicity, production, use, import and export information, relevant domestic and international regulations), (2) conduct a public hearing on the proposal among the stakeholders, (3) present relevant information and the results of the public hearing to the Sub-committee for the Stockholm Convention and (4) submit an official letter to the DIW, acting as the secretariat to the Hazardous Substance Committee, to issue a notification to control the substance.

2.4 Implementation of the 1st National Implementation Plan

Thailand ratified the SC on 31 January 2005. The national sub-committee on the SC was established, with the Pollution Control Department (PCD) under the Ministry of Natural Resources and Environment assigned as the country's focal point. As a Party to the Convention, Thailand has developed and submitted its first National Implementation Plan (NIP) in 2008. The NIP sets out the outlines, strategies and action plans to be taken in POPs management.

Thailand's first NIP addressed 12 chemical substances or groups of substances listed in Annexes A, B, and C. The management procedure was then set up for the 5 years action plan (2008-2012) comprising of:

- 1) Action plans on POPs pesticides
- 2) Action plans on PCBs
- 3) Action plans on unintentional release of POPs
- 4) Action plan on socio-economic analysis due to uses of POPs

Summary of the operational status of the 1st National Implementation Plan and the implementation of the Convention's obligations in the past, classified by the Convention's obligations as follows:

Implementation of the 1st National Implementation Plan B.E. 2552-2555 (2009-2012)

SC Obligations	Implementation																																																												
1. Measures to reduce or eliminate release from intentional production and use (Article 3)	Thailand has followed legal measures to prohibit initial POPs by listing them as Category 4 Hazardous Substances under the Hazardous Substance Act B.E. 2535 as follows:																																																												
	<table border="1"> <thead> <tr> <th data-bbox="835 392 875 421">No</th> <th data-bbox="931 392 1048 421">SC POPs</th> <th colspan="3" data-bbox="1525 392 1682 421">Year of ban</th> </tr> <tr> <td></td> <td></td> <th data-bbox="1447 432 1518 461">DOA</th> <th data-bbox="1563 432 1630 461">FDA</th> <th data-bbox="1693 432 1765 461">DIW</th> </tr> </thead> <tbody> <tr> <td data-bbox="887 480 904 509">1</td> <td data-bbox="931 480 1016 509">Aldrin</td> <td data-bbox="1447 480 1518 509">1988</td> <td></td> <td></td> </tr> <tr> <td data-bbox="887 528 904 557">2</td> <td data-bbox="931 528 1061 557">Chlordane</td> <td data-bbox="1447 528 1518 557">2000</td> <td data-bbox="1574 528 1646 557">1995</td> <td></td> </tr> <tr> <td data-bbox="887 576 904 604">3</td> <td data-bbox="931 576 994 604">DDT</td> <td data-bbox="1447 576 1518 604">1983</td> <td data-bbox="1574 576 1646 604">2003</td> <td></td> </tr> <tr> <td data-bbox="887 624 904 652">4</td> <td data-bbox="931 624 1039 652">Dieldrin</td> <td data-bbox="1447 624 1518 652">1988</td> <td></td> <td></td> </tr> <tr> <td data-bbox="887 671 904 700">5</td> <td data-bbox="931 671 1016 700">Endrin</td> <td data-bbox="1447 671 1518 700">1981</td> <td></td> <td></td> </tr> <tr> <td data-bbox="887 719 904 748">6</td> <td data-bbox="931 719 1070 748">Heptachlor</td> <td data-bbox="1447 719 1518 748">1988</td> <td></td> <td></td> </tr> <tr> <td data-bbox="887 767 904 796">7</td> <td data-bbox="931 767 1279 796">Hexachlorobenzene (HCB)</td> <td data-bbox="1447 767 1518 796">2001</td> <td></td> <td></td> </tr> <tr> <td data-bbox="887 815 904 844">8</td> <td data-bbox="931 815 1010 844">Mirex</td> <td data-bbox="1447 815 1518 844">2001</td> <td></td> <td></td> </tr> <tr> <td data-bbox="887 863 904 892">9</td> <td data-bbox="931 863 1070 892">Toxaphene</td> <td data-bbox="1447 863 1518 892">1983</td> <td></td> <td></td> </tr> <tr> <td></td> <td data-bbox="869 903 1368 932">10 Polychlorinated Biphenyls (PCBs)</td> <td></td> <td></td> <td data-bbox="1693 903 1765 932">2004</td> </tr> </tbody> </table>	No	SC POPs	Year of ban					DOA	FDA	DIW	1	Aldrin	1988			2	Chlordane	2000	1995		3	DDT	1983	2003		4	Dieldrin	1988			5	Endrin	1981			6	Heptachlor	1988			7	Hexachlorobenzene (HCB)	2001			8	Mirex	2001			9	Toxaphene	1983				10 Polychlorinated Biphenyls (PCBs)			2004
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	<p>In 2004, the DIW designated end-of-life devices, transformers and power capacitors that contain PCBs a chemical waste, classified as Category 3 HS. Any production, import, export, or possession of these devices requires prior approval from the DIW.</p>																																																												
	<p>In 2008, the DIW issued a notification to totally phase-out PCBs by 2012. The notification obligated device holders to prepare and implement a plan to phase-out and completely dispose of PCBs by 2012. Any movement of the affected devices also needed prior approval from the DIW.</p>																																																												
	<p>Since PCBs oil was not one of the wastes or discarded materials that were allowed to be treated or disposed of by waste management processors, industrial waste incinerators in Thailand were not allowed by law to incinerate PCBs oils. All PCBs oils, therefore, were collected and exported to third countries (France, the Netherlands, etc.) for final destruction. Particularly, as reported in Thailand's National Reporting of the Stockholm Convention (Fourth Reporting Cycle),</p>																																																												

SC Obligations	Implementation				
	<p>761 tonnes of PCBs wastes were exported to France (20 t), the United Kingdom (452 t), Belgium (33 t), and other countries (256 t) for final destruction during 1992-2002. Moreover, in 2012, 110 tonnes of transformers contaminated with PCBs and 100 tonnes of waste containing PCB oils were exported to the Netherlands and France for final disposal.</p> <p>Thailand has followed legal measures to prohibit all New POPs by listing them as Category 3 and 4 Hazardous Substances under the Hazardous Substance Act B.E. 2535 as follows</p>				
	No	SC POPs	Category /Year of ban		
			DOA	FDA	DIW
	1	alpha – Hexachlorocyclohexane (alpha - HCH)			4/2001
	2	beta - Hexachlorocyclohexane: Beta – HCH			4/2001
	3	Chlordecone			
	4	Decabromodiphenyl ether (commercial mixture (c - decaBDE))		4/1995	
	5	Dicofol	3/2013	4/2013	
	6	Hexabromobiphenyl (HexaBB)			4/2003
	7	Hexabromodiphenyl ether and heptabromodiphenyl ether (c - OctaBDE)			3/2017
	8	Lindane	4/2001	4/2012	
	9	Pentachlorophenol and its salts and esters (PCP)			4/1993
	10	Perfluorooctane sulfonic acid (PFOS), its salts and perfluorooctane sulfonyl fluoride (PFOSF)			3/2017
	11	Short - chain chlorinated paraffins (SCCPs)			3/2019
	12	Technical endosulfan and its related isomers	4/2004		
	13	Tetrabromodiphenyl ether and pentabromodiphenyl ether (c - PentaBDE)			3/2017
	14	Perfluorooctanoic acid (PFOA), its salts and PFOA - related compounds			3,4/2022

SC Obligations	Implementation
2. Register of specific exemptions and acceptable purposes (Article 4)	<p>Thailand is considering listing Category 4 Hazardous Substances under the Hazardous Substance Act B.E. 2535, which consist of (1) Hexabromocyclododecane (HBCDD) (2) Hexachlorobutadiene (HCBDD) (3) Pentachlorobenzene (PeCB) (4) Polychlorinated naphthalenes (PCNs) and (5) Perfluorohexane sulfonic acid (PFHxS), its salts and PFHxS-related compounds</p> <p>Four relevant POPs: DDT, PCBs, technical endosulfan and its related isomers and Lindane was banned as Category 4 HSs under the HSA in Thailand. Accordingly, there is no need for specific exemptions for this entry.</p> <p>Thailand is in the process of making decisions on registrations for specific exemptions for (1) c-decaBDE (2) c-octaBDE (3) PCNs (4) SCCPs (5) c-pentaBDE (6) PFOS, its salts and PFOA. Most of POPs are also classified as Category 3 HS under the HSA that require prior approval from the DIW or DOA. There is no record of these substances ever being imported into the country. Thailand's only involvement with c-pentaBDE is believed to be through imports of transport vehicles that may have contained c-pentaBDE, possibly in their seats and interior fabrics. However, Thailand is in the process of making decisions to category 4 HS under the HSA. Moreover, Thailand classified PFOA, its salts and PFOA – related compounds as category 3 on specific exceptions under SC and classified as category 4 under the HAS in 2022.</p>
3. Operation to reduce or eliminate POPs releases from unintentional production. (Article 5: Measures to reduce or eliminate releases from unintentional production)	<p>Thailand has set up standard values for dioxin and furan releases from 5 sources which are 1) waste incinerators 2) hazardous industrial wastes 3) infectious wastes incinerators, 4) industrial incinerators fueled with processed used oils or synthetic fuels and 5) cement plants using wastes as fuels or raw materials for production. Additionally, BAT/BEP projects have been introduced to reduce or eliminate dioxin/furan releases from electricity and heat generation, incinerations, and iron/metal industrial works.</p>
4. Operation to reduce or eliminate POPs releases from stockpiles and waste (Article 6: Measures to reduce from stockpiles and wastes)	<p>Thailand has developed the Obsolete Pesticides Inventory during the year 2004 with additional surveys in 2010 - 2011. In 2018 the Inventory was updated.</p> <p>Additionally, for raising awareness on pesticides and obsolete pesticides, a document on “Obsolete Pesticides” is published for dissemination of basic knowledge on pesticides and obsolete pesticides, potential risks from pesticides and obsolete pesticides, protection from harm from pesticides and obsolete pesticides and their safe handling practices. Another document on “Obsolete Pesticides Management” is published to provide basic knowledge in practices related to safe storage of obsolete pesticides and emergency responses.</p>

SC Obligations	Implementation
5. Operation for information exchange (Article 9: Information exchange)	Thailand has designated PCD as National focal point to the SC to facilitate information sharing and exchange relevant to POPs management while developing websites of the national focal point to enhance information sharing and awareness of POPs among academic and interested people as well as the public at large
6. Operation for public information, awareness and education (Article 10: Public information, awareness and education)	<p>Thailand has continues to implement measures to awareness and educate about POPs. Through the cooperation of many sectors such as:</p> <ol style="list-style-type: none"> 1) Publication of various communication materials, i.e., folders and posters, has been continuously. 2) The information and publication to provide knowledge, understanding, and safety awareness on chemicals. 3) Training to educate about hazardous substances in legal and technical for the target group to operate their business legally and efficiently. 4) Implementation of the "Greening the Scrap Metal Value Chain through Promotion of BAT/BEP to Reduce U - POPs Releases from Recycling Facilities" to raise awareness of persistent, unintentionally released pollutants (uPOPs) and the best available techniques and best environmental practices (BAT/BEP) to relevant sectors and develop the capacity of national authorities to properly manage of the scrap metal recycling supply chain. 5) Implementation of the "Regional Chem Helpdesk to Strengthen the Sound Management of Chemicals" with publication on chemical management supported by Q&A between experts and chemical users. It has established a graduate program and short courses on toxicity, mechanisms of toxicity, impacts on human health and environment, sources, and exposures to multiple chemicals.

SC Obligations	Implementation
7. Operation on research, development and monitoring (Article 11: Research, development and monitoring)	<p>Thailand has conducted research, development and monitoring projects for POPs to cover:</p> <ol style="list-style-type: none"> 1) The research project on health affected by exposure to dioxin/furan and bio-degradation of dioxin/furan through assessed contamination in mussel, oyster and prawn from the eastern coast of Thailand under “The evaluation of PCBs and dioxin-like PCBs contaminated coast of Thailand by using chemical and biological techniques” project with collaboration between the Center of Excellence on Environmental Health, Toxicology and Management of Chemicals (ETM), Asian Institute of Technology (AIT) and Chulabhorn Research Institute. 2) The research project on PFOS and PFOA contamination and its relation with ground-surface water pollutants, the study case for the lower Chao Phraya River by the Engineering Faculty, Mahidol University. 3) The monitoring project for dioxin/furan release from various sources, i.e. electricity plants, industrial boilers, iron and metal industrial plants and central incinerators by the Department of Pollution Control. 4) The monitoring project for environment PCBs by the Department of Environmental Quality Promotion to monitor PCBs in sediment along the Chao Phraya River, river mouth and the upper Gulf of Thailand. 5) The study project of POPs piling and spreading in the environment of agricultural areas along the important river basin by the Department of Agriculture. 6) The monitoring project of organochlorine pesticides and POPs in plant, vegetable and fruits by the Food and Drug Administration. 7) The analysis project of POPs in foods among the risk groups by the Department of Health and the Food and Drug Administration. 8) The primary study of organochlorine pesticides formulation among the Thai population by the Department of Medical Sciences to specify chemical types and quantities as the guideline to reduce and solve POPs problems. 9) Implementation of the POPs Monitoring Plan in the Asian Region (GMP 2 Asia) for capacity building of countries in the Asia Regional on operations for monitoring POPs. <p>On the capability of dioxins/furans testing laboratories, there are various laboratories in Thailand with dioxins/furans testing capacity as follows: (1) National Dioxin Laboratory run by Department of Environmental Quality Promotion, MNRE, having scientific equipment and readiness for analyzing dioxins/furans in environment and (2) Dioxin Laboratory run by Department of Medical Services, MOPH, having capacity to analyze dioxins/furans from food and living samples.</p>

SC Obligations	Implementation
8. Submission of national reports (Article 15: Reporting)	<p>Thailand has continually submitted national reports which are:</p> <ol style="list-style-type: none"> 1) The 1st National report in 2007. 2) The 2nd National report in December 2010. 3) The 3rd National report in August 2014. 4) The 4th National report in August 2018. 5) The 5th National report in May 2022.
9. Operation of effectiveness evaluation (Article 16: Effectiveness evaluation)	<p>Thailand has participated in various effectiveness evaluation projects under SC Article 16 as followings:</p> <ol style="list-style-type: none"> 1) Environmental Monitoring of Persistent Organic Pollutants (POPs) in East Asian Countries from 2004 to present with technical and financial supports by the Japanese government. This project aims to cover 9 POPs pesticides in the atmosphere of East Asian member countries. 2) Capacity building on PCDDs/PCDFs sampling and analysis to enhance capacity for POPs analytical monitoring in main samples i.e. air, breast-feeding and blood with technical and financial supports from Japan SAICM Quick start Program (QSP) provided by the Japanese government during 2009 - 2010. 3) Implementation of the POPs Monitoring Plan in the Asian Region to enhance Asian regional capability for POPs analytical monitoring with coverage of 23 types with financial support from the Global Environmental Facility during 2018 - 2020. <p>Thailand has continually managed all relevant laboratory functioning to support the national POPs monitoring in the long run to support the SC effectiveness evaluation.</p>

3. Action plan of the National Implementation Plan

3.1 Objective

The Persistent Organic Pollutants (POPs) possess toxic properties, resist degradation, bioaccumulate and are transported through air, water and migratory area international boundaries and deposited far from their place of relevant. The Thai government recognizes the dangers of the Persistent Organic Pollutants to human health and the environment. Therefore, reviewing the status of the country's management of POPs and developing the Second National Implementation Plan of the Stockholm Convention in accordance with the obligations in Chapter 7 has become the country's master plan for managing persistent pollutants. It is presented our commitment to managing persistent pollutants to cover POPs Pesticides, POPs Industrial Chemicals and Unintentional POPs in line with the implementation of the obligations of the Stockholm Convention.

3.2 Goal

Thailand drives the National Implementation Plan to achieve the goal of reducing and/or eliminate from production, use and emissions of persistent organic pollutants to protect human health and the environment from the effects of pollutants with the participation of government agencies, private sectors and civil society organization. The Stockholm Convention Subcommittee on Persistent Organic Pollutants under the National Environment Board is a mechanism for considering operations and coordinating between relevant agencies. Thai government is supervise and support to achieve the aforementioned goals.

3.3 Action Plans

To be able to achieve the objectives of the Second National Implementation Plan of the Stockholm Convention and the goal of managing the POPs with participation from government agencies, private sectors and civil society organization, it is in accordance with the obligations of the Stockholm Convention. Thailand has prepared an action plan consisting of 16 action plans for the period 2023-2027 in accordance with the Guidance for Developing a National Implementation Plan for the Stockholm Convention on Persistent Organic Pollutants 2017. It has been setting goals, activities, indicators, operational units processing time, budget and funding sources are (1) the main agency is the agency responsible for the policy and/or by law and coordinate relevant agencies to implement the plan and (2) supporting agencies is an agency that participates in the operation. There are 37 agencies, with details of 16 operational activities and activity plans, which can be summarized as follows:

3.3.1 Activity 1 Institutional and regulatory strengthening measures

Thailand has many laws and regulations related to POPs. However, there is a need for these laws and regulations to be updated to be in line with added substances on the new substance list under the SC. This activity plan is divided into two areas for enhancing the improvement and the enforcement of laws and regulations. The goals and activities of operations are set as follows:

1) Updating laws and regulations:

(1) Control POPs as Hazardous Substances under the Hazardous Substance Act B.E. 2535, the activities are set as follows:

- Prepare proposal for the control of candidate POPs for classification as Hazardous Substances under the Hazardous Substance Act B.E. 2535.
- Issue notifications to control POPs substances as Hazardous Substances under the Hazardous Substance Act B.E. 2535

(2) Establish criteria for chemical assessment that cover substance properties as described in Paragraph 1 of Annex D of the SC by 2027, the activity is set as:

- Revise assessment criteria both for new POPs (pesticides and industrial) and for currently permitted POPs, to cover chemical property criteria described in Paragraph 1, Annex D of the SC.

(3) Establish additional standard limits for POPs in environmental media and in food by 2027, the activities are set as follows:

- Issue notifications to specify environmental standard limits for all POPs substances.
- Issue notifications to specify standard limits in food for all POPs substances.
- Issue notifications to specify drinking water standard limits for POPs substances, e.g., PFOS and PFOA.

(4) Establish additional POPs emission limits from sources by 2027, the activities are set as follows:

- Issue notifications to designate sources/emitters of relevant POPs as pollutant sources and to specify emission limits.
- Specify POPs monitoring criteria (including related parameters) in relevant media according to their sources (e.g., PBDEs, HBCD, SCCPs, PFOS)

(5) Report the data on emission to the environment together with data according to the Pollutant Release and Transfer Register (PRTR), the activities are set as follows:

- Revise the Promotion and Conservation of National Environmental Quality Act, B.E. 2535 to assign pollutant sources to report their pollutant emission and PRTR inventory data that include sufficient additional parameters (metadata) for the evaluation of POPs emission per unit activity in question. The pollutant sources must also report their PRTR inventories report to local authorities and/or pollution control officers.
- Set up reporting systems for pollutant emission data and PRTR inventories for submission to local authorities and/or pollution control officers, according to the revised version of the Promotion and Conservation of National Environmental Quality Act, B.E. 2535.

(6) Update the law on hazardous chemicals to cover industrial POPs and apply it to both products manufactured domestically and imported products, the activities are set as follows:

- Issue notifications to i) prohibit the uses of penta- & octaBDE contaminated materials in all products, ii) prohibit the uses of decaBDE in high-risk products (products that are in close contact with users).
- Issue notifications to mandate producers to declare the use of POPs in their products and to make appropriate markings on such parts to facilitate management throughout products' life-cycle

(7) Control hazardous operations to protect public health (sources of POPs emissions) and control the quality of POPs monitoring to reduce health impact, the activities are set as follows:

- Issue notifications to specify criteria for operations are considered hazardous to public health due to POPs emissions, e.g., junk shops, recycling plants and waste disposal plants below 50 horsepower, etc.
- Issue notifications to specify criteria for environment standards and (biological) laboratory testing standards according to the Control of Occupational and Environmental Diseases Act B.E.2562 (2019)

2) Strengthen law enforcement:

(1) Enhance law-enforcement efficiency to reduce and control uPOPs emissions, the activities are set as follows:

- Enforce existing uPOPs emission standards to cover the following activities: municipal waste incinerators (especially technically improper ones), medical waste incinerators, industrial waste incinerators, industrial operators which utilize used oils as fuel, and pollutant threshold limits for classifying industrial wastes as hazardous wastes.
- Encourage sub-district administrative organizations to follow PCD's notification on "guidelines for efficient management of municipal waste incinerators".

(2) Enhance the control on import and export of POPs by 2027, the activities are set as follows:

- Review existing gaps, challenges, and obstacles in the control of POPs import and export, and identify solutions
- Organize training programs for customs officials regarding the list of POPs substances that have been controlled as Hazardous Substances, to prevent illegal import and export.
- Define customs tariff and statistical codes (HS Code) to cover new POPs, including candidate POPs

(3) Enhance the capability of subdistrict administrative organizations (LAOs) in managing POPs-containing materials and waste, as well as in controlling uPOPs release sources by 2027, the activities are set as follows:

- Organize trainings for local LAOs officials on the proper and continual management of POPs-containing materials and waste, and on the selection of environmentally sound waste incinerators.
- Organize meetings among LAOs to exchange information and experiences, and to foster collaborations among themselves towards proper, continual, and systematic management of POPs.

(4) Enhance control efficiency of dioxin/furan emission from municipal waste incinerators and crematoria, the activities are set as follows:

- Develop an effective manifest system for medical waste transport, including revising MOPH's regulation on medical waste disposal, to control medical waste transfer and ensure proper disposal. And develop an effective oversight program for infectious waste management that covers the entire medical waste life cycle, from sources to transport, and to disposal.
- Organize trainings for local officials on crematoria maintenance and operation according to standard operation procedures (SOPs).

3.3.2 Activity 2 Management of POPs pesticides (Annex A, Part I)

Thailand has managed POPs in the form of chemical pesticides or POPs pesticide by legal measures. Most of POPs pesticide are classified as Category 4 under the Hazardous Substances Act B.E.2535. It means prohibit to production, import, export, transit and possession There are agencies to regulate activities from import to repacking and distribution. However, quantitative POPs pesticide data is compiled as import/export data. Information from activities arising from the use of chemicals in the country is recorded such as the amount remaining and accumulations in the environment and humans. There is still a lack of systematic monitoring and collection of information in order to manage POPs in the form of pesticides and pesticides to achieve the goal. Therefore set goals and activities are set as follows:

1) Develop a multi-dimensional online reporting system that incorporates spatial, temporal, application mode, and other descriptive aspects related to pesticide distribution and use, the activities are set as follows:

- Conduct a pilot project to develop an online multi-dimensional data collection and reporting system for candidate POPs pesticides, to assess contamination-risk areas.
- Analyze data obtained from the online reporting system to predict the flow of pesticides in the environment and to be able to properly monitor risk areas.

2) Dispose of obsolete POPs pesticide stocks in environmentally sound manners, the activities are set as follows:

- Develop mechanisms to support the proper disposal of obsolete pesticide stocks, and set up a stockpiles reporting system that is accessible to the public.
- Create the online pesticide information dissemination media that will readily reach and educate all parties along the pesticide supply chain.
- Dispose the obsolete POPs pesticide stocks.

3) Adequate POPs pesticide residue monitoring data in the environment, humans, animals, and food products by 2027, the activities are set as follows:

- Revise the types of POPs pesticides that should be monitored, and set up monitoring plans for POPs pesticides residues in the environment, humans, animals, and food products.
- Monitor the POPs pesticides residues in the environment, humans, animals, and food products in risk areas (according to the monitoring plans in 2.3.1).
- Create POPs monitoring data storage systems, which may be separately maintained and operated by the different responsible authorities.

3.3.3 Activity 3 Management of PCB, HCB, PCN, and PeCB

According to the POPs inventory, PCBs, HCB, PCN, and PeCB included the Legacy Industrial POPs group as POPs are not produced and used in developed countries. Thailand might produce and use in the past. Currently, Thailand has not found any information on the use of such substances. The goals for take steps to ensure that there is no use and/or possession of equipment and products containing PCBs, HCB, PCNs and PeCB by 2027. The main activity is tracking the possession data among target groups and operators of equipment and products containing PCBs, HCB, PCNs and PeCB, and randomly check closed-application equipment and products that may contain these substances (e.g., transformer oil, capacitor oil, hydraulics oil) as well as contamination in surrounding areas.

3.3.4 Activity 4 Management of HexaBDE, HeptaBDE (Annex A, Part IV), TetraBDE, PentaBDE (Annex A, Part V), DecaBDE (Annex A, Part IX), HBB (Annex A, Part I) and HBCD (Annex A, Part VII)

1) Management of HBB and PBDEs

HBB can be considered a legacy material with no new production for decades. Thailand never produced HBB. There is no data to suggest that HBB has ever been imported into or used in Thailand. HBB has been totally banned as a Category 4 HS under the Thai HSA since 2013. No report to detect any of HBB in the food chain or in Thailand's environmental media was found.

Thailand never produced any type of PBBs/PBDEs. All of the SC listed PBBs/PBDEs are listed under the HSA. PBDEs were listed as Category 3 HSs; pentaBDEs and octaBDEs in 2017 and decaBDE in 2019. Although all commercial PBDEs are designated Category 3 HSs, the content of PBDEs in materials, parts, and/or finished products are beyond the scope of the existing controls. The goals for reduce and eliminate the use of products that contain BDEs by 2027, the activities are set as follow:

- Conduct full survey/inventory for POPs flame retardants in products that still lack data, e.g., textiles, automotive, rubber/silicone, construction materials
- Define methods and means to identify, sort, and collect WEEE that contain POPs flame retardants from the recycling routes (to be in accordance with the Basel Convention)
- Estimate/specify the types and quantities of equipment and products containing recycled BDEs, as well as utilization rates of recycled products
- Study the suitability of disposal technology for BDEs contaminated wastes
- Prepare recommendations/guidelines for environmentally sound management of BDEs containing wastes
- Issue notifications to i) prohibit the uses of penta- & octaBDE contaminated materials in all products, ii) prohibit the uses of decaBDE in high-risk products (products that are in close contact with users; e.g., garments, textiles, automobile passenger compartment parts) and in non-exempt applications, and iii) prohibit the uses of decaBDE in all applications by 2027. (in Activity 1)
- Research to gain insights (Intelligence information) to accurately identify PBDEs-contaminated product residues.
- Develop and verify guidelines For environmentally friendly handling of contaminated materials (in Activity 12)
- Develop activities/places for the environmentally friendly management of waste contaminated with PBDEs. (in Activity 12)

2) Management of HBCD

HBCD is not manufactured in Thailand but it imported by producers of expanded polystyrene (EPS) foams beads for use as a flame retardant in self-extinguish grade EPS (SE-grade EPS) in order to produce EPS-core sandwich panels for applications such as cold storages and cleanrooms. In 2016, there was a notification of importation for use in the production of foam beads. Most of it is expected to remain within SE-grade EPS foams which are currently in the use phase. Currently, the world's largest producer of HBCD has ceased production. And no imported substances have been found to be used. ESP manufacturers in Thailand have stopped using HBCD and used alternative substances.

Emissions of HBCD during EPS foam use phase is to be low. However, emissions are highly likely during the decommissioning and disposal of the constructed panels. Thus, it is imperative that the affected foams or panels be clearly marked to allow for easy identification, in line with the provisions of Part VII of Annex A of the SC. In addition, it is also necessary to identify appropriate disposal routes and develop guidance for the decommissioning and disposal of the affected panels to protect workers from exposure to HBCD including to prevent further releases to the environment. Thailand is making a transition toward a more circular economy. The proper marking of BFR in products will be an important measure to avoid unnecessary risk of cross-contamination of substances of potential concern into sensitive products (such as food packaging, buoys, etc.) even after the phase-out of HBCD.

The goals for Identify insulation foams for cold storage rooms and other products that contain or are contaminated with HBCD, in Thailand and neighboring countries (regional project), the activities are set as follow:

- Prepare an HBCD survey manual for HBCD in insulation foams in cold storage rooms and other products
- Conduct survey of insulation foams in cold storage rooms and other products that may contain HBCD. Also, assemble an inventory of HBCD-containing products, and clearly mark them to facilitate proper decommissioning and disposal
- Develop technology for the management of HBCD containing foams and prepare a work instruction manual for the management of HBCD containing foams/wastes

3.3.5 Activity 5 Management of PFOS, its salts and PFOSF (Annex B, Part III)

Thailand has followed legal measures for Nine PFOS-related substances were recently listed as Category 3 HSs in 2013 and 2017 which means any production, import, export, or possession requires prior approval from the DIW. PFOS is a surfactant that may be used in Thailand in textile (may be only for export oriented products), paper (food packaging), metal plating, and firefighting foams applications. PFOS can contaminate surface water and groundwater as leached from sewage sludge that can be accumulated in agricultural plants and animals, where they can transfer to humans through the food chain. Existing treatment plants may not be able to handle (remove or destroy) PFOS contaminated inputs. The goals for phase out and cease the use of PFOS, its salts, and PFOSF substances, the activities are set as follows:

- Revise regulations to mandate reporting of the use and stockpiling of PFOS, its salts, and PFOSF substances.
- Forecast the quantities of chemical products containing PFOS, its salts, and PFOSF that are expiring, e.g., firefighting foams.
- Study the suitability of technology for disposing chemical wastes that contain PFOS, its salts, and PFOSF substances.
- Prepare recommendations/guidelines for environmentally sound management of chemical waste containing PFOS, its salts, and PFOSF substances that are currently in stock, as well as relevant fire-fighting foams that have not yet expired. (If they cannot be sent for proper disposal, relevant fire-fighting foams can only be used in actual fire incidents (not in fire-fighting drills) and run-off water must be collected and properly treated.)

3.3.6 Activity 6 Register for specific exemptions (Article 4)

Parties of the SC have a duty to review and make decision the register of specific exemptions for production and use according to Article 16. It mean of a notification in writing to the Secretariat with the information on the production and use including of the reduce or eliminate plan. Thailand has taken into account the situation of imports and the use of POPs. The goals and activities are set as follows:

1) Recommendation to support decision for the requests for specific exemptions for all relevant POPs within the time frame designated by the SC. This assesses the POPs substances' production, use, import/export status towards decision on the necessity to request specific exemptions on POPs for hard metal plating only in closed systems.

2) Obtain information from operators request specific exemption registration to confirm their requests for specific exemption for necessary applications to use the POPs substances.

3.3.7 Activity 7 Measures to reduce or eliminate releases from unintentional production

The preliminary unintentional production POPs inventory study covers relevant activities that took place in Thailand in 2017. It covers the assessment of all 9 UNEP-identified potential source groups. From the estimated PCDD/Fs emissions in Thailand for the baseline year 2017, the main emission source groups in decreasing order are waste incineration, medical waste incineration, open burning processes, ferrous and non-ferrous metal production, heat and power generation, landfill/disposal, production of chemicals and consumer goods, and miscellaneous (crematoria). The goals and activities for support actions to reduce uPOPs releases are set as follow:

1) uPOPs release reduction measures for major uPOPs sources within 2027, the activities are set as follow:

(1) Waste incineration

- Sorting food waste and recycling waste to reduce the amount of waste destined for incinerators and to reduce moisture contents in municipal solid waste (to be implemented by LAOs)
- Phase out municipal waste incinerators with technically improper air pollution control systems (to be implemented by LAOs)
- Include waste incinerators into Green Public Procurement to control uPOPs by selecting technology based on Environmental Technology Verification (ETV) protocol and apply IQ/OQ/PQ during installation
- Maintain municipal waste incinerators to ensure the optimally performant according to their specifications
- Enforce the already existing uPOPs emission standards to cover municipal waste incinerators. (in Activity 1)
- Organize trainings for local officials on municipal waste incinerator maintenance and operation according to standard operation procedures (SOPs). (in Activity 11)

(2) Medical waste incineration

- Inspect uPOPs in exhaust air and ashes from medical waste incinerators (especially those operating at higher capacities and/or near populated areas), as well as monitor environmental media contamination in nearby areas.
- Enforce existing uPOPs emission standards that cover the medical waste incinerators. (in Activity 1)

- Develop an effective manifest system for medical waste transport, including revising MOPH's regulation on medical waste disposal, to control medical waste transfer and ensure proper disposal. And develop an effective oversight program for infectious waste management that covers the entire medical waste life cycle, from sources to transport, and to disposal. (in Activity 1)

(3) Open burning processes

A relatively large portion of PCDD/Fs generated in agricultural field burnings is transferred to land with long-term risks to the communities that rely on food and feed produced from these land areas. Emissions from biomass open burning are identified as a hotspot that need to be addressed. The associated main activities are set as follow:

- Monitor uPOPs releases to air and soil, as well as related food chains, in areas with biomass burning
- Issue incentive measures for consumers and private sectors to support agricultural products made without open burning and/or financial measures for farmers to produce agricultural products without open burning.
- Enhance zone-based management efficiency by evaluating and learning from previous operations, in order to improve emergency response plans and to be ready for future incidents.
- Control pollution from agricultural waste burning by utilizing agricultural waste, by promoting alternatives to mono-cropping and crops that require open burning, by banning, open burning, and by applying social measures on wildfire.
- Study alternatives to biomass open burning, e.g., for areas that practice multiple cultivation cycles per year. (in Activity 12)

(4) Ferrous and non-ferrous metal production

The main vector for this source group is the release into residues, which accounts for about 241 gTEQ/a, or 87% of the total release from this source group in 2017. Some of the PCDD/Fs embedded in these residues were destroyed via incineration in cement kilns, while the rest of the residues were used for other purposes and could not be traced further. Thus, the main activities reduce the uPOPs emission from this source group as follow:

- Monitor uPOPs in residues and air from metal production plants, especially aluminum, iron/steel, and copper
- Enforce the already existing uPOPs emission standards that cover the pollutant threshold limits for classifying industrial wastes as hazardous wastes. (in Activity 1)
- Study dioxin standard threshold levels that are used to designate industrial waste as hazardous waste, according to MOI's Notification on Industrial Waste Disposal, B.E. 2548 (in accordance with the Basel Convention's levels).
- Report the phasing out and the release reduction of POPs substances every year in PCD's annual Thailand State of Pollution Reports. (in Activity 11)

(5) Heat and Power Generation

Biomass power plants were the key contributors for this source group, being responsible for about 48% of the emission, followed by fossil fuel power plants and household cooking with biomass. More than half of the PCDD/Fs generated are released by ashes. If these ashes are not properly controlled, this power could be further spread out to . The main activities to reduce the uPOPs emission from this source group as follow:

- Study the suitability of technology used to produce electricity from various fuel types, in terms of uPOPs formation and the management of uPOPs in ashes, in order to minimize risk of conflicts among different government measures and policies. (in Activity 12)
- Enforce the existing uPOPs emission standards to cover the pollutant threshold limits for classifying industrial wastes as hazardous wastes (in Activity 1)
- Study dioxin standard threshold levels to designate industrial waste as hazardous waste, according to the MOI's Notification on Industrial Waste Disposal, B.E. 2548. (in Activity 12)
- Report the phasing out and the release reduction of POPs substances every year in PCD's annual Thailand State of Pollution Reports. (in Activity 11)
- Evaluate the risks and release campaigns and supporting measures to change the way biomass is used for cooking in households, restaurants, and food carts. (in Activity 16)

(6) Landfills

The main contributors (93%) for this source group are activities related to landfills and waste dumping area particularly from landfill or open dumping of wastes contaminated with hazardous components or mixed wastes with residue being the main pathway. The main activities to reduce the uPOPs emission from this source group as follow:

- Set up systems to prevent the spread of pollutants during landfill excavation and investigate pollutants in previously buried waste
- Study the composition and contamination levels of POPs in municipal and hazardous wastes landfilled by setting up data recording systems. (in Activity 12)
- Issue notifications to designate sources/emitters of relevant POPs as pollutant sources and to specify emission limits. (in Activity 1)
- Report the phasing out and the release reduction of POPs substances every year in PCD's annual Thailand State of Pollution Reports. (in Activity 11)

(7) Production of Chemicals and Consumer Goods

The main sources for PCDD/Fs in products were dioxin contamination in chlorinated chemicals, particularly, chlorinated paraffins and dioxazine pigments, and residuals in paper recovered from contaminated paper waste. The relevant proposed activity has to study release and contamination status of uPOPs in risk areas for both of current and past activities, e.g., chlor-alkali plant (former), ethylene dichloride plants (former), etc. These screening activities should also include other relevant uPOPs (PeCB, PCBs, PCNs.)

(8) Crematoria

Miscellaneous sources contributed about 39.5 gTEQ/a (3%) to the total emission in 2017, with crematoria being responsible for almost all (98%) of the PCDD/Fs released from this source group. Crematoria were identified in Thailand's 2004 Inventory Report as a potential hotspot and actions to reduce the emission. Consequently, through efforts laid down by the previous NIPs, the number of improved crematoria has increased and Thailand's country-specific emission factors have been made available. Nevertheless, the improvement appeared moderate because the derived country-specific EFs were still higher than those of UNEP's Toolkit Class 2 crematoria. This was finding points toward the contribution of other important factors, particularly operation and maintenance. Thailand has been planning to improve all crematoria to meet PCD's Type-3 specification. This is crucial responsible agencies put in place measures to ensure the performance of the upgraded crematoria. It is also to meet at least performance of UNEP Class 2. The main activities to reduce the uPOPs emission from this source group is as follow:

- Issue measures to support upgrading of crematoria towards PCD's level 3.0 and include crematoria into Green Public Procurement to select technology and control uPOPs generation
- Develop uPOPs screening/indication methods as alternatives to the expensive direct PCDD/F measurements. (in Activity 12)
- Organize trainings for local officials on crematoria maintenance and operation according to standard operation procedures (SOPs). (in Activity 1)
- Study release and contamination status of uPOPs in Crematoria. (in Activity 12)

The activities to address cross-cutting issues among the 3 main POPs groups are set as follow:

- Study the suitability and effectiveness of disposal methods for POPs-containing waste in Thailand (e.g., cement kilns, hazardous waste incinerators, other potential incinerators). (in Activity 12)
- Revise the Promotion and Conservation of National Environmental Quality Act, B.E. 2535 to mandate pollutant sources to report their pollutant emission and PRTR inventory data that include sufficient additional parameters (metadata) for the evaluation of POPs emission per unit activity in question. (in Activity 1)

2) Generate uPOPs inventory data to reflect Thailand's contexts. The main activity is assembling full inventory for the main emission sources/activities as indicated by the Preliminary Inventory, and derive Thailand's specific uPOPs emission factors (Efs), e.g., ashes from biomass power plants, etc.

3) Apply BAT/BEP towards new uPOPs sources and adopt BEP guidelines for existing sources by 2027, the activities are set as follow:

- Prepare and revise manuals/technical criteria/training programs related to BAT/BEP guidelines, by prioritizing activities that release the highest amounts of uPOPs (Crematoria , Watse incinerator)
- Organize BAT/BEP practical training for operators and relevant parties, giving priority to activities which release the highest amounts of uPOPs (Crematoria , Watse incinerator)
- Offer tax incentives and honorary awards to business operations/operators who adopt BAT/BEP to reduce or cease their POPs releases (Segregate the origin of uPOPs according to regulatory authorities.)
- Specify BAT/BEP methods and measures for local administrative organizations towards reducing uPOPs from major sources (e.g., municipal waste incinerators, open burning) that are within their responsibility

3.3.8 Activity 8 Measures to reduce or eliminate releases from stockpiles and waste

Information from the POPs inventory study indicates that there are stockpiles of POPs pesticides due to the ban of substances. In addition, there is a need to manage end-of-life products that contain POPs which may accumulate after measures to limit or prohibit the use of products containing POPs are implemented. The goals and activities for support actions to reduce or eliminate the production, use and release of POPs from stockpiles and waste are set as follows:

- 1) Environmentally sound disposal of POPs-containing wastes by 2027, the activities are set as follows:
 - Verify and conduct pilot project on environmentally sound temporary storage and management of POPs-contaminated wastes using the guidelines developed under the Basel Convention.
 - Provide manuals/guidelines/technical criteria for temporary storage of POPs-containing wastes and environmentally sound management of POPs-contaminated wastes using the guidelines developed under the Basel Convention
- 2) Environmentally sound disposal of POPs by 2027 (Implement on Activity 2)
- 3) Environmentally sound disposal of end-of-life products containing BDEs by 2027 (Implement on Activity 4)
- 4) Environmentally sound disposal of chemical waste containing PFOS, its salts, and by 2032 (Implement on Activity 5)

3.3.9 Activity 9 Information exchange (Article 9)

Thailand has fulfilled its obligation according to Article 9 of the SC to facilitate the exchange of POPs information between the public, private and public sectors by established the Stockholm Convention Official contact point as the convenience to provide information and exchange news related to the management of POPs and through electronic channels such as the website and facebook of the Pollution Control Department to disseminate information and raise awareness about POPs to academics, interested parties and the public. However, there are needs to updating the website to be modern, accurate and accessible source of information. Thus goals and activities are setting as follows:

- 1) Develop the report of the status on PCB-contaminated products to the secretariat every 5 years (Annex A, Part II, Paragraph (g)).
- 2) Develop the report of the status on the use of PFOS-containing chemical products to the secretariat every 4 years (Annex A, Part III, Paragraph 3).
- 3) Develop the report of uPOPs release reduction status to the secretariat every 5 years (Article 5, Paragraph a(V)).
- 4) Revise and update the 2017 Preliminary POPs Inventory Assessment Report.

3.3.10 Activity 10 Identification of contaminated sites and, where feasible, remediation in an environmentally sound manner

Sites contaminated with POPs substances are represent important sources of potential human exposures. The relevant areas/sites which related with POPs activities (decades ago) may be already changing or covering with other functions. These areas/sites may still recognize as sources of POPs. Unfortunately, there is insufficient data and/or study to help identify these contaminated sites. Also, there is no policy instrument to address the identification and remediation of contaminated sites in Thailand.

However, since relevant industrial activities were historically clustered in/around industrial areas/estates in 2-3 provinces near Bangkok instead of site-by-site investigation. These areas can be investigated for possible contamination with all relevant POPs (as well as other pollutants, such as mercury and other toxic metals) to assess potential contaminated areas. It is possible to assess the contamination situation of all relevant POPs including other groups of pollutants in cause of understanding the issues for question, with guidelines for reducing risks and guidelines for the overall rehabilitation of contaminated areas. There is a risk from any of the POPs, a detailed study should be conducted. to plan actions to reduce risks and/or rehabilitation further as appropriate The risk areas are as follows:

- a) E-waste management sites including dismantling, plastic shredding and recycling, and sites where open burning of halogenated cables and circuit boards were historically or are currently practiced
- b) Textile and leather production and finishing sites
- c) Landfills and dumpsites
- d) Industrial estates and/or areas where following activities took place in the past:
 - POPs pesticides repackaging and storage sites
 - Chlor-alkali and chlorinated organics (chlorinated paraffins, EDC) production sites
 - Production sites (pulp & paper) using elemental chlorine
- e) Areas surrounding activities that generate large amounts of uPOPs as well as areas where receive residues and/or effluent from these activities, including:
 - Waste incineration (MSW, medical waste, and waste to energy)
 - Power generation (biomass power plants and fossil power plants)
 - Crematoria
- f) PFOS/PFOA, PBDEs and HBCD related industrial wastewater treatment plants and areas where receive outputs (effluent, sludge) from these plants
 - Textile, leather and/or paper finishers
 - Plastic compounders and/or formulators
 - Metal plating
- g) Areas where PCB-containing transformers and capacitors were installed, repaired and/or reconditioned, stored and decommissioned (also cover PCNs)
- h) Other major excavation activities that may lead to relocation of POPs including sediment dredging and landfill excavation

The goal for identification of contaminated sites for POPs pesticides, POPs industrial chemicals and uPOPs are also addressed under specific measures to manage the corresponding POPs. The activities are implementing on the other Activities, Activity 2 (Management of POPs pesticides, Activity 3 (Management of PCBs, HCBD, PCNs, PeCB and other Legacy Industrial POPs), Activity 4 (Management of HexaBDE, HeptaBDE (Annex A, Part IV), TetraBDE, PentaBDE, HBB, HBCD and DecaBDE), Activity 5 (Management of PFOS, its salts and PFOSF), Activity 7 (Measures to reduce or eliminate releases from unintentional production (Article 5)), and Activity 12 (Research, development and monitoring (Article 11)). For most newly listed POPs, criteria for determining contaminated sites (environmental standards) are also needed. This activity is covered in Activity 1 (Institutional and regulatory strengthening measures).

3.3.11 Activity 11 Public information, awareness and education

Thailand has continuously carried out activities to raise awareness and provide knowledge on POPs. With additional focus on newly listed POPs, the main implementation plans are as follows:

1) Continually strengthen public awareness on relevant POPs substances, focusing on new POPs, among citizens of all sectors through various channels and media, the activities are set as follows:

- Strengthen awareness among the public, workers in operation sites or emission sources, operation owners, etc. The rights for protection against exposure to hazardous chemicals, which may result from private sectors' failure or from nonresponsible government agencies.
- Responsible government agencies in charge of POPs open monitoring data to the public according to the Official Information Act, B.E. 2540, and also analyze data to generate knowledge and information towards policy-making and implementation.
- Strengthen awareness and educate various target groups such as government agencies, business operators, media, community leaders, children, women, underprivileged and elders

2) Strengthen awareness and knowledge on BDEs and their proper management for small & medium operators and all sectors of the population.

3) Strengthen awareness and knowledge on uPOPs and their proper management among farmers, small & medium operators, and all sectors of the population.

4) Upgrade Thailand's SC Focal Point's website by 2027.

5) Set up a systematic online database for various data-holding government agencies that links data across the agencies and is easily accessible, and transparent, to allow for statistical analysis and POPs status evaluation.

6) Monitor and report POPs management status. The main activity is reporting the phasing out and the reduction of POPs substances every year in PCD's Annual Thailand State of Pollution Reports.

7) Drive to include POPs and other pollutants in school and university.

8) Train and educate target groups by 2027.

- Organize trainings for local officials on municipal waste incinerator maintenance and operation according to standard operation procedures (SOPs).
- Organize training for the relevant agencies on the management and disposal of POPs-containing wastes.

9) Strengthen awareness and educate all sectors of the public by 2027. The main activity is preparing the information media and drive for compulsory elementary level curriculum to strengthen awareness on hazards from the use of chemicals in general, and on personal protection and risk reduction related to daily uses of chemicals among the public.

3.3.12 Activity 12 Research, development and monitoring

In addition to operational activities related to POPs pesticides from industrial chemicals and unintentionally POPs, research, development and monitoring activities of POPs have been set in accordance with Article 11. The goals and activities for support actions to reduce or eliminate the production, use and release of POPs are set as follows:

1) Allocate additional budget for POPs-related research and development, the activities are set as follows:

- Drive national research funding agencies to allocate funds for POPs monitoring in the environment, humans, and the food chains
- Drive national research funding agencies in the country to allocate funds for alternative solutions to replace the use of POPs pesticides

2) Enhance the capability of regional testing laboratories as well as private laboratories. The main activity is allocate additional personnel and equipment for POPs analysis in research organizations.

3) Develop Thailand's management and planning mechanisms for candidate POPs. The activities are developing a generic protocol that will trigger domestic actions, leading to data gathering and transfer towards responsible agencies for their implementation planning and setting of relevant standard limits for candidate POPs.

4) Study and derive country specific POPs emission factors for emission evaluation towards PRTR to reporting.

5) Study the suitability and effectiveness of disposal methods for POPs-containing waste in Thailand are friendly methods for the disposal of POPs-containing waste by 2027. (e.g., cement kilns, hazardous waste incinerators, other potential incinerators)

6) Study the composition and POPs contamination levels in landfilled municipal and hazardous wastes, and set up data recording systems.

7) Generate spatial and temporal pesticide application data by study towards creating a pesticide distribution model that is multi-dimensional to predict risk areas/hotspots, and to analyze correlation between the model's predictions and potentially related illness data of local populations.

8) Generate POPs pesticides residue data in former formulation and repackaging sites.

9) Develop capability to identify legally permitted pesticides by developing the techniques to detect and identify legally permitted pesticides, especially candidate POPs pesticides and pesticides with high risk.

10) Monitor POPs industrial chemicals, the activities are set as follows:

- Study the flow paths and quantities of chemicals throughout their life cycles (Material Flow Analysis) by conducting a pilot project for high-impact target chemicals.
- Study to assess the status of use and contamination of Legacy POPs in open applications in Thailand, e.g anti-rust protective coatings, gaskets, sealants etc., .
- Study and revise Thailand's low POPs content limits for the definition of hazardous waste.

11) Conducting survey to assess the quantities of POPs-containing products, the activities are set as follows:

- Investigate domestic sources of Mirex utilization as industrial POPs.
- Study and research flame retardants in plastics and textiles to enable sorting and separation of materials that contain different types flame retardants from recycling routes.

12) Monitoring the contamination of all POPs substances from factories, business operation sites, and other sources, the activities are set as follows:

- Gather soil and underground water contamination data for relevant POPs within factory perimeters (which operators must monitor and report according to M-Industry's notification)
- Analysis of soil and underground water contamination data by relevant data-holding government agencies.

- Study released and contamination status of uPOPs, industrial POPs, POPs derivatives, and POPs precursors in risk areas, for both current and past activities.
 - Study dioxin standard threshold levels that are used to designate industrial waste as hazardous waste.
- 13) Promote research on monitoring and reduction of dioxin from waste and biomass burning, as well as the effects of organochlorine contamination, the activities are set as follows:
- Develop uPOPs screening/indication methods as alternatives to the expensive direct PCDD/F measurements.
 - Study alternatives to replace biomass burning, especially in areas that are cultivated for 2-3 cycles per year.
- 14) Study methods to evaluate uPOPs from accidental municipal waste landfill fires.
- 15) Study the suitability of technology to produce electricity from various fuel types, in terms of uPOPs formation and the management of uPOPs in ashes to minimize risk of conflicts among different government measures and policies.
- 16) Study the suitability of technology for the reduction and management of uPOPs from the scrap metal recycling industry.
- 17) Study and develop data formats (or reporting template) and systems to support operators' data declaration throughout supply chains (including sale volumes) for the purpose of tracking industrial POPs and other hazardous chemicals, which will benefit continual POPs risk management and monitoring efforts in humans, animals, plants, and environmental media according to local contexts.

3.3.13 Activity 13 Technical assistance and financial resources and mechanisms

As a developing country, Thailand is not required to provide technical assistance according to Article 12 of the SC. However, the ability of Thailand to fulfil its obligations under the SC depends partly on the provision of adequate financial and technical assistance.

Thailand has received financial and technical support through international collaboration programs, both for managing and monitoring of POPs. Such programs help facilitating Thailand to comply with the SC obligations. In this regard, the operational goals are to cooperate with international organizations for POPs management and to ask for funding from GEF, under GEF-7 and GEF-8 funds.

3.3.14 Activity 14 National Report

Parties of the SC have a duty to monitor and submitted the National Report on the implementation of the reduce and/or eliminate product, use, emission, and disposal POPs according to Article 16. The goals for the National Report have activities are set as follows:

- 1) Report status on PCB-contaminated products to the secretariat every 5 years (Annex A, Part II, Paragraph (g))
- 2) Report status on the use of PFOS-containing chemical products to the secretariat every 4 years (Annex A, Part III, Paragraph 3)
- 3) Report uPOPs release reduction status to the secretariat every 5 years (Article 5, Paragraph a (V))

3.3.15 Activity 15 Effectiveness evaluation

Parties of the SC have a duty to comply with the obligations, which include assessment of the effectiveness of the Convention according to Article 16. The assessment is made on the basis of existing scientific, environmental, technical and economic information. The PCD acting as the national focal point to continuously submitted the information mentioned above and other information requested by the meeting of the Parties. Moreover, Thailand coordinate and cooperate with other Parties, both regionally and globally, in POPs monitoring activities and conduct POPs monitoring activities domestically as appropriate and according to her capabilities.

The goals for establish national POPs monitor by 2027, the activity is national POPs monitoring plans and conduct monitoring activities according to the national POPs monitoring plans.

3.3.16 Activity 16 Gender-related issues

The majority of the Thai population is females and most of female workers are in the informal sector, some of which are farmers. However, the majority of male workers are in the formal sector, which has better social welfare than the informal sector. Therefore, women and men have different exposure to POPs. In addition, women dominate in cooking activities, both for household consumption and for income generating. For this reason, gender-related activities shall focus on creating awareness among the female population.

The goals for gender-related activities are set to raise awareness for women, children, youth, and the elderly regarding POPs by 2027. The main activities are setting the campaigns and set up measures to promote proper use of biomass as fuel for cooking in households, food carts and restaurants. In addition, the Lesbian, Gay, Bisexual, Transgender, Queer, and Intersex (LGBTQI) group is also included in these gender-related activities. Moreover, the activities related to public awareness (Article 10) and reduce the generation and releases of uPOPs (Article 5) as mentioned above are also incorporating gender-related issues.

3.3.17 Summary and prioritization of activities under the National Implementation Plan

Action Plans under the National Implementation Plan are 16 activity are considered to be important such that they should be implemented simultaneously to achieve success in the specified period in order for the public to correctly understand the obligation to achieve the targets of POPs controls covering group all of the POPs are POPs pesticides, POPs industrial chemicals, and unintentional production POPs (uPOPs) Therefore, the activities are grouped into three issues as follows:

1. Activity related to producing safe food, ensuring healthy life, and clean environment.

Activity	POPs			Implementing Body
	P	I	U	
Regulate new POPs, including candidate POPs substances as Hazardous Substances under the Hazardous Substance Act B.E. 2535	•	•	•	M-Industry/ MNRE/MOAC
Strengthening existing regulations, for example, elevating the control level of POPs substances as Hazardous Substances under the Hazardous Substance Act B.E. 2535, declaring and collecting data on POPs chemical substances in products (CiP) on products manufactured in Thailand and imported from other countries, reporting data on emission to the environment together with data according to the Pollutant Release and Transfer Register (PRTR)	•	•	•	M-Industry/ MOAC/MNRE

Establishing additional standard limits for POPs in environmental media and in food and drinking water	•	•	•	MNRE/ MOAC/MOPH
Establishing a monitoring and assessment system for products containing POPs in all kinds of recycling processes		•	•	M-Industry/ MNRE
Supporting safe agriculture practice or organic farming or biological cultivation or integrated pesticide management	•			MOAC
Setting up measures to reduce uPOPs release for major uPOPs sources and enhance the efficiency of law enforcement and regulations are waste incinerators, infectious wastes incinerators, open burning, iron and metal industrial plants, crematoria and products. waste incinerators , infectious wastes incinerators, open burning, iron and metal industrial plants, crematoria and product			•	MNRE/M- Industry/MOI

Note: P: POPs pesticides, I: POPs Industrial Chemicals and U: unintentional production POPs

2. Activities relating to capacity building of government agencies and local authority organizations in monitoring small and medium industrial firms that are related to products containing POPs, monitoring activities that release unintentionally produced POPs (uPOPs), and monitoring quality of the environment as well as emission standards at point sources of POPs.

Activity	POPs			Implementing Body
	P	I	U	
Empowering staffs of local authority organizations, together with providing budgets for operating and maintenance the waste incinerators under their supervision			•	MNRE/ MOI
Improving laboratories in terms of equipment and personnel, at the national, local, and the private sector levels. A guideline for managing recycle activities that prevent POPs contamination is also suggested, as well as research of new technologies for analyzing POPs	•	•	•	MHESI/ MNRE/ MOAC/ MOPH
Establishing an accomplished data management system, which consists of data from various government and private agencies, for evaluating the incidents or surveillance of POPs related activities which is accessible by all stakeholders	•	•	•	MHESI/ MNRE
Monitoring POPs in the environment (including surface water, ground water, sea water, soil, sediments, air) especially at locations with high risk of POPs contamination	•	•	•	MHESI/ MNRE
Establishing marking system or declaring information on materials/products containing industrial POPs, to facilitate separators to manage these materials/products discretely from other materials		•		M-Industry

Activity	POPs			Implementing Body
	P	I	U	
Establishing a tracing system for products containing POPs, and data on stocks of POPs. POPs identification system should cover all the supply chain and consumer network (especially raw materials and substances used in the production process and in products) for the advantage of tracking POPs data	•	•	•	MHESI/ MOAC/ MNRE/ MOPH

Note: P: POPs pesticides, I: POPs Industrial Chemicals and U: unintentional production POPs

3. Activities relating to raising awareness and understanding for concerned sectors, including private entrepreneurs and local administrative organizations, with focuses on wastes containing POPs and unintentionally production of POPs.

Activity	POPs			Implementing Body
	P	I	U	
Raising awareness and understanding among staffs of local authority organizations, especially on identification and separation of POPs containing products and separate waste collection		•	•	MNRE/ M-Industry
Raising awareness and understanding among people in all stakeholder groups at the local level, especially small and medium private firms, children, women, elderly, and disadvantage people	•	•	•	MNRE/ M-Industry / MOI/ MOL

Note: P: POPs pesticides, I: POPs Industrial Chemicals and U: unintentional production POPs

3.4 Detailed action plans

3.4.1 Activity 1 Institutional and regulatory strengthening measures

Goal	Activity	Indicator		Implementing Body		Duration (B.E.)	Estimated Budget (MB)	Financial Sources
				Core	Supporting			
Review & update existing regulations								
1.1 Regulate POPs substances as Hazardous Substances under the Hazardous Substance Act B.E. 2535	1.1.1 Issue notifications to control POPs substances as Hazardous Substances under the Hazardous Substance Act B.E. 2535 1) Consider controlling new industrial POPs substances that are not yet classified as Hazardous Substances, i.e., PeCB, HCBd, HBCD, esters of PCP, PCNs, and PFOA and PFHxS group 2) Consider elevating control level and/or specify utilization conditions in accordance with the objectives permitted by the convention for the current Class-3 Hazardous Substances, i.e., PFOS group, BDE group, SCCPs and dicofol 3) Consider controlling candidate POPs according to MNRE's control proposal (item 1.1.2)	Issue notifications to control POPs substances as Hazardous Substances under the Hazardous Substance Act B.E. 2535		M-Industry MOAC	MNRE MOPH FTI I-EA-T	2567 – 2570	Regular gov. spending	RTG
	1.1.2 Prepare proposal for the control of candidate POPs for classification as Hazardous Substances under the Hazardous Substance Act B.E. 2535.	Proposal for the control of POPs		MNRE	M-Industry MOAC MOPH FTI	2566 – 2570	5	RTG
1.2 Establish criteria for chemical assessment that	1.2.1 Revise assessment criteria both for new POPs (pesticides and industrial) and for currently permitted POPs, to cover	Criteria for chemicals assessment on		M-Industry MNRE MOAC	FTI	2567 – 2569	0.5	RTG

Goal	Activity	Indicator		Implementing Body		Duration (B.E.)	Estimated Budget (MB)	Financial Sources
				Core	Supporting			
cover substance properties as described in Paragraph 1 of Annex D of the SC by 2027	chemical property criteria described in Paragraph 1, Annex D of the SC	Paragraph 1, Annex D of the SC		MOPH				
1.3 Establish additional standard limits for POPs in environmental media and in food by 2027.	1.3.1 Issue notifications to specify environmental standard limits for all POPs substances 1) Notifications of the Natinal Environment Board on the Standard of Soil B.E. 2564 2) Notifications of the Natinal Environment Board on the Criteria for the Quality of surface water B.E. 2565	Notifications specifying standard limits for POPs substances in environmental media		MNRE	MOAC MOPH MWA PWA EGAT PEA MOT MoEN	2565	0.01	RTG
	1.3.2 Issue notifications to specify standard limits in food for all POPs substances	Notifications specifying standard limits for POPs substances in food		MOPH MOAC	MNRE	2564 – 2565	0.1	RTG
	1.3.3 Issue notifications to specify drinking water standard limits for POPs substances, e.g., PFOS and PFOA	Notifications specifying additional standard limits for POPs substances in drinking water		MOPH	MNRE MWA PWA	Continuous		
1.4 Establish additional POPs emission limits from sources by 2027	1.4.1 Issue notifications to designate sources/emitters of relevant POPs as pollutant sources and to specify emission limits	Notifications specifying POPs emission limits for POPs from sources		MNRE	MOPH	2567 – 2570	10	RTG
				M-Industry	FTI EGAT	2563 – 2566	0.1	RTG
				MOAC	PEA MEA	2565 - 2566	5.18	GEF

Goal	Activity	Indicator		Implementing Body		Duration (B.E.)	Estimated Budget (MB)	Financial Sources
				Core	Supporting			
	1.4.2 Specify POPs monitoring criteria (including related parameters) in relevant media according to their sources (e.g., PBDEs, HBCD, SCCPs, PFOS)	POPs monitoring criteria (including related parameters)		MNRE	MHESI	2566 – 2570 2565 - 2568	2	RTG
1.5 Revise the Promotion and Conservation of National Environmental Quality Act, B.E. 2535 to mandate pollutant sources to report their pollutant emission and PRTR inventory data	1.5.1 Revise the Promotion and Conservation of National Environmental Quality Act, B.E. 2535 to mandate pollutant sources to report their pollutant emission and PRTR inventory data that include sufficient additional parameters (metadata) for the evaluation of POPs emission per unit activity in question. The pollutant sources must also report their PRTR inventories report to local authorities and/or pollution control officers.	A revised version of the Promotion and Conservation of National Environmental Quality Act, B.E. 2535 that mandates pollutant sources to report their pollutant emissions and PRTR inventory data		MNRE	M-Industry MOAC MOPH MOI	2566 – 2570	5	RTG
PRTR inventory data	1.5.2 Set up reporting systems for pollutant emission data and PRTR inventories for submission to local authorities and/or pollution control officers, according to the revised version of the Promotion and Conservation of National Environmental Quality Act, B.E. 2535	System of the Annual pollutant emission and PRTR inventory reports		MNRE	M-Industry MOAC MOPH MOI LAOs	2566 – 2570	2	RTG
1.6 Revise the regulations on hazardous chemicals to include industrial POPs substances and enforce them towards both	1.6.1 Issue notifications to i) prohibit the uses of penta- & octaBDE contaminated materials in all products, ii) prohibit the uses of decaBDE in high-risk products (products that are in close contact with users; e.g., garments, textiles, automobile passenger compartment parts) and in non-exempt applications, and iii) prohibit the uses of decaBDE in all applications by 2027.	Notifications to prohibit the use of POPs substances (in manufactured products)		M-Industry MNRE MOC	FTI MOT	2569 – 2570	1	RTG

Goal	Activity	Indicator		Implementing Body		Duration (B.E.)	Estimated Budget (MB)	Financial Sources
				Core	Supporting			
domestically produced and imported products	While the uses of decaBDE are still permitted (during transition period), operators must follow conditions and be responsible for the environmental disposal of the waste of their products.							
	1.6.2 Issue notifications to mandate producers to declare the use of POPs in their products and to make appropriate markings on such parts to facilitate management throughout products' life-cycle	Notifications mandating the declaration of POPs contents in products		M-Industry (TISI)	MOC MOF MNRE	2564 – 2568	1	RTG
1.7 Control operations that are hazardous to public health (sources of POPs emissions) and control the quality of POPs-related public health monitoring	1.7.1 Issue notifications to specify criteria for operations that are considered hazardous to public health due to POPs emissions, e.g., junk shops, recycling plants and waste disposal plants below 50 horsepower, etc.	Notifications specifying criteria for operations that are considered hazardous to public health due to POPs emissions		MOPH MOI MNRE	LAOs MOL MOAC	2566	0.1	RTG
	1.7.2 Issue notifications to specify criteria for environment-induced illnesses and (biological) laboratory testing standards according to the Control of Occupational and Environmental Diseases Act B.E.2562 (2019)	Notification specifying criteria for environment-induced illnesses		MOPH MOI	MNRE LAOs MOL MOAC	2566-2568 & continue thereafter	5	RTG
Strengthen law enforcement								
1.8 Enhance law-enforcement efficiency to reduce and control uPOPs emissions	1.8.1 Enforce existing uPOPs emission standards that cover the following activities: municipal waste incinerators (especially technically improper ones), medical waste incinerators, industrial waste incinerators, industrial operators that utilize used oils as fuel, and pollutant threshold limits	Emission monitoring data and law enforcement/penalty evaluation report		M-Industry MNRE	MOPH MOI	2566 – 2570	5	RTG

Goal	Activity	Indicator		Implementing Body		Duration (B.E.)	Estimated Budget (MB)	Financial Sources
				Core	Supporting			
	for classifying industrial wastes as hazardous wastes							
	1.8.2 Encourage sub-district administrative organizations to follow PCD's notification on "guidelines for efficient management of municipal waste via incineration"	- Percentage of efficiently managed municipal waste incinerators - Operation and uPOPs emission reports		MNRE	MOI	2566 – 2570	2	RTG
1.9 Tighten the control on import and export of POPs by 2027	1.9.1 Review existing gaps, challenges, and obstacles in the control of POPs import and export, and identify solutions.	Method to manage POPs import and export control gaps		MNRE M-Industry MOAC MOPH MOF	FTI MOC MOL	2567	1	RTG
	1.9.2 Organize training programs for customs officials regarding the list of POPs substances that have been controlled as Hazardous Substances, to prevent illegal import and export	Number of customs officials have the potential to identify the list of POPs substances in products.		MNRE M-Industry MOF	MHESI Customs MOAC MOPH	2567 – 2570	1	RTG
	1.9.3 Define customs tariff and statistical codes (HS Code) to cover new POPs, including candidate POPs	HS Codes for new and candidate POPs		MNRE MOF	FTI M-Industry MOAC MOPH	2567 – 2570	1	RTG
1.10 Enhance the capability of subdistrict administrative	1.10.1 Organize trainings for local LAOs officials on the proper and continual management of POPs-containing materials and waste, and on the selection of	Number of trained LAOs officers		MOI MNRE MOPH	MHESI	2567 – 2570	1.5	RTG

Goal	Activity	Indicator		Implementing Body		Duration (B.E.)	Estimated Budget (MB)	Financial Sources
				Core	Supporting			
organizations (LAOs) in managing POPs-containing materials and waste, as well as in controlling uPOPs release sources by 2027	environmentally sound waste incinerators (e.g., employing proper incineration methods while also prohibiting management of POPs-contaminated waste via landfilling)			M-Industry MOAC				
	1.10.2 Organize meetings among LAOs to exchange information and experiences, and to foster collaborations among themselves towards proper, continual, and systematic management of POPs	- Number of attending LAOs - Number of meetings per year		MOI	MNRE MOPH M-Industry MOAC	2567 – 2570	1.5	RTG
1.11 Enhance dioxin/furan emission control efficiency from municipal waste incinerators and crematoria	1.11.1 Develop an effective manifest system for medical waste transport, including revising MOPH's regulation on medical waste disposal, to control medical waste transfer and ensure proper disposal. And develop an effective oversight program for infectious waste management that covers the entire medical waste life cycle, from sources to transport, and to disposal.	Manifest data of medical waste's entire life cycle		MOPH DOLA	MNRE MOI	2567 – 2570	1.5	RTG
	1.11.2 Organize trainings for local officials on crematoria maintenance and operation according to standard operation procedures (SOPs)	Number of crematoria that meet their operational specifications		MNRE LAOs	MOI MHESI NOB	2567 – 2568	0.5	RTG

3.4.2 Activity 2 Management of POPs pesticides (Annex A, Part I)

Goal	Activity	Indicator	Implementing Body		Duration (B.E.)	Estimated Budget (MB)	Financial Sources
			Core	Supporting			
2.1 Develop a multi-dimensional online reporting system that incorporates spatial, temporal, application mode, and other descriptive aspects related to pesticide distribution and use	2.1.1 Conduct a pilot project to develop an online multi-dimensional (e.g., sale amounts and time periods, locations of registered distribution shops, application locations and time periods, use modes, packaging management, etc.) data collection and reporting system for 2-3 candidate POPs pesticides, to assess contamination-risk areas	An online reporting system	MOAC	MHESI MOI	2564 – 2565	10	RTG
	2.1.2 Analyze data obtained from the online reporting system to predict the flow of pesticides in the environment and to be able to properly monitor risk areas	Report on the analysis and prediction of related chemical flows in the environment	MOAC	MHESI MOI	2566 – 2568	5	RTG
2.2 Dispose of obsolete POPs pesticide stocks in environmentally sound manners	2.2.1 Develop mechanisms to support the proper disposal of obsolete pesticide stocks, and set up a stockpiles reporting system that is accessible to the public	- Mechanism for sound disposal of obsolete pesticide stocks - Updated reports on obsolete pesticide stocks	MOAC MOPH		2570 & thereafter	5	RTG
	2.2.2 Create the online pesticide information dissemination media that will readily reach and educate all parties along the pesticide value chain, regarding appropriate and environmentally friendly pesticide management, including types of Hazardous Substances, storage methods, application methods, personal protection, sorting and disposal of packaging, etc.	- Number of target groups accessing online media - Number of target groups who acquired appropriate	MOAC	MOE MOPH MHESI MNRE	2566 – 2570 2566 - 2567	5	RTG

Goal	Activity	Indicator	Implementing Body		Duration (B.E.)	Estimated Budget (MB)	Financial Sources
			Core	Supporting			
		pesticide management knowledge					
	2.2.3 Dispose the obsolete POPs pesticide stocks	Data of the dispose the obsolete POPs pesticide stocks	MOAC MOPH	MNRE	2565	-	-
2.3 Adequate POPs pesticide residue monitoring data in the environment, humans, animals, and food products by 2027	2.3.1 Revise the types of POPs pesticides that should be monitored, and set up monitoring plans for POPs pesticides residues in the environment, humans, animals, and food products	Monitoring plans for POPs pesticide residues in the environment, humans, animals, and food products	MNRE MOAC MOPH	NHCO MHESI	2566 – 2570	6	RTG/GEF
	2.3.2 Monitor the POPs pesticides residues in the environment, humans, animals, and food products in risk areas (according to the monitoring plans in 2.3.1)	- POPs pesticide monitoring data in risk areas - Number of monitored risk areas - Number of related chemical substances that have been investigated	MNRE MOPH	MOAC MOI MHESI	2565 - 2570	2.8	RTG
	2.3.3 Create POPs monitoring data storage systems, which may be separately maintained and operated by the different responsible authorities	Readily accessible monitoring data	MNRE MOAC MOPH	MHESI	2566 – 2570	5	RTG

3.4.3 Activity 3 Management of PCBs, HCBd, PCNs, PeCB (Annex A, Part II) and other Legacy Industrial POPs

Goal	Activity	Indicator	Implementing Body		Duration (B.E.)	Estimated Budget (MB)	Financial Sources
			Core	Supporting			
3.1 Take steps to ensure that there is no use and/or possession of equipment and products containing PCBs, HCBd, PCNs and PeCB by 2027	3.1.1 Track possession data among target groups and operators of equipment and products containing PCBs, HCBd, PCNs and PeCB, and randomly check closed-application equipment and products that may contain these substances (e.g., transformer oil, capacitor oil, hydraulics oil) as well as contamination in surrounding areas.	Reports that include equipment/product information and their volumes	EGAT MEA PEA	MNRE FTI	2566 – 2570	5	RTG

3.4.4 Activity 4 Management of HexaBDE, HeptaBDE (Annex A, Part IV), TetraBDE, PentaBDE (Annex A, Part V), HBB (Annex A, Part I), HBCD (Annex A, Part VII) and DecaBDE (Annex A, Part IX)

Goal	Activity	Indicator	Implementing Body		Duration (B.E.)	Estimated Budget (MB)	Financial Sources
			Core	Supporting			
4.1 Reduce and eliminate the use of products that contain BDEs by 2027	4.1.1 Conduct full survey/inventory for POPs flame retardants in products that still lack data, e.g., textiles, automotive, rubber/silicone, construction materials	Full inventory	MNRE	M-Industry FTI I-EA-T	2566 – 2570	10	RTG/GEF
	4.1.2 Define methods and means to identify, sort, and collect WEEE that contain POPs flame retardants from the recycling routes (to be in accordance with the Basel Convention)	Manual for collecting and sorting WEEE that contains POPs flame retardants	MNRE	FTI MOI DOLA I-EA-T M-Industry EEI	2565 – 2566	1	GEF
	4.1.3 Estimate/specify the types and quantities of equipment and products containing recycled BDEs, as well as utilization rates of recycled products	Estimated domestic quantities of	MNRE	FTI MOI I-EA-T	2565 – 2566	3	GEF

Goal	Activity	Indicator	Implementing Body		Duration (B.E.)	Estimated Budget (MB)	Financial Sources
			Core	Supporting			
		relevant sorted and recycled BDEs		M-Industry			
	4.1.4 Study the suitability of disposal technology for BDEs contaminated wastes	Appropriate technology for the disposal of wastes containing BDEs	MNRE	MHESI FTI I-EA-T MOI M-Industry	2566	3	GEF
	4.1.5 Prepare recommendations/guidelines for environmentally sound management of BDEs containing wastes	Recommendations/guidelines for management of waste containing BDEs	MNRE	FTI I-EA-T LAOs M-Industry	2565 – 2568	3	GEF
4.2 Identify insulation foams for cold storage rooms and other products that contain or are contaminated with HBCD, in Thailand and neighboring countries (regional project)	4.2.1 Prepare an HBCD survey manual for HBCD in insulation foams in cold storage rooms and other products	HBCD survey manual	MNRE	MHESI FTI I-EA-T LAOs	2565 2566	1	GEF
	4.2.2 Conduct survey of insulation foams in cold storage rooms and other products that may contain HBCD. Also, assemble an inventory of HBCD-containing products, and clearly mark them to facilitate proper decommissioning and disposal	A survey report of insulation foams in cold storage rooms and other products that contain HBCD	MNRE	FTI I-EA-T LAOs	2565 2566 – 2567	4	GEF
	4.2.3 Develop technology for the management of HBCD containing foams and prepare a work instruction manual for the management of HBCD containing foams/wastes	Manual on the management of HBCD-containing products/wastes	MNRE	MHESI FTI I-EA-T LAOs	2566 2566 – 2567	5	GEF

3.4.5 Activity 5 Management of PFOS, its salts and PFOSF (Annex B, Part III)

Goal	Activity	Indicator	Implementing Body		Duration (B.E.)	Estimated Budget (MB)	Financial Sources
			Core	Supporting			
5.1 Phase out and cease the use of PFOS, its salts, and PFOSF substances	5.1.1 Revise regulations to mandate reporting of the use and stockpiling of PFOS, its salts, and PFOSF substances	Inventory report on the use and stockpiling of PFOS and related substances	M-Industry	FTI I-EA-T	2566 – 2570	1	RTG
	5.1.2 Forecast the quantities of chemical products containing PFOS, its salts, and PFOSF that are expiring, e.g., firefighting foams	Quantities of relevant expiring products	MNRE M-Industry	FTI	2565	4	GEF
	5.1.3 Study the suitability of technology for disposing chemical wastes that contain PFOS, its salts, and PFOSF substances	Data on appropriated technology for final disposal of waste containing PFOS and related substance	MNRE MHESI	FTI M-Industry	2566	3	GEF
	5.1.4 Prepare recommendations/guidelines for environmentally sound management of chemical waste containing PFOS, its salts, and PFOSF substances that are currently in stock, as well as relevant fire-fighting foams that have not yet expired. (If they cannot be sent for proper disposal, relevant fire-fighting foams can only be used in actual fire incidents (not in fire-fighting drills) and run-off water must be collected and properly treated.)	Recommendation s/guidelines for the management of relevant PFOS containing waste	MNRE MHESI	FTI MOI M-Industry DDPM LAOs	2566	3	GEF

3.4.6 Activity 6 Register for specific exemptions (Article 4)

Goal	Activity	Indicator	Implementing Body		Duration (B.E.)	Estimated Budget (MB)	Financial Sources
			Core	Supporting			
6.1 Recommendation to support decision for the requests for specific exemptions for all relevant POPs within the time frame designated by the SC	6.1.1 Assess POPs substances' production, use, import/export status towards decision on the necessity to request specific exemptions on POPs for hard metal plating only in closed systems.	Resolutions from relevant committees on specific exemption registration	MNRE	M-Industry MOAC MOPH FTI I-EA-T	2566 – 2570	1	RTG
6.2 Obtain information from operators who request specific exemption registration	6.2.1 The operator confirms their request for a specific exemption for the essential use of POPs.	Report on domestic uses of POPs substances	MNRE FTI	M-Industry	2566 – 2570	1	RTG

3.4.7 Activity 7 Measures to reduce or eliminate releases from unintentional production (Article 5)

Goal	Activity	Indicator	Implementing Body		Duration (B.E.)	Estimated Budget (MB)	Financial Sources	
			Core	Supporting				
7.1 uPOPs release reduction measures for major uPOPs sources within 2027	Waste incineration							
	7.1.1 Release stringent waste sorting measures to reduce the amount of waste destined for incinerators and to reduce moisture contents in municipal solid waste (to be implemented by LAOs)	Notification on household waste sorting	MOI MOPH	MNRE	2565 – 2568 & Continue thereafter	10	RTG	
	7.1.2 Phase out municipal waste incinerators with technically improper air pollution control systems (to be implemented by LAOs)	- Target number of decommissioned improper incinerators at 20 units/year - Zero newly installed improper incinerators	MOI LAOs	MNRE BMA	2564 – 2566	50	RTG	
	7.1.3 Include waste incinerators into Green Public Procurement to control uPOPs by selecting technology based on Environmental Technology Verification (ETV) protocol and apply IQ/OQ/PQ during installation	Procurement specifications for environmentally friendly waste incinerators	MNRE	MHESI M-Industry DIW	2565 – 2568 & Continue thereafter	10	RTG	
	7.1.4 Maintain municipal waste incinerators to ensure that they perform optimally and according to their specifications	- Number of serviced incinerators - uPOPs measurements before and after maintenance	LAOs BMA	MOI MNRE	2565 – 2568 & Continue thereafter	30	RTG	

Goal	Activity	Indicator	Implementing Body		Duration (B.E.)	Estimated Budget (MB)	Financial Sources
			Core	Supporting			
	Medical waste incineration						
	7.1.5 Inspect uPOPs in exhaust air and ashes from medical waste incinerators (especially those operating at higher capacities and/or near populated areas), as well as monitor environmental media contamination in nearby areas	uPOPs monitoring results, including contamination in nearby areas	MNRE MOPH LAOs	FTI MOI	2566 – 2570	5	RTG
	Open burning processes						
	7.1.6 Monitor uPOPs releases to air and soil, as well as related food chains, in areas with biomass burning	Monitoring results towards evaluation of future status	MNRE MOPH	LAOs MOI	2566 – 2570	15	RTG
	7.1.7 Issue incentive measures for consumers and private sectors to support agricultural products made without open burning and/or financial measures for farmers to produce agricultural products without open burning. (To be implemented in conjunction with the ongoing national agenda on air pollution.)	Incentive measures for consumers/business/farmers to avoid open burning practices	MOAC	MOF MOI MNRE MOPH	2566 – 2570	5	RTG
	7.1.8 Enhance zone-based management efficiency by evaluating and learning from previous operations, in order to improve emergency response plans and to be ready for future incidents. (To be implemented in conjunction with the ongoing national agenda on air pollution.)	Data towards evaluating and issuing control measures against open burning	MNRE MOAC	MOI MOPH	2566 – 2570	5	RTG

Goal	Activity	Indicator	Implementing Body		Duration (B.E.)	Estimated Budget (MB)	Financial Sources
			Core	Supporting			
	7.1.9 Control pollution from agricultural waste burning by utilizing agricultural waste, by promoting alternatives to mono-cropping and crops that require open burning, by banning open burning, and by applying social measures on those who start wildfires. (To be implemented in conjunction with the ongoing national agenda on air pollution.)	Reduction in agricultural and forest burning	MOI MOAC MNRE	MOPH MOT	2566 – 2570	5	RTG
Ferrous and non-ferrous metal production							
	7.1.10 Monitor uPOPs in residues and air from metal production plants, especially aluminum, iron/steel, and copper	Monitoring data	M-Industry	MNRE FTI I-EA-T	2566 – 2567 2565 - 2566	5 2	RTG GEF
Crematoria							
	7.1.11 Issue measures to support upgrading of crematoria towards PCD's level 3.0 and include crematoria into Green Public Procurement to select technology and control uPOPs generation	Number of upgraded & GPP-based crematoria	MNRE NOB	MOI M-Industry MHESI MOPH	2564 – 2568	0.15	RTG
Landfills							
	7.1.12 Set up systems to prevent the spread of pollutants during landfill excavation, and investigate pollutants in previously buried waste	Pollutant database from previously landfilled waste	MOI MNRE	MOPH LAOs	2566 – 2570	0.15	RTG
7.2 Generate uPOPs inventory data that reflect Thailand's contexts	7.2.1 Assemble full inventory for the main emission sources/activities as indicated by the Preliminary Inventory, and derive Thailand's specific uPOPs emission factors (Efs), e.g., ashes from biomass power plants, etc.	Inventory data and Thailand's specific Efs	MHESI MoEN MNRE	M-Industry I-EA-T LAOs EGAT PEA MEA.	2566 – 25708	10	RTG/GEF

Goal	Activity	Indicator	Implementing Body		Duration (B.E.)	Estimated Budget (MB)	Financial Sources
			Core	Supporting			
7.3 Apply BAT/BEP towards new uPOPs sources and adopt BEP guidelines for existing sources by 2027	7.3.1 Prepare and revise manuals/technical criteria/training programs related to BAT/BEP guidelines, by prioritizing activities that release the highest amounts of uPOPs	Manuals/technical criteria/training programs towards uPOPs reduction	MNRE M-Industry	MHESI NOB MOAC MOPH	2566 – 2570	10	RTG/GEF
	7.3.2 Organize BAT/BEP practical training for operators and relevant parties, giving priority to activities that release the highest amounts of uPOPs	- Number of organized trainings - Number of trainees	MNRE M-Industry NOB	MHESI MOPH LAOs	2566 – 2570	5	RTG/GEF
	7.3.3 Offer tax incentives and honorary awards to business operations/operators who adopt BAT/BEP to reduce or cease their POPs releases	Number of operations/operators who adopt BAT/BEP	M-Industry MOAC	MOF MHESI MOPH MNRE	2566 – 2570	10	RTG/GEF
					2565 - 2566	1.58	GEF
7.3.4 Specify BAT/BEP methods and measures for local administrative organizations towards reducing uPOPs from major sources (e.g., municipal waste incinerators, open burning) that are within their responsibility	- Management measures comparable to ISO 9000/14001 for relevant tasks - Manuals according to applicable emission source types	MNRE MHESI MoEN	NOB M-Industry LAOs	2564 – 2568	5	RTG/GEF	

3.4.8 Activity 8 Measures to reduce or eliminate releases from stockpiles and wastes (Article 6)

Goal	Activity	Indicator	Implementing Body		Duration (B.E.)	Estimated Budget (MB)	Financial Sources
			Core	Supporting			
8.1 Environmentally sound disposal of POPs-containing wastes by 2027	8.1.1 Verify and conduct pilot project on environmentally sound temporary storage and management of POPs-contaminated wastes using the guidelines developed under the Basel Convention	Data in Thailand's contexts	MNRE	M-Industry I-EA-T FTI	2566 – 2570	8	RTG
	8.1.2 Provide manuals/ guidelines/ technical criteria for temporary storage of POPs-containing wastes and environmentally sound management of POPs-contaminated wastes using the guidelines developed under the Basel Convention	Number of manuals/ guidelines/ technical criteria	MNRE	M-Industry I-EA-T MOE MOPH	2566 – 2570	40	RTG
8.2 Environmentally sound disposal of POPs by 2027	Please see activity: 3.4.2 (Management of POPs pesticides (Annex A, Part I))						
8.3 Environmentally sound disposal of end-of-life products containing BDEs by 2027	Please see activity: 3.4.4 (Management of HexaBDE, HeptaBDE (Annex A, Part IV), TetraBDE, PentaBDE (Annex A, Part V), HBB (Annex A, Part I), HBCD (Annex A, Part VII) and DecaBDE (Annex A, Part IX))						
8.4 Environmentally sound disposal of chemical waste containing PFOS, its salts, and by 2032	Please see activity: 3.4.5 (Management of PFOS, its salts and PFOSF (Annex B, Part III))						

3.4.9 Activity 9 Information exchange (Article 9)

Goal	Activity	Indicator	Implementing Body		Duration (B.E.)	Estimated Budget (MB)	Financial Sources
			Core	Supporting			
9.1 Annex-A POPs status update report	9.1.1 Report status on PCB-contaminated products to the secretariat every 5 years (Annex A, Part II, Paragraph (g))	Periodic report (every 5 years)	MNRE	MOAC M-Industry	On going	0.5	RTG
9.2 Annex-B POPs status update report	9.2.1 Report status on the use of PFOS-containing chemical products to the secretariat every 4 years (Annex A, Part III, Paragraph 3)	Periodic report (Every 4 years)	MNRE	M-Industry	On going	0.5	RTG
9.3 uPOPs reduction update report	9.3.1 Report uPOPs release reduction status to the secretariat every 5 years (Article 5, Paragraph a(V))	Periodic report (Every 5 years)	MNRE	M-Industry	On going	0.5	RTG
9.4 Full POPs inventory assessment report	9.4.1 Revise and update the 2017 Preliminary POPs Inventory Assessment Report	A full POPs Inventory Assessment Report for Thailand	MNRE	M-Industry MOAC FTI PEA MEA	On going	5	RTG/GEF

3.4.10 Activity 10 Identification of contaminated sites and, where feasible, remediation in an environmentally sound manner

Goal	Activity	Indicator	Implementing Body		Duration (B.E.)	Estimated Budget (MB)	Financial Sources
			Core	Supporting			
10.3 Identify of contaminated sites for POPs pesticides, POPs industrial chemicals and uPOPs are also addressed under specific measures to manage the corresponding POPs			Please see activity: 3.4.2 (Management of POPs pesticides (Annex A, Part I)) 3.4.3 (Management of PCBs, HCBD, PCNs, PeCB (Annex A, Part II) and other Legacy Industrial POPs) 3.4.4 (Activity 4 Management of HexaBDE, HeptaBDE (Annex A, Part IV), TetraBDE, PentaBDE (Annex A, Part V), HBB (Annex A, Part I), HBCD (Annex A, Part VII) and DecaBDE (Annex A, Part IX)) 3.4.5 (Management of PFOS, its salts and PFOSF (Annex B, Part III)) 3.4.7. (Measures to reduce or eliminate releases from unintentional production (Article 5)) 3.4.12 (Research, development and monitoring (Article 11))				
10.2 Develop multi-dimension online reporting system for pesticides that integrates spatial, temporal, and application mode information			Please see activity: 3.4.2 (Management of POPs pesticides (Annex A, Part I))				
10.3 Landfill management system			Please see activities: 3.4.7 (Measures to reduce or eliminate releases from unintentional production (Article 5)) & 3.4.12 (Research, development and monitoring (Article 11))				

3.4.11 Activity 11 Public information, awareness and education

Goal	Activity	Indicator	Implementing Body		Duration (B.E.)	Estimated Budget (MB)	Financial Sources
			Core	Supporting			
11.1 Continually strengthen public awareness on relevant POPs substances, focusing on new POPs, among citizens of all sectors through various channels and media	11.1.1 Strengthen awareness among the public, workers in operation sites or emission sources, operation owners, etc. on the rights for protection against exposure to hazardous chemicals, which may result from private sectors' failure to abide by relevant regulations or from ignorance of responsible government agencies	- Number of events per year - Number of participants per year	MOL M.Society	MNRE M-Industry MOAC MOPH FTI	2567 – 2568	10	RTG
	11.1.2 Responsible government agencies in charge of POPs make monitoring data open and available to the public according to the Official Information Act, B.E. 2540, and also analyze their data to generate knowledge and information towards policy-making and implementation	Data and knowledge made known to the public	MNRE M-Industry MOAC	MOPH MOL FTI I-EA-T LAOs	2566 – 2570	2	RTG
	11.1.3 Strengthen awareness and educate various target groups -- government agencies, business operators, the media, community leaders, children, women, underprivileged individuals, the elderly, etc., -- regarding all POPs substances, through various channels and media such as printed media, electronic media, meetings, seminars, exhibitions, and community information & learning networks	- Number of information distribution channels - Number of media outlet types - Number of target groups for awareness-raising	MNRE M-Industry MOAC MOPH M.Society MHESI MoEN	MOI MOL MOE Public Communication Private Enterprises FTI	2566 – 2570 2565 - 2566	10 5.18	RTG GEF
11.2 Strengthen awareness and knowledge on BDEs and their proper management for small & medium	11.2.1 Train/educate business operators and the general public about BDEs as well as technically proper and environmentally sound management of BDE-containing waste	- Number of trainings organized - Number of trainees	MNRE M-Industry MOPH	MOI MOE	2566 – 2570	1	RTG

Goal	Activity	Indicator	Implementing Body		Duration (B.E.)	Estimated Budget (MB)	Financial Sources
			Core	Supporting			
operators and all sectors of the population							
11.3 Strengthen awareness and knowledge on uPOPs and their proper management among farmers, small & medium operators, and all sectors of the population	11.3.1 Train/educate business operators and the general public about uPOPs substances as well as technically proper control of uPOPs releases	- Number of trainings organized - Number of trainees	MNRE MOAC MOPH	MOI M-Industry	2566 – 2570	1.5	RTG
	11.3.2 Organize practical trainings for local administrative organizations on BAT/BEP for main uPOPs sources	Trainings throughout the country by 2027 (in order of urgency)	MNRE	MOI M-Industry MHES	2566 – 2570	1.5	RTG
11.4 Upgrade Thailand's SC Focal Point's website by 2027	11.4.1 Upgrade Thailand's SC Focal Point's website, e.g., POPs database	Upgraded website for the SC Focal Point	MNRE	MOPH MOI M-Industry	2566 – 2570	2	RTG
11.5 Set up an online database that systematically gathers data from various government agencies	11.5.1 Set up a systematic online database for various data-holding government agencies that links data across the agencies and is easily accessible, and transparent, to allow for statistical analysis and POPs status evaluation	Readily accessible online database for POPs status evaluation	MNRE	M-Industry MOAC MOPH EGAT PEA I-EA-T MOI	2566 – 2570	10	RTG

Goal	Activity	Indicator	Implementing Body		Duration (B.E.)	Estimated Budget (MB)	Financial Sources
			Core	Supporting			
11.6 Follow and report POPs management status	11.6.1 Report the phasing out and the release reduction of POPs substances every year in PCD's annual Thailand State of Pollution Reports	POPs status data in PCD's annual Thailand State of Pollution Reports	MNRE		2566 – 2570	1.5	RTG
11.7 Include POPs in school and university curricula by 2027	11.7.1 Drive to include POPs and other pollutants in school and university curricula	Number of relevant curricula	MNRE MHES	MOE M-Industry MOAC MOPH FTI	2566 – 2570	10	RTG
11.8 Train and educate target groups by 2027	11.8.1 Organize trainings for local officials on municipal waste incinerator maintenance and operation according to standard operation procedures (SOPs)	Number of waste incinerators that meet their operational specifications	MNRE	M-Industry MOPH MOI	2566 – 2570	1.5	RTG
	11.8.2 Organize training for the relevant agencies on the management and disposal of POPs-containing wastes	Number of organized trainings	MNRE M-Industry	I-EA-T FTI M-Industry	2566 – 2570	2	RTG
11.9 Strengthen awareness and educate all sectors of the public by 2027	11.9.1 Prepare information media and drive for compulsory elementary level curriculum to strengthen awareness on hazards from the use of chemicals in general, and on personal protection and risk reduction related to daily uses of chemicals among the public	- Online media - Number of target groups	MHESI MOE	MNRE M-Industry MOAC MOPH	2566 – 2570	5	RTG

3.4.12 Activity 12 Research, development and monitoring (Article 11)

Goal	Activity	Indicator	Implementing Body		Duration (B.E.)	Estimated Budget (MB)	Financial Sources
			Core	Supporting			
12.1 Allocate additional budget for POPs-related research and development	12.1.1 Drive national research funding agencies to allocate funds for POPs monitoring in the environment, humans, and the food chains	- Allocated research funding -Number of additional POPs research personnel	TSRI NRCT	MNRE M-Industry MOAC MOPH MOL M.Society MHESI MOE	2566 – 2570	-	RTG
	12.1.2 Drive national research funding agencies in the country to allocate funds for alternative solutions to replace the use of POPs pesticides	- Allocated research funding -Number of additional POPs research personnel	TSRI NRCT ARDA	MNRE M-Industry MOAC MOPH MOL M.Society MOE	2566 - 2570	-	RTG
12.2 Enhance the capability of regional testing laboratories as well as private laboratories	12.2.1 Allocate additional personnel and equipment for POPs analysis in research organizations	Number of participating regional laboratories	MHESI MOPH MNRE	TSRI	2566 – 2570	40	RTG

Goal	Activity	Indicator	Implementing Body		Duration (B.E.)	Estimated Budget (MB)	Financial Sources
			Core	Supporting			
12.3 Develop Thailand's management and planning mechanisms for candidate POPs	12.3.1 Develop a generic protocol that will trigger domestic actions, leading to data gathering and transfer towards responsible agencies for their implementation planning and setting of relevant standard limits for candidate POPs, as soon as new candidate POPs are proposed to the SC by the POPs Reviewing Committee. (To be able to report to the secretariat within 2 years according to Article 7, Paragraph 1.)	A generic action-triggering protocol	MHESI	M-Industry MNRE FTI MOPH	2566 – 2570	10	RTG
12.4 Derive POPs Emission Factor	12.4.1 Study and derive country specific POPs emission factors for emission evaluation towards PRTR	POPs emission factors	MNRE M-Industry MOAC MHESI	TSRI MOPH	2567	10	RTG
12.5 Environment- and public health-friendly methods for the disposal of POPs-containing waste by 2027	12.5.1 Study the suitability and effectiveness of disposal methods for POPs-containing waste in Thailand (e.g., cement kilns, hazardous waste incinerators, other potential incinerators)	Options for the disposal of POPs-containing waste	MNRE MHESI	M-Industry I-EA-T FTI MOE NOB	2566 – 2570	5	RTG
12.6 Landfilled waste composition data	12.6.1 Study the composition and POPs contamination levels in landfilled municipal and hazardous wastes, and set up data recording systems	Database on waste compositions in landfills and their POPs contamination levels	MHESI	M-Industry MOI	2566 – 2570	10	RTG

Goal	Activity	Indicator	Implementing Body		Duration (B.E.)	Estimated Budget (MB)	Financial Sources
			Core	Supporting			
12.7 Generate spatial and temporal pesticide application data	12.7.1 Study towards creating a pesticide distribution model that is multi-dimensional (incorporating parameters such as pesticide types, temporal and spatial application data, geology and hydrology of surface water and groundwater, etc.) to predict risk areas/hotspots, and to analyze correlation between the model's predictions and potentially related illness data of local populations (starting with a pilot project for 2-3 relevant pesticides)	Pesticide distribution model that can predict the flows of target chemicals	MHESI MOPH MOAC	MOI DOLA MWA PWA DOA	2566 – 2570	15	RTG/GEF
12.8 Generate POPs pesticides residue data in former formulation and repackaging sites	12.8.1 Monitor and analyze the POPs pesticides residues in soil and groundwater in former formulation and repackaging sites	Information on POPs pesticides contamination in soil and groundwater	MHESI MNRE	MOAC MOI	2566 – 2570	10	RTG
12.9 Develop capability to identify legally permitted pesticides	12.9.1 Develop techniques to detect and identify legally permitted pesticides, especially candidate POPs pesticides and pesticides with high risk of smuggling	Pesticides fingerprinting techniques	MHESI MOAC MNRE		2565 – 2567	5	RTG
12.10 Monitor POPs industrial chemicals	12.10.1 Study the flow paths and quantities of chemicals throughout their life cycles (Material Flow Analysis) by conducting a pilot project for 1-3 high-impact target chemicals (under the project entitled “Application of industry-urban symbiosis and green chemistry for low emission and persistent organic pollutants free industrial development in Thailand”, in collaboration with UNIDO)	Material flow analysis data	MNRE	FTI	2564 – 2568	5	RTG/GEF
			M-Industry MHESI MOPH	MHESI MOE	2565 - 2566	3	GEF

Goal	Activity	Indicator	Implementing Body		Duration (B.E.)	Estimated Budget (MB)	Financial Sources
			Core	Supporting			
	12.10.2 Study to assess the status of use and contamination of Legacy POPs in open applications in Thailand, e.g anti-rust protective coatings, gaskets, sealants	Product information and quantification report	MHESI	MOT	2564 – 2568	5	RTG
	12.10.3 Study and revise Thailand's low POPs content limits for the definition of hazardous waste	Suggestion for appropriate low POPs content limits for Thailand's industrial waste	MHESI MNRE		2566 – 2570	10	RTG
12.11 Conduct survey to assess the quantities of POPs-containing products	12.11.1 Investigate domestic sources of Mirex utilization as industrial POPs	Report on the uses of Mirex in industrial applications in Thailand	MNRE MHESI	FTI I-EA-T M-Industry	2566 – 2570	4	RTG
	12.11.2 Study and research flame retardants in plastics and textiles to enable sorting and separation of materials that contain different types flame retardants from recycling routes	Sorting and separation methods for materials that contain different types of flame retardants	MNRE MHESI	MOPH MOI DOLA FTI I-EA-T M-Industry	2566 – 2570	4	RTG
12.12 Monitor contamination of all POPs substances from factories, business operation sites, and other sources	12.12.1 Gather soil and underground water contamination data for relevant POPs within factory perimeters (which operators must monitor and report according to M-Industry's notification) and submit to MNRE for inclusion into the annual report	Annual soil and groundwater contamination data report	M-Industry	FTI I-EA-T Private Company	2567 – 2570	10	RTG
	12.12.2 Analysis of soil and underground water contamination data by relevant data-holding government agencies	Analysis reports based on available soil and	MOAC MNRE		2566 – 2570	5	RTG

Goal	Activity	Indicator	Implementing Body		Duration (B.E.)	Estimated Budget (MB)	Financial Sources
			Core	Supporting			
		underground water contamination data					
	12.12.3 Study release and contamination status of uPOPs, industrial POPs, POPs derivatives, and POPs precursors in risk areas, for both current and historical activities, e.g., in textile and leather production and use (current), chlor-alkali plant (historical), ethylene dichloride plants (historical), and crematoria (current & historical), etc.	- Information on risk areas and their contamination - Proposed risk reduction/mitigation solutions	MHESI MNRE	FTI MOD	2566 – 2570	40	RTG
	12.12.4 Study dioxin standard threshold levels that are used to designate industrial waste as hazardous waste, according to M-Industry's Notification on Industrial Waste Disposal, B.E. 2548 (in accordance with the Basel Convention's levels)	Appropriate dioxin standard threshold levels for hazardous waste	MNRE MHESI		2566 – 2570	5	RTG
12.13 Promote research on monitoring and reduction of dioxin from waste and biomass burning, as well as the effects of organochlorine contamination	12.13.1 Develop uPOPs screening/indication methods as alternatives to the expensive direct PCDD/F measurements	Alternative uPOPs screening/indication methods	MNRE MHESI	MOAC MOPH MoEN	2566 – 2570	5	RTG
	12.13.2 Study alternatives to biomass open burning, e.g., for areas that practice multiple cultivation cycles per year. Example approaches include: agricultural waste management machineries that are accessible to the average farmers, and/or guidelines on methods to reduce uPOPs from open biomass burning	Number of alternative options	MOAC MHESI	MNRE DOLA MOPH M.Society	2566 – 2570	5	RTG

Goal	Activity	Indicator	Implementing Body		Duration (B.E.)	Estimated Budget (MB)	Financial Sources
			Core	Supporting			
12.14 Obtain impact evaluation method for accidental landfill fire	12.14.1 Study methods to evaluate uPOPs release from accidental municipal waste landfill fires	Evaluation methods	MHESI	MNRE MOI (DDPM)	2566 – 2570	10	RTG
12.15 Obtain suitable technology for electricity generation from various fuel types	12.15.1 Study the suitability of technology used to produce electricity from various fuel types, in terms of uPOPs formation and the management of uPOPs in ashes, in order to minimize risk of conflicts among different government measures and policies	Policy suggestions	MHESI	MNRE	2566 – 2570	15	RTG
12.16 Obtain suitable technology for management uPOPs from the scrap metal recycling industry	12.16.1 Study the suitability of technology used to reduce and management uPOPs form the scrap metal recycling industry	Policy suggestions	MHESI	MNRE	2565 – 2566	5.18	GEF

Goal	Activity	Indicator	Implementing Body		Duration (B.E.)	Estimated Budget (MB)	Financial Sources
			Core	Supporting			
12.17 Enhance enforcement efficiency of chemical regulations to cover industrial POPs substances and apply the regulations to domestic and imported products	12.17.1 Study and develop data formats (or reporting template) and systems to support operators' data declaration throughout supply chains (including sale volumes) for the purpose of tracking industrial POPs and other hazardous chemicals, which will benefit continual POPs risk management and monitoring efforts in humans, animals, plants, and environmental media according to local contexts	Data formats that are suitable for developing declaration systems along supply chains	MNRE MHESI	MOC MOF MNRE MOPH M-Industry	2566 – 2570	10	RTG

3.4.13 Activity 13 Technical assistance and financial resources and mechanisms (Article 12 and 13)

Goal	Activity	Indicator	Implementing Body		Duration (B.E.)	Estimated Budget (MB)	Financial Sources
			Core	Supporting			
13.1 Set up POPs management collaborations with international organizations and request GEF-7 and GEF-8 funding/support	13.1.1 Hold meetings/seminars to enhance information and capacity in obtaining GEF's support to operate and implement activities according to the SC	Number of meetings/seminars	MNRE	M-Industry MOAC MOPH FTI MHESI	2566 – 2570	0.50	RTG

3.4.14 Activity 14 Reporting (Article 15)

Goal	Activity	Indicator	Implementing Body		Duration (B.E.)	Estimated Budget (MB)	Financial Sources
			Core	Supporting			
14.1 Status update report for Annex-A POPs	14.1.1 Report status on PCB-contaminated products to the secretariat every 5 years (Annex A, Part II, Paragraph (g))	Periodic report (every 5 years) A report every 5 years	MNRE	MOAC M-Industry	2566 – 2570	1	RTG
14.2 Annex-B POPs status update report	14.2.1 Report status on the use of PFOS-containing chemical products to the secretariat every 4 years (Annex A, Part III, Paragraph 3)	Periodic report (every 4 years)	MNRE	M-Industry	2566 – 2570	1	RTG
14.3 uPOPs reduction status report	14.3.1 Report uPOPs release reduction status to the secretariat every 5 years (Article 5, Paragraph a(V))	Periodic report (every 5 years)	MNRE	M-Industry	2566 – 2570	1	RTG

3.4.15 Activity 15 Effectiveness evaluation

Goal	Activity	Indicator	Implementing Body		Duration (B.E.)	Estimated Budget (MB)	Financial Sources
			Core	Supporting			
15.1 Establish national POPs monitor by 2027	15.1.1 Set up national POPs monitoring plans	National POPs monitoring plans	MNRE	M-Industry MOAC MOPH MHESI I-EA-T FTI	2566 – 2570	1	RTG
	15.1.2 Conduct monitoring activities according to the national POPs monitoring plans	POPs monitoring data (for implementation evaluation)	MNRE	M-Industry MOAC MOPH MHESI I-EA-T FTI	Continuous -	As indicated in respective monitoring plan	RTG

3.4.16 Activity 16 Gender-related issues

Goal	Activity	Indicator	Implementing Body		Duration (B.E.)	Estimated Budget (MB)	Financial Sources
			Core	Supporting			
16.1 Set up POPs awareness-raising plans for women, children, youth, and elderly by 2027	16.1.1 Evaluate the risks and release campaigns and supporting measures to change the way biomass is used for cooking in household, restaurants, and food carts. Also, disseminate knowledge and raise awareness among the public, including women, men, and the LGBTQI group	Information on risks and related measures	MNRE M.Society MOL	MOF M-Industry MOE MOI MOPH	2566 – 2570	5	RTG
<i>Please see activities: 0 & Error! Reference source not found.</i> (Public information, awareness and education & Measures to reduce or eliminate releases from unintentional production (Article 5))							

3.5 Financial of Thailand's Updated National Implementation Plan under the Stockholm Convention on Persistent Organic Pollutants

Thailand's Updated National Implementation Plan under the Stockholm Convention on Persistent Organic Pollutants involves participation from the government, private organizations and civil society. There are 37 agencies, which consist of main and supporting organizations. The budget allocate to carry out 16 activity plans, totaling 704.9 Million baht, is as follows:

Activity	Estimated Budget (MB)
Activity 1: Institutional and regulatory strengthening measures.	51
Activity 2: Management of POPs pesticides.	38.8
Activity 3: Management of PCBs, HCBd, PCNs, PeCB and other Legacy Industrial POPs.	5
Activity 4: Management of HexaBDE, HeptaBDE, TetraBDE, PentaBDE, DecaBDE, HBB and HBCD.	30
Activity 5: Management of PFOS, its salts and PFOSF.	11
Activity 6: Register for specific exemptions.	2
Activity 7: Measures to reduce or eliminate releases from unintentional production.	193.7
Activity 8: Measures to reduce or eliminate releases from stockpiles and wastes.	48
Activity 9: Information exchange.	6.5
Activity 10: Identification of contaminated sites and, where feasible, remediation in an environmentally sound manner.	-
Activity 11: Public information, awareness and education.	63.2
Activity 12: Research, development and monitoring.	246.2
Activity 13: Technical assistance and financial resources and mechanisms.	0.5
Activity 14: Reporting.	3
Activity 15: Effectiveness evaluation.	1
Activity 16: Gender-related issues.	5
Total budget	704.9

Annexes

Annex 1. Government and key stakeholders for the implementation of action plans

ACFS	National Bureau of Agricultural Commodity and Food Standards
ARDA	Agricultural Research Development Agency (Public Organization)
BMA	Bangkok Metropolitan Administration
Customs	The Customs Department
DDPM	Department of Disaster Prevention and Mitigation, Ministry of Interior
DEDE	Department of Alternative Energy Development and Efficiency, Ministry of Energy
DEQP	Department of Environment Quality Promotion, Ministry of Natural Resources and Environment
DIW	Department of Industrial Works, Ministry of Industry
DLA	Department of Local Administration, Ministry of Interior
DOA	Department of Agriculture, Ministry of Agriculture and Cooperatives
DOH	Department of Health, Ministry of Public Health
EGAT	The Electricity Generating Authority of Thailand
FTI	The Federation of Thai Industries
I-EA-T	The Industrial Estate Authority of Thailand
LAOs	Local Administrative Organizations
MEA	The Metropolitan Electricity Authority
MHESI	Ministry of Higher Education, Science, Research and Innovation
M-Industry	Ministry of Industry
MNRE	Ministry of Natural Resources and Environment
MOAC	Ministry of Agriculture and Cooperatives
MOC	Ministry of Commerce
MOD	Ministry of Defence
MOE	Ministry of Education
MoEN	Ministry of Energy
MOF	Ministry of Finance
MOI	Ministry of Interior
MOL	Ministry of Labour
MOPH	Ministry of Public Health
MOT	Ministry of Transport
MSDHS	Ministry of Social Development and Human Security
MWA	The Metropolitan Waterworks Authority
NHCO	National Health Commission Office
NOB	National Office of Buddhism
NRCT	The National Research Council of Thailand
PEA	The Provincial Electricity Authority
PWA	The Provincial Waterworks Authority
TISI	Thai Industrial Standards Institute, Ministry of Industry
TSRI	Thailand Science Research and Innovation

Annex 2. List of workig Groups

The National Environment Board appointed Sub-committee on the Stockholm Convention with organization duties and powers as follows:

1. Sub-committee on the Stockholm Convention

1.1 Organization

- | | |
|--|------------------|
| 1) Mr. Jakkris Sivadechathep | Chairperson |
| 2) Director General of the Pollution Control Department
or representative | Vice-chairperson |
| 3) Secretary General of the Office of the National Economic
and Social Development Council or representative | Sub-committee |
| 4) Director General of the The Customs Department
or representative | Sub-committee |
| 5) Director General of the Department of Treaties and Legal Affairs
or representative | Sub-committee |
| 6) Director General of the Department of International Organizations
or representative | Sub-committee |
| 7) Director General of the Department of Agriculture
or representative | Sub-committee |
| 8) Director General of the Department of Environmental
Quality Promotion or representative | Sub-committee |
| 9) Director General of the Department of Foreign Trade
or representative | Sub-committee |
| 10) Director General of the Department of Local Administration
or representative | Sub-committee |
| 11) Director General of the Department of Health or representativ
or representative | Sub-committee |
| 12) Director General of the Department of Industrial Works
or representative | Sub-committee |
| 13) Secretary General of the Food and Drug Administration
or representative | Sub-committee |
| 14) Director of Foreign Affairs Division
Office of The Permanent Secretary for Ministry of Natural Resources
and Environment or representative | Sub-committee |
| 15) Governor of Bangkok or representative | Sub-committee |
| 16) Governor of the Industrial Estate Authority of Thailand
or representative | Sub-committee |
| 17) Chairman of the Federation of Thai Industries
or representative | Sub-committee |
| 18) Executive Director National Metal and Materials Technology Center
or representative | Sub-committee |
| 19) Ms. Chalongkwan Tangbanluekal | Sub-committee |
| 20) Ms. Suwanna Boontanon | Sub-committee |

- 21) Director of Waste and Hazardous Substances Management Division, Sub-committee, Subcommittee Pollution Control Department Secretary
- 22) Officer of Waste and Hazardous Substances Management Division, Sub-committee, Pollution Control Department

1.2 Duties and Powers

- 1) Consideration and opinions related to formulating policies, measures, and methods for managing persistent organic pollutants for implementing the Stockholm Convention.
- 2) Provides opinions and recommends persistent organic pollutants to be listed as chemicals in the Annex to the Convention for compliance the Stockholm Convention.
- 3) Consideration and recommendation on issues in meetings of the Conference of Parties, Persistent Organic Pollutants Review Committee meeting and other relevant meetings.
- 4) Appointment of working groups as appropriate to perform tasks as assigned.
- 5) Perform other duties as assigned by the National Environment Board.

2. Working Group under the project “Enabling Activities to Review and Update the National Implementation Plan for the Stockholm Convention on Persistent Organic Pollutants”

Sub-committee on the Stockholm Convention appointed Working Group under the project “Enabling Activities to Review and Update the National Implementation Plan for the Stockholm Convention on Persistent Organic Pollutants” are five groups as follows:

Working Group 1: The Working group on project supervision and coordination consists of 14 members from 12 organizations with the Pollution Control Department Director General or representative as the chairperson, as follows:

- 1) Pollution Control Department
- 2) Department of Agriculture
- 3) Department of Industrial Works
- 4) Office of the National Economic and Social Development Council
- 5) Department of Environmental Quality Promotion
- 6) The Customs Department
- 7) Department of Health
- 8) Thai Industrial Standards Institute
- 9) Industrial Estate Authority of Thailand
- 10) The Federation of Thai Industries
- 11) United Nations Industrial Development Organization (UNIDO), Regional Office in Thailand
- 12) National Metal and Materials Technology Center (MTEC), National Science and Technology Development Agency (NSTDA)

Working Group 2: Working group on the review and update of the national implementation plan and POPs pesticides inventory; consists of 12 members from 9 organizations with the DOA's Director General or representative as the chairperson, as follows:

- 1) Department of Agriculture
- 2) Department of Agricultural Extension
- 3) The Customs Department
- 4) Food and Drug Administration
- 5) Department of Health
- 6) National Farmers Council
- 7) United Nations Industrial Development Organization (UNIDO), Regional Office in Thailand
- 8) Pollution Control Department
- 9) National Metal and Materials Technology Center (MTEC),
National Science and Technology Development Agency (NSTDA)

Working Group 3: The Working group on the review and update of the national implementation plan and POPs industrial chemicals inventory; consists of 14 members from 11 organizations with the Department of Industrial Works Director General or representative as the chairperson, as follows:

- 1) Department of Industrial Works
- 2) Thai Industrial Standards Institute
- 3) The Customs Department
- 4) Industrial Estate Authority of Thailand
- 5) Electricity Generating Authority of Thailand
- 6) Electrical and Electronics Institute
- 7) The Federation of Thai Industries
- 8) Chemical Society of Thailand
- 9) United Nations Industrial Development Organization (UNIDO), Regional Office in Thailand
- 10) National Metal and Materials Technology Center (MTEC),
National Science and Technology Development Agency (NSTDA)
- 11) Pollution Control Department

Working Group 4: The Working group on the review and update of the national implementation plan and unintentional production POPs inventory consists of 13 members from 9 organizations with the Pollution Control Department Director General or representative as the chairperson, as follows:

- 1) Pollution Control Department
- 2) Department of Industrial Works
- 3) Department of Health
- 4) Department of Environmental Quality Promotion
- 5) Department of Industrial Promotion
- 6) Industrial Estate Authority of Thailand
- 7) The Federation of Thai Industries

- 8) United Nations Industrial Development Organization (UNIDO), Regional Office in Thailand
- 9) National Metal and Materials Technology Center (MTEC),
National Science and Technology Development Agency (NSTDA)

Working Group 5: The Working group on socio-economic implications of POPs uses consists of 12 members from 10 organizations with the Director of Office for the Promotion of Health Risk Controls, Thai Health Promotion Foundation or representative as the chairperson, as follows:

- 1) Promotion of Health Risk Controls, ThaiHealth Promotion Foundation
- 2) Food and Drug Administration
- 3) Budget Bureau
- 4) Department of Foreign Trade
- 5) Department of Labour Protection and Welfare
- 6) The Federation of Thai Industries
- 7) Faculty of Public Health, Mahidol University
- 8) National Metal and Materials Technology Center (MTEC),
National Science and Technology Development Agency (NSTDA)
- 9) United Nations Industrial Development Organization (UNIDO), Regional Office in Thailand
- 10) Pollution Control Department

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