





Initially, the name Mab Ta Put was associated with modern industries and investment figures. But not long after, Mab Ta Put and nearby industrial areas became associated with less positive aspects of development. This came as a result of several events, namely, a mercury leak from PTT’s gas pipeline and gas separation plant in 1989, a protest by villagers from Pluakdaeng, Mab Ta Put District against the construction of an industrial waste disposal plant by Genco Company in 1995, and Genco’s continued illegal dumping of hazardous waste. What really got people’s attention were the harmful odors and toxic fumes from Star Petroleum Refining, which made teachers and students at Mab Ta Put Phanpitayakarn School sick, to the point that in 1997 the school had to be relocated. Other deleterious environmental effects include oil spilling into the sea, chemical trucks overturning, waste water being released into natural water sources, and fires breaking out at plants, all of which continue to occur periodically.

### Air pollution reaches critical levels

At present, the greatest concern at Mab Ta Put is air pollution, especially from Volatile Organic Compounds (VOCs) and hazardous smoke from factories and power plants, namely, sulfur dioxide and nitrogen dioxide. From air samples taken during October–November 2005, the Pollution Control Department found more than 40 types of VOCs, with more than 20 types known to cause cancer.

What is frightening is that the concentration of **19 cancer-causing chemicals found in Mab Ta Put Industrial Estate was higher than the United States Environmental Protection Agency’s screening levels.** For example, acrolein was 693 times higher than the screening level, trichloroethylene 498 times higher, ethylene dichloride 256 times higher, chloroform 238 times higher, vinyl chloride 45 times higher, and benzene 31 times higher (details in Table 1). In addition, most people are unaware

**Table 1: Health effects from VOCs found in Mab Ta Put**

VOCs	Health Effects
Acrolein	<ul style="list-style-type: none"> <li>● Cancer-causing compound that destroys the liver and affects blood flow to the heart, lungs, eyes, and kidneys</li> </ul>
Trichloroethylene	<ul style="list-style-type: none"> <li>● Cancer-causing compound, exposure to which at high levels will cause eye and skin irritation and may damage gastrointestinal system, liver, and kidneys</li> <li>● Prolonged inhalation or absorption into the body will affect the central nervous system</li> </ul>
Ethylene Dichloride	<ul style="list-style-type: none"> <li>● Cancer-causing compound in animals, causes irritation to the respiratory system, headaches, nausea, and vomiting</li> <li>● Frequent and prolonged exposure will destroy the liver and kidneys and can cause jaundice, low blood pressure, skin inflammation, and anemia</li> </ul>
Chloroform	<ul style="list-style-type: none"> <li>● A likely cancer-causing compound and a cause of deformities in babies in the womb</li> <li>● Frequent or prolonged exposure to the gas may damage the central nervous system, heart, liver, and kidneys</li> <li>● Contact with the substance in liquid form will cause skin dryness, inflammation, and chronic irritation</li> </ul>
Vinyl Chloride	<ul style="list-style-type: none"> <li>● Cancer-causing compound that affects the growth of babies in the womb</li> </ul>
Benzene	<ul style="list-style-type: none"> <li>● Cancer-causing compound that causes lymph node cancer, lung cancer, bladder cancer, and blood cancer</li> <li>● Causes irritation to the respiratory system that affects the central nervous system and causes headaches and vomiting</li> <li>● Exposure to benzene at high concentration levels may affect the reproductive system</li> <li>● Causes abnormalities of the white blood cells, destroys blood cells, affects the immune system, and causes anemia as it destroys bone marrow, which is responsible for producing blood cells</li> <li>● Prolonged exposure will cause rashes and skin dryness/inflammation as well as affecting nerve endings and the spinal cord, causing headaches and memory loss</li> </ul>

Source : Decharut Sukkumnoed, Suphakij Nuntavorakarn and Wipawa Chuenchit, 2007. And Kesa Nimrahong, 2007.

that each year factories in Mab Ta Put use approximately 610,000 tons of vinyl chloride, more than 600,000 tons of benzene, and more than 250,000 tons of ethylene dichloride.

Meanwhile, data on actual emission from factories indicate that, at certain times, concentrations of sulfur dioxide and nitrogen dioxide are higher than air quality standards allow. Five or six power plants release 80 percent of the total sulfur dioxide from all factories. The worse case is BLCP's coal-fired power plant, which emits 1,000 grams of sulfur dioxide per second, equivalent to half of the total sulfur dioxide emission in Mab Ta Put.

BLCP's coal-fired power plant also emits the greatest amount of nitrogen dioxide, at a rate of approximately 680 grams per second, accounting for one-third of the total nitrogen dioxide emission in Mab Ta Put. The second-largest nitrogen dioxide polluter is the natural gas-fired power plant of the Electricity Generating Public Company Ltd. (EGAT), which emits 458 grams of nitrogen dioxide per second, equivalent to 21 percent of the total nitrogen dioxide emission in Mab Ta Put.

Fumes from burning not only create respiratory problems for the villagers but also affect nearby communities in the form of acid rain. A farmer who has lived in Rayong all his life has observed, "Mango and lychee trees have flowers that sprout, but no fruit. The flowers of marian plum trees become black only after 3 days. When it rains, even though only a little bit, the leaves of plants like basil are burnt black like they've been scorched with hot water."

In addition, there is pollution in the form of fly ash. Villagers living around Mab Ta Put believe that this is a result of using coal to power the industries in the area.

## Water quality in serious threat, toxic waste everywhere

The second environmental problem in terms of severity is water pollution. Though Mab Ta Put Industrial Estate has a water treatment system, the quality of natural water sources, both surface water and coastal water, has been significantly defiled. Monitoring of surface water quality by the Pollution Control Department has shown that the amounts of BOD and heavy metals such as copper, manganese, nickel, and arsenic were higher than standard levels.

Dr. Arpa Wangkiat from Rangsit University has studied heavy metal contamination in water sources of 25 communities in Mab Ta Put. Analysis of 77 water samples from shallow well ponds and artesian wells on 26-27 November 26-27, 2005 and February 4-5, 2006 show that heavy metal contamination was higher than standard levels (Table 2).

Acid rain and wells that have been contaminated with heavy metals send a warning signal that natural water sources in Mab Ta Put are no longer suitable for consumption. Penchom Sae Tang, the Coordinator of the Campaign for the Alternative Industry Network, has noted that, "Water is a basic necessity for living. The fact that 25 communities in Mab Ta Put have to buy drinking water and do not have pipe water reflects unfairness in society."

Heavy metal contamination in fresh water sources inevitably affects the quality of coastal water, which in turn affects sea creatures, creating the problem of accumulation of heavy metal in benthos, shellfish, and fish and plankton boom.

**Table 2: Amount of heavy metal in water samples from Mab Ta Put communities, Muang District, Rayong province**

Type of metal	No. of samples with heavy metal contamination above standard	Amount (Milligram/Liter)				Times over average (calculated from highest contamination value)
		Standard value*	Contamination mean	Highest contamination value	Lowest contamination value	
Cadmium	65	0.005	0.023	0.030	0.0030	6
Iron	40	0.5	2.969	75.717	0.0139	151
Manganese	29	0.3	0.610	10.301	0.0050	34
Lead	28	0.05	0.108	2.329	0.0007	47
Zinc	1	5	0.762	49.237	0.0009	10

**Note :** \* Standard value is water quality standard used for consumption in rural areas recommended by the Committee Overseeing Clean Fresh Water Project in Rural Areas Throughout Thailand, 1988.

Toxic waste is another form of pollution that cannot be overlooked. Mab Ta Put Industrial Estate creates more than 22,000 tons of hazardous solid waste per month. This problem is worsening as there are only a limited number of waste disposal sites in Mab Ta Put, and correct disposal of hazardous waste is very costly. Furthermore, insufficient control of dumping means that illegal industrial waste is dumped in public areas, both in communities surrounding Mab Ta Put and areas further away, such as Sri Racha District, Chonburi province.

Thus, **Mab Ta Put is the most hazardous industrial pollution area in Thailand.** Even so, Dr. Samarn Thangtongtawi, Deputy Governor (Special Affairs) of the Industrial Estate Authority of Thailand has asserted that "Mab Ta Put has never had water pollution problems. As for air pollution, not even once have measurements been over the standard level. I think the air in Mab Ta Put is cleaner than in Bangkok."

#### **Besieged by cancer, quality of life under attack**

Huge amounts of money from industrial development have boosted Rayong's GDP per capita to rank as the nation's highest (in 2007), at 850,253 baht, approximately 8 times higher than the nation's average of 109,440 baht. But the quality of life of the people of Rayong is declining. Both the environment and people's health have suffered severely.

Studies of the incidence of cancer during 2001-2003 state that cancer cases have increased 1-2 times since the 1997-2000 study. Statistics from the Muang District area show that most of the people with cancer had lung cancer, followed by liver cancer, esophageal cancer, bladder cancer, and leukemia.

Dr. Petcharin Sriwattanakul, Advisor of the National Cancer Institute who conducted the study, acknowledged that "cancer has many causes - food, genetics, and health behavior. But the environment and air pollution are also important factors contributing to increased illness. Volatile organic compounds and chemicals from industrial factories put Rayong people at higher risk than those living in other areas."

In addition to cancer, industrialization has brought increased birth defects and deformities for Rayong. **Cases of chromosome irregularities have increased more than threefold from 1997 to 2005. These abnormalities are related to exposure to VOCs.**

In addition, sexually transmitted diseases in Rayong are on the rise. The rate of new AIDS cases is 5 times higher

than the national average. The number of gonorrhoea cases is the third highest in the country and 4 times higher than the national average. Furthermore, the number of mental patients is increasing and **the suicide rate in Rayong is 72.17 per 100,000, the highest in the country** and 11 times higher than the national average.



#### **Treatment for Mab Ta Put: Continued care or no treatment?**

Industrial pollution has prompted the Ministry of Natural Resources and Environment to propose that the National Environment Board designate Mab Ta Put District as a special pollution control area in the hope that this would lead to regulations to control the problems that are becoming even more severe.

In a special meeting of the National Environment Board on January 11, 2007, two subcommittees were appointed in response to the severity of the problems. Their task was to study the relation between people's health and the amount of VOCs released from Mab Ta Put Industrial Estate. The subcommittees would also set a safe VOC standard, a work plan, a timeline for completion of the assessment, an evaluation system, and specific measures to reduce VOCs. It was agreed that if the targets were not achieved within one year, the National Environment Board would designate Mab Ta Put as a special pollution control area.

But the government's response was completely different from what the villagers wanted, namely, for the government to quickly designate Mab Ta Put as a special pollution control area without having to wait for the study results, given the immediacy of their ongoing health problems.

In early February 2007, Mr. Kosit Panpiemrat, Deputy Prime Minister at that time, announced the halt of 10

new investment projects in and around Mab Ta Put Industrial Estate that were waiting for the approval of their Environmental Impact Assessment report as well as the delay of the Phase 3 Petrochemical Industry Expansion Project for an indefinite period.

At the end of February, the National Environment Board set the following standards for 9 types of VOCs :

- 1) Benzene must not be over 1.7  $\mu\text{g}/\text{m}^3$
- 2) Vinyl Chloride must not be over 10  $\mu\text{g}/\text{m}^3$
- 3) Dichloroethane must not be over 0.4  $\mu\text{g}/\text{m}^3$
- 4) Trichloroethylene must not be over 23  $\mu\text{g}/\text{m}^3$
- 5) Dichloromethane must not be over 22  $\mu\text{g}/\text{m}^3$
- 6) Dichloropropane must not be over 4  $\mu\text{g}/\text{m}^3$
- 7) Tetrachloroethylene must not be over 200  $\mu\text{g}/\text{m}^3$
- 8) Chloroform must not be over 0.43  $\mu\text{g}/\text{m}^3$
- 9) Butadiene must not be over 0.33  $\mu\text{g}/\text{m}^3$

Rayong's pollution reduction and elimination plan for 2007-2011 was approved with a budget of 22.772 billion baht. The first lump sum received was 9.834 billion baht, of which 1.033 billion baht was from the government, 6.222 billion baht from the private sector, and 80 million baht from the Industrial Estate Authority of Thailand.

However, in less than one year, on May 23, 2007, General Surayud Chulanont, Prime Minister at that time, visited Mab Ta Put Industrial Estate and declared, "Rayong Province will not be declared a special pollution control area because there may be more negative consequences than benefits." He also said that pollution had fallen to levels lower than the target and that, therefore, new projects could be approved for investment, but that pollution reduction must continue until 2011. A few days later, the National Environment Board released a resolution similar to the Prime Minister's statement, greatly disappointing the Rayong people who were waiting for a serious and concrete solution to the problem.

With no hope from the government, more than 5,000 Rayong people gathered on Sukhumvit Road on September 4, 2007 to protest against IRCP Public Company Limited's coal-fired power plant bidding. The protest and roadblock ended the following day when the Ministry of Energy confirmed that the project had not yet been approved and the Rayong Governor volunteered to communicate the villagers' proposal to IRCP's management.

Most recently, the government has moved ahead with the Phase 3 petrochemical expansion, approving 12 new

projects to be constructed in the area as well approving construction of Glow Company's coal-fired power plant.

At the end of 2007, Supat Wangwongwatana, Director-General of the Pollution Control Department, said that pollution control in Mab Ta Put had progressed a lot. The VOC concentration levels in the atmosphere had clearly fallen. He claimed that sulfur dioxide and nitrogen dioxide levels would fall in 2008 following the pollution emission conditions that state that new projects or expansion projects can only emit pollution not over 80 percent of the amount of pollution reduced. He further asserted that the pollution problem in Mab Ta Put would improve within three years.

Suthi Atchasai, coordinator of the Eastern People's Network, had opposing views. "In the past year, reduction of pollution in Mab Ta Put has made no progress. Pollution has not been reduced as the government agencies have announced. Villagers are still at risk of exposure to VOCs. The subcommittees have no clear answers. The Pollution Control Department announced that sulfur dioxide and nitrogen dioxide emitted from factories has been reduced by 60-80 percent. But in reality, there are still pungent odors at night."

The only hope left for villagers is the decision from the Rayong Administrative Court on the complaint filed on October 1, 2007 against the National Environment Board for failing to declare Mab Ta Put a pollution control area.

**Mab Ta Put today provides an important lesson regarding pursuing economic development through industrialization, as if it were the only choice for the country's development. It was never examined whether the prosperity that was hoped for at the start of the project was worth the local people's health that was sacrificed in return and whether the locals would gain much from the impressive economic growth figures. The locals never had a say in this development direction that was chosen. What is saddest is that Mab Ta Put industrial sector's pulse of growth today has been gained at the expense of the health and well being of the people in Rayong.**

