

General introduction on pollution status of Thailand

- I) **Surface Water:** The surface water quality was monitored in 48 major rivers and 4 standing surface water resources (Kwan Phayao, Bueng Boraphet, Nong Han and Songkhla Lake). The water quality was evaluated by comparing to the surface water quality standards. It was found that water quality in the level of good, fair and deteriorated conditions, representing 31%, 36% and 33% respectively. When comparing water quality during 2007 - 2009, there was an improvement in the overall water quality. This was determined by a continuous increase in the good-level water quality. When comparing water quality in during 2008 - 2009, it was found that there were 11 water resources (most of which were in the eastern region) whose water quality was lifted to the good level in 2009 from a fair level in 2008. Meanwhile, there were 8 water resources (most of which were in the north eastern region) whose water quality deteriorated to a deteriorated condition in 2009 from a fair condition in 2008. This was due to many factors such as rainfall level and flooding. However, in 2008 and 2009, no water resources with highly deteriorated condition were found.

- II) **Groundwater:** The groundwater quality in general was within the consumption standard under the Groundwater Act B.E.2520 (1977). Groundwater by nature is located in the pore spaces and fractures in rock and sediment. Therefore, some minerals can be found dissolved in the groundwater in a relatively, yet naturally, high level such as iron and manganese. In addition, certain areas have specific geological features. For instance, hot spring areas may contain special minerals such as fluoride which can often be found in the northern region. Saline groundwater problem also can be found in, for instance, the northeastern region, which is rich in rock salt sources, and coastal areas. High water hardness is often found in groundwater that accumulates in limestone including Saraburi and Ratchaburi. There are other causes for the deterioration problem of groundwater that tend to become more severe and frequent at present. These causes include, for example, improper burying of waste, illegal dumping, mining and agriculture.

- III) **Coastal Water:** The coastal marine water quality inspection throughout the country showed that the water qualities were in the level of excellent, good, fair, deteriorated and highly deteriorated, representing 5%, 51%, 34%, 5% and 5% respectively. When comparing water quality during 2007 - 2009, the result showed that the overall water quality were deteriorated, particularly at the estuaries of 4 major rivers (Chao Phraya, Tha Chin, Mae Klong and Bang Pakong) in the inner Gulf of Thailand due to waste from the main river. The parameters indicating the deteriorated to highly deteriorated conditions of water quality were Total Coliform Bacteria (TCB), Fecal Coliform Bacteria (FCB, Enterococci Bacteria, nutrients, Dissolved Oxygen (DO) and floating oil and grease. Most of them were found with high level around the mouths of rivers, tourist attractions and community areas.

- IV) Tourist Beach Environmental Quality: Pollution Control Department has carried out the Star Beach Project since 2002 in order to create collaboration from related agencies in looking after and monitoring the environmental quality of over 500 beaches across the country. The agencies overseeing beaches make nominations for participation and improve the quality of beach environment in collaboration with local communities in accordance with four evaluation criteria which are environmental pollution quality, state and richness of nature, environmental management and tourism management. In 2009, the number of agencies and beaches participating in the Project rose to 156 and 229 respectively. The survey on the beach environmental quality revealed that there were 24 two-star beaches, 143 three-star beaches, 56 four-star beaches and 6 five-star beaches which were Ao Kah Beach (Wua Ta Lup Island), Sam Sao Beach (Sam Sao Island), Surat Thani, Koh Rok Beach, Bile Beach (Hong Island), Krabi, Koh Lidi Beach (Lidi Island), Satun and Tai Mueng Beach, Phang Nga.
- V) Air quality: The air quality monitoring data showed that particulate matters sized smaller than 10 microns or particulate matter (PM10) in 24-hour average was still a major problem as in 2008. Na Phralarn Subdistrict in Saraburi Province is remaining the worst problem area. Particulate matters originated from vehicles, industry, constructions and open burning. Following this problem was the Ozone (O₃) which was found to exceed the standard in many areas such as Bangkok and vicinity areas, Chiang Mai and Ayudhya. The total suspended particles (TSP) exceeded the standard on some Bangkok's roadsides while other pollutants including sulfur dioxide (SO₂), nitrogendioxide (NO₂) and carbonmonoxide (CO) remained within the standards.
- VI) Volatile organic compounds (VOCs) situation: The monitoring of volatile organic compounds in the carbonyl group and other VOCs was conducted in Bangkok and vicinity areas, Rayong, Chiang Mai, Khon Kaen and Songkhla. It was found that in Bangkok and its vicinity, Rayong and Chiang Mai, the 24-hour average of carbonyl compounds in roadside areas was higher than general areas. In Khon Kaen and Songkhla, the results showed that the 24-hour average of carbonyl compounds was within the monitoring limit. Additionally, the monitoring results of other VOCs exhibited that the amount of Benzene occasionally exceeded the standard.
- VII) Acid Deposition Situation in Thailand: The monitoring of the acidity-alkalinity of rainwater in 7 provinces, which were Bangkok, Pathum Thani, Kanchanaburi, Chiang Mai, Nakhon Ratchasima, Chonburi and Songkhla, revealed that the average annual acidity-alkalinity (pH) values of rainwater ranged from 4.34 - 5.92 (data from January-September 2009). The area with the highest average acidity value was found in Chonburi at the value of 4.34. This was possibly because the monitoring stations were located in Sri Racha district of Chonburi, which was close to industrial areas where major rain-acidifying pollutants were emitted. These pollutants included

sulfurdioxide and nitrogenoxide. Pollutions that spread from nearby areas as well caused the acidity value in Chonburi to be higher than other monitoring stations.

- VIII) States of Noise Level: Having monitored the noise level situation in various roadsides and general areas, it was found that most roadside areas had a noise level exceeding the standard. Bangkok and vicinity areas had the 24-hour average noise levels (Leq) at roadsides in the range of 62.0 - 84.8 dBA with an annual average level of 69.6 dBA (a decline by 0.4 dBA from the previous year). Areas with noise levels exceeding the standard (70 dBA) everyday were Lad Phrao road, Tri Petch road and every temporary noise monitoring station which had the 24-hour average noise level (Leq) in the range of 69.3 – 83.1 dBA. Meanwhile, in general areas, noise levels exceeded the standard in certain areas with levels ranging from 48.9 - 83.9 dBA and an average annual level of 59.3 dBA close to that of the previous year (average level was 59.4 dBA in 2008). In provincial areas, the 24-hour average noise levels (Leq) at roadsides were in the range of 54.0 - 76.6 dBA with an average annual level of 63.0 dBA (an increase by 0.3 dBA from the previous year). The problem area was the provincial police station, Na Pralarn, Chalerm Pra Kiat district, Saraburi. In general areas, the 24-hour average noise levels (Leq) were in the range of 43.9-73.8 dBA with an average annual level of 57.0 dBA (a decline by 0.8 dBA from the previous year)
- IX) Solid Waste: In 2009, there were 15.11 million tons of municipal waste generated throughout the country or 41,410 tons/day (not excluding waste prior to disposal). Bangkok generated about 8,834 tons/day (21%). Municipalities and Pattaya generated about 16,368 tons/day (40%) and Subdistrict Administrative Organizations generated about 16,208 tons/day (39%). When compared with the previous year, the amount of waste increased by 0.8%. The amount of waste in municipal areas rose by up to 9.74%. Meanwhile, there was a drop of waste by 6.68% in the areas outside municipalities due to the raising of 378 Subdistrict Administrative Organizations status to municipalities. Approximately 16,358 tons of waste/day or 40% of the country's total waste was properly management, up by 2% from 2008.
- X) Waste Utilization: In 2009, approximately 3.86 million tons of waste or 26% of the total waste generated in the country were utilized. Of the total utilized amount, about 3.12 million tons (81%) were recyclable waste, e.g. broken glasses, paper, steel and aluminum, and had been reused and recycled. The remaining 0.63 million tons (16%) of organic waste had been fermented to produce organic fertilizer, bio-fertilizer and biogas. About 0.128 million tons (3%) were used to generate electricity and alternative energy. For the utilization of recycled materials in the industrial sector, there were approximately 12.09 million tons of recyclable industrial waste including glass, paper, plastic, steel, aluminum and rubber. Of those, about 8.06 million tons or 67% had been utilized by recycling/reusing as well as using them as fuel.

- XI) **Hazardous Waste:** In 2009, there were approximately 3.07 million tons of hazardous waste throughout the country (a decline of 2% from 2008). Of the total, 77% or 2.37 million tons were generated from the industrial sector and 23% or 0.70 million tons were from the household sector (including waste from electrical and electronic products and infectious waste). The area that generated the highest amount of hazardous waste was the eastern region and Bangkok and vicinity areas accounting for over 70% of the total hazardous waste.
- XII) **Hazardous Substances:** In 2009, the total volume of chemical imports to Thailand combined with domestic production was about 39.64 million tons. Domestic production accounted for 61% or 24.10 million tons which were done by plants number 42 (1) whose operations relating to chemicals, chemical substances or hazardous articles. Another 39% or 15.54 million tons were made up by imported organic chemicals of 4.87 million tons and imported inorganic chemicals of 10.67 million tons. Thailand's import volume of chemicals increased by nearly three times or by 10.19 million tons from 2008. Of the total increased volume, organic chemicals contributed 2.82 million tons and inorganic chemicals made up 7.37 million tons. According to the Bureau of Epidemiology, Department of Disease Control, there were 1,926 patients exposed to chemical toxic in 2009 (increasing by 58 cases or 3% from 2008). These patients can be divided into 277 patients exposed to industrial hazardous substances and 1,649 patients exposed to toxic from pesticides.
- XIII) **Environmental Inspection and Law Enforcement:** In 2009, the monitoring of pollution sources was conducted in 4 river basins which were Chao Phraya River Basin, Bang Pakong River Basin, Tha Chin River Basin and Lamtakong River Basin. The monitoring was carried out on wastewater drainage from 18 pollution sources in the industrial zones and on water drainage from swine farming in 303 areas in Pra Du Temple and Branch Canals and other areas in Ratchaburi. Pollution drainage from stone grinding mills and stone mining in 64 areas across the country was inspected. As well, the monitoring was conducted on 8,932 vehicles in collaboration with the Royal Thai Police to detect pollution-emitting vehicles that exceeded the standard in Bangkok, Nonthaburi, Samut Prakan and Nakhon Ratchasima.
- XIV) **Pollution Problem Complaints:** Information on complaints regarding environmental problems were collected from government agencies such as Bangkok, Department of Industrial Works, Pollution Control Department, the Shared Service Center under the Ministry of Natural Resources and Environment, Damrong Dharma Center under Ministry of Interior and the Public Service Center under Prime Minister's Office. In 2009, 8,784 complaints were reported with Bangkok receiving the most complaints. Pollution problems receiving the most complaints were noise/vibration, making up 32%, followed by foul odor at 25% sticides.