

Monitoring the impacts of Ming Dih Chemical Plant Explosion on groundwater and surface water in Samut Prakan province, Thailand.

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ABSTRACT

The Ming Dih Chemical factory is located in Bang Phli district, Samut Prakan Province. The main product of this factory is plastic resin, particularly expandable polystyrene (EPS) resins. On 5 July, 2021, the factory was exploded causing widespread damage to nearby communities and raising people worried about the contamination to groundwater. The Department of Groundwater Resources expedited the operation of surveillance within 12 km radiant to monitoring the impacts on groundwater and surface water.

Regarding groundwater quality, the Department of Groundwater Resources monitored the VOCs contamination, especially styrene monomer in groundwater used for consumption within 12 km radiant of the explosion site, determined the guidelines, and notified the public for groundwater use. Groundwater samplings were collected from 26 observation wells and 4 private wells for three times. The laboratory results showed that VOCs is not detected. However, the VOCs contaminants were detected in the surface water. For the first analysis (7-13 July 2021), benzene and Ethylbenzene 4.4 µg/l, Styrene 176-19,210 µg/l, toluene 1.9-2.7 µg/l, xylene 6.2-8.1 µg/l were detected. For the second monitoring (3-7 August 2021), benzene 1.30-0.42 µg/l, Ethylbenzene 428-475 µg/l, Styrene 0.34-12,112 µg/l, toluene 1.5 µg/l, xylene 1,396-1,499 µg/l were detected. The last analysis (23-27 August 2021), benzene 1.9 µg/l, Ethylbenzene 1.5-7,417 µg/l, Styrene 0.33-1,098 µg/l, toluene 1.4 µg/l and xylene 2.5-19,512 µg/l were detected. The results of the 3 surface water quality analyzes showed that the surface water samples were exposed to the air which makes the amount of VOCs decreased. And during that period there was also rain; therefore, the VOCs were decreased. The surface water that was not exposed to the air also had high ethylbenzene and styrene. (Standards of surface water quality (1992) is undefined about VOCs therefore compared with standards of groundwater quality (1992)). However, the surface water quality (canal and the pond) nearby the factory within 12 km radiant not detected VOCs substances, meaning that the surface water supply remained safe for consumption.

When considering the above-mentioned inspection results together with the hydrogeological characteristics, Samut Prakan Province is located in the estuaries which has marine clay on the top layer deeper than 20 meters. The marine clay or Bangkok Clay is composed of grey and greenish-grey clay and silt with no mottle. The clay has the ability to prevent seepage into the groundwater flow or slower the flow and absorb the contaminants. Styrene is clear, colorless liquid with specific odor. It is insoluble and lighter than water, so it evaporates into the air rather than into the soil. Thus, groundwater in the exploding site was safe for local consumption.

Keywords: Groundwater monitoring, Ming Dih