Study on Occurrence of Acid Mine Drainage Inner Part of Dumping Site at KPC Coal Mine, Indonesia

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Outline

Background

- Coal Production in Indonesia
- Acid Mine Drainage

Experiment

- Sample Analysis
- Field Investigation
- Leaching Test

Summary

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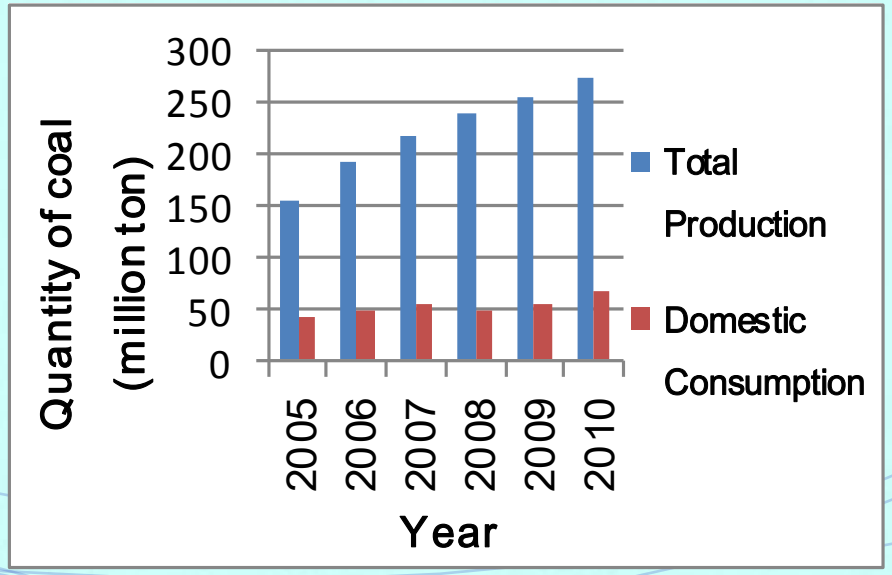
Location of Indonesia

Google.map



Change of Coal Production and Consumption in Indonesia

Acid Mine Drainage

$FeS_2 + 15/4O_2 + 7/2H_2O$

$\rightarrow Fe(OH)_3 + 2SO_4^{2-} + 4H^+$

As^{3+}

Zn^{2+}

Cr^{2+}

Bad Effect to

- Ecosystem
- Human body

Location of KPC coal mine Google.map

KPC Coal Mine

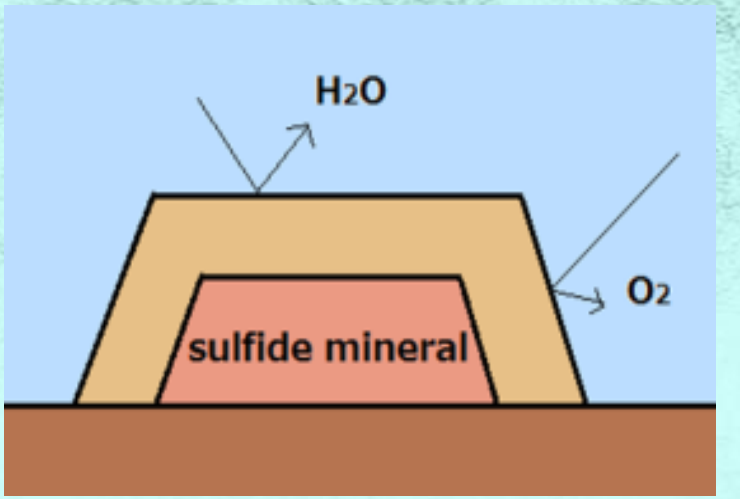
Operation: 1991~

Annual Production: 40 M ton / year (2010)

Truck and Shovel

Grade: 6500~7500 kcal/kg

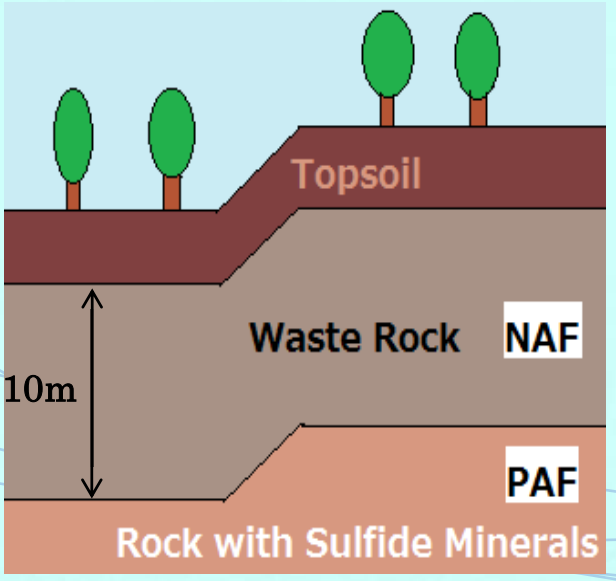
Cover Layering System



Cover layer can cut off O_2 and H_2O supply to sulfide minerals.

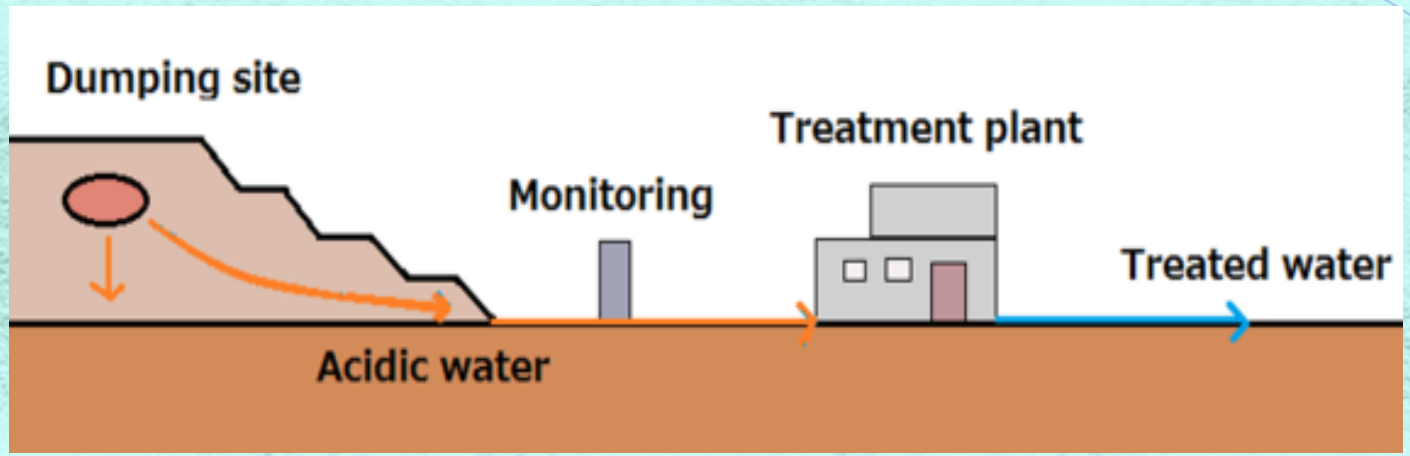
Low permeability materials are used for cover layer.

Cover layering system in KPC coal mine



PAF: Potentially Acid Forming

NAF: Non Acid Forming



Long-Term Treatment

High Cost

It is not clear that the cover layering system works or not.

To study about acidic water generation inside of dumping site

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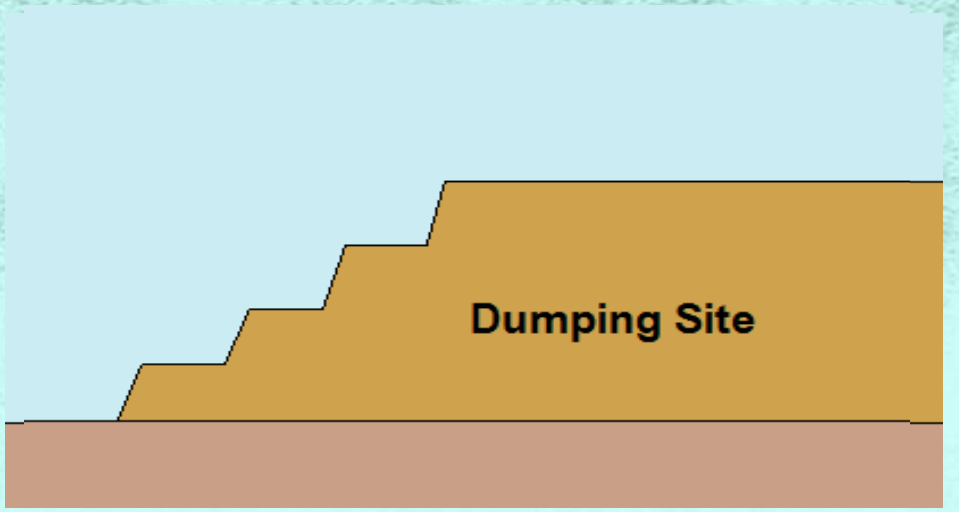
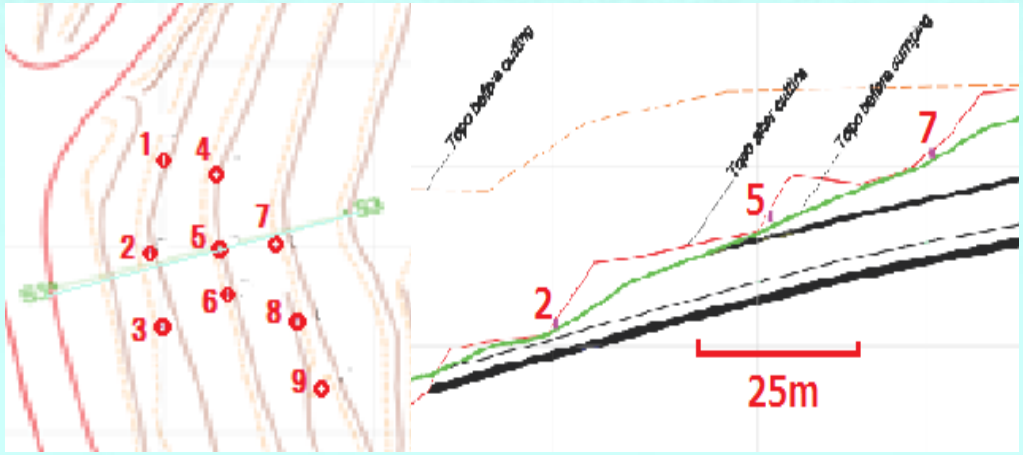
Sample Analysis





Sampling points

Grain Size Test

Chemical Analysis

Sample Analysis

Result of grain-size distribution analysis

	unwashed	washed	USCS classification
	< 4.75mm (%)		
1	35.8	72.9	CL Well Graded
2	37.7	89.5	CL Well Graded
3	32.8	89.1	CL Well Graded
4	28.6	72.1	CL Well Graded
5	33.5	68.3	CL Well Graded
6	25.3	52.8	CL Well Graded
7	29.9	81.5	CL Well Graded
8	30.6	92.3	CL Well Graded
9	25.4	79.0	CL Well Graded

Result of paste pH, EC (mS/cm), and ABA test

	Paste pH	Paste EC	NAPP
1	6.06	0.99	5.00
2	4.44	1.07	36.00
3	6.47	0.71	- 4.00
4	6.29	0.58	12.00
5	2.50	3.20	102.00
6	5.46	1.03	33.00
7	6.93	0.49	-19.00
8	2.36	3.40	119.00
9	2.27	4.70	122.00

The layer can be easily compacted and the permeability decreases in the layer.

Acidic water may still be generated in some layers inside of the dumping site.

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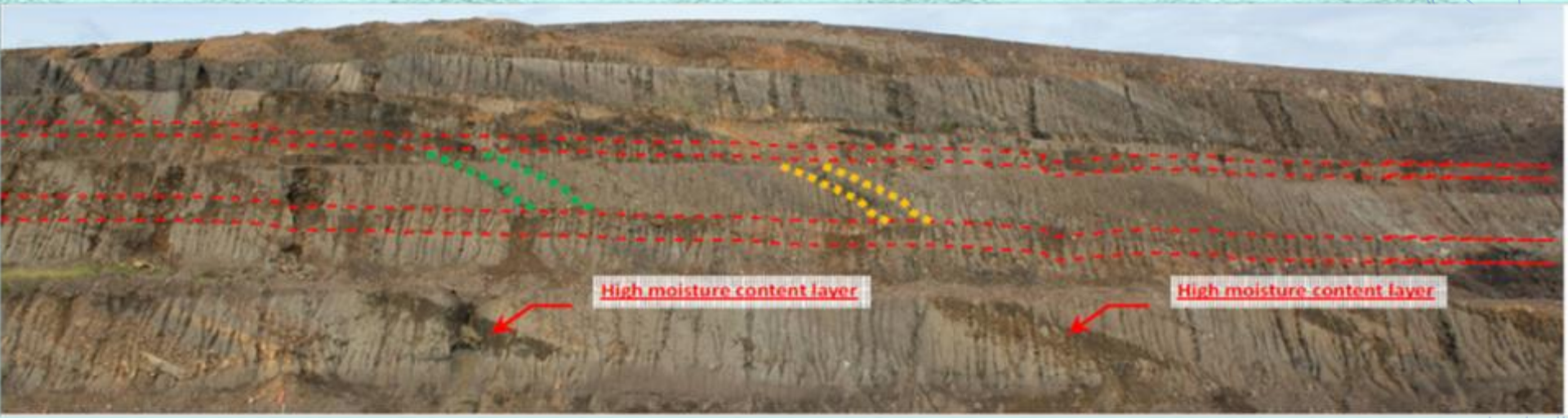
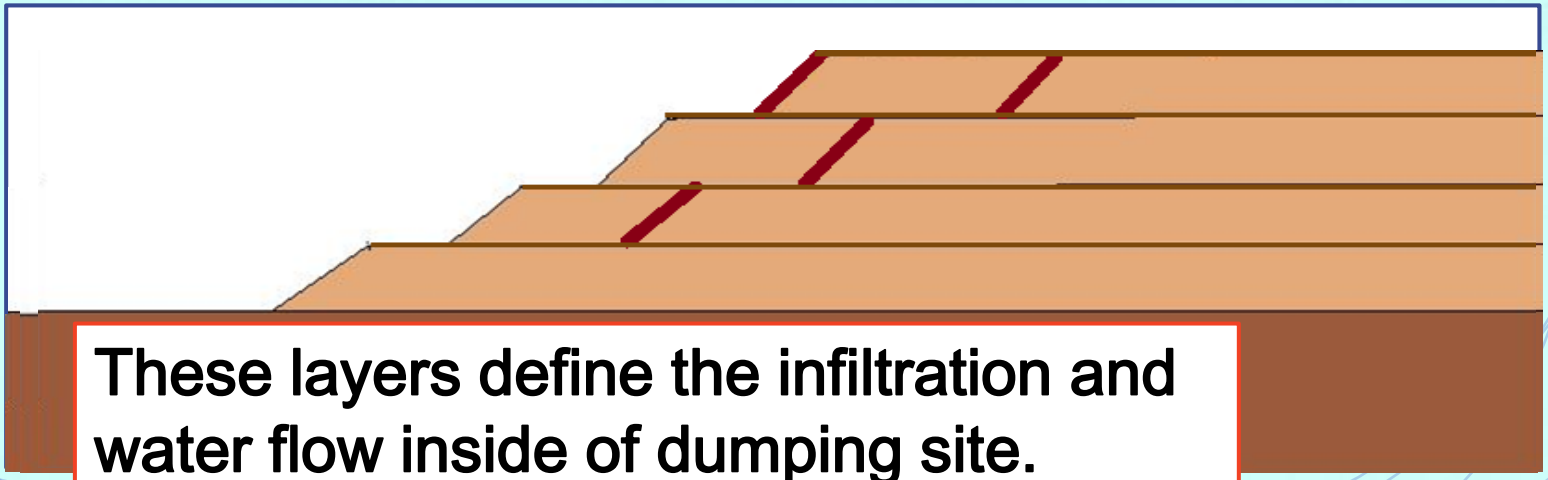


Exposure face at the dumping site



These layers define the infiltration and water flow inside of dumping site.

The inclined layers have different characteristics and they are formed in alternate layer.

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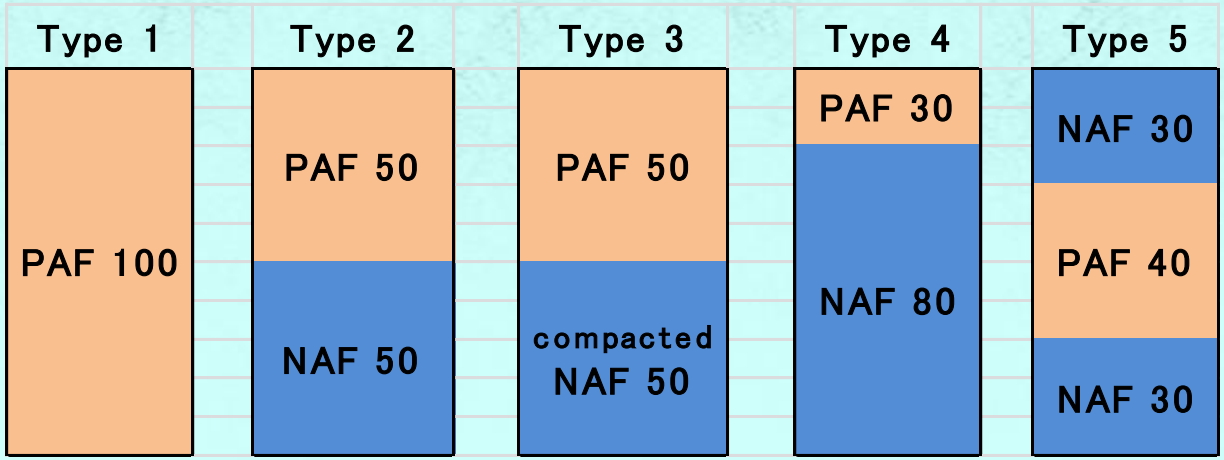
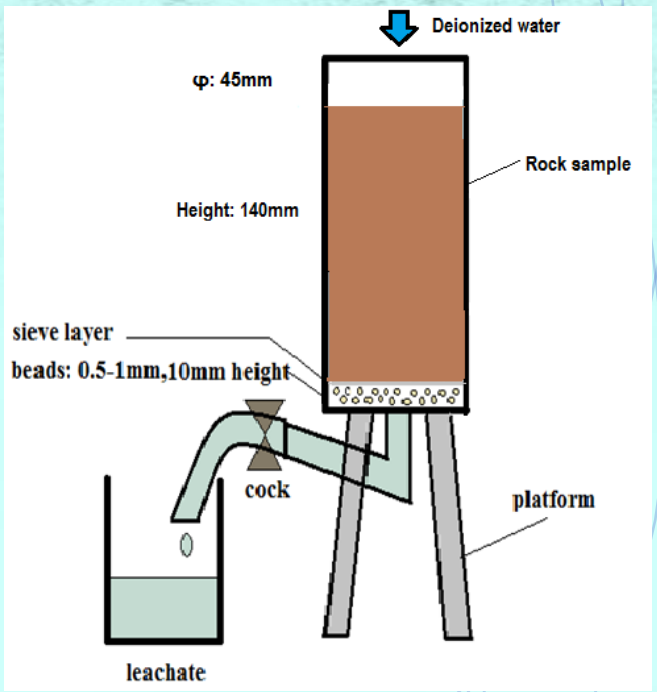
Leaching Test

To understand effects of the layers formed during construction of dumping site on the acidic water generation.

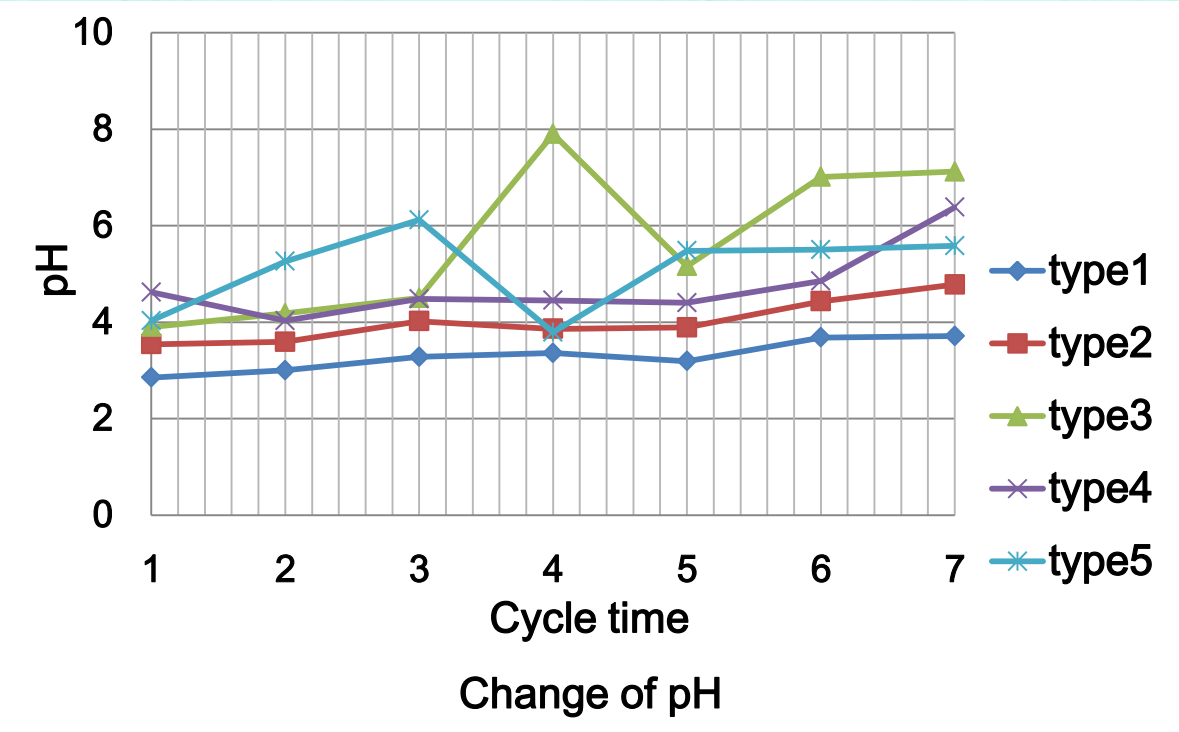


Types of the leaching test



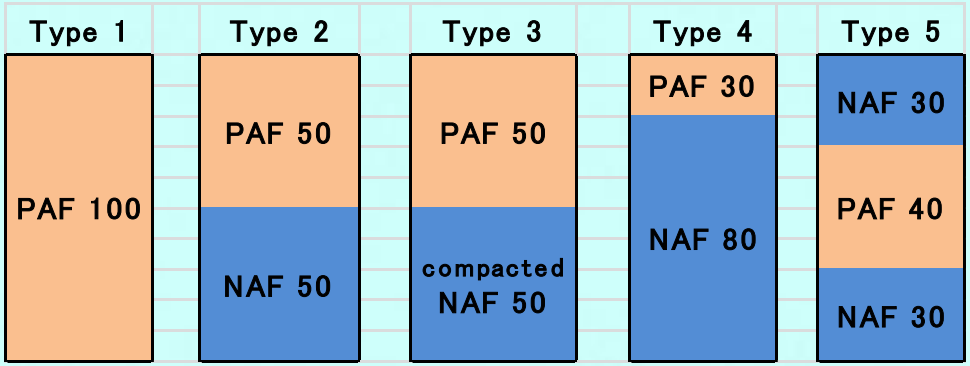
Concept of the leaching test

Distilled water was poured into the column and quality of the leachate was measured.



Change of pH

Result of the leaching test



Acidic water can be neutralized in the situation that NAF rocks are compacted or arranged alternately.

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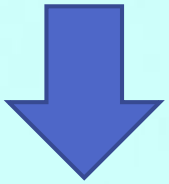
Inclined and compacted layers were formed inside of dumping site during construction of the site.

Acidic water may still be generated inside of the site.

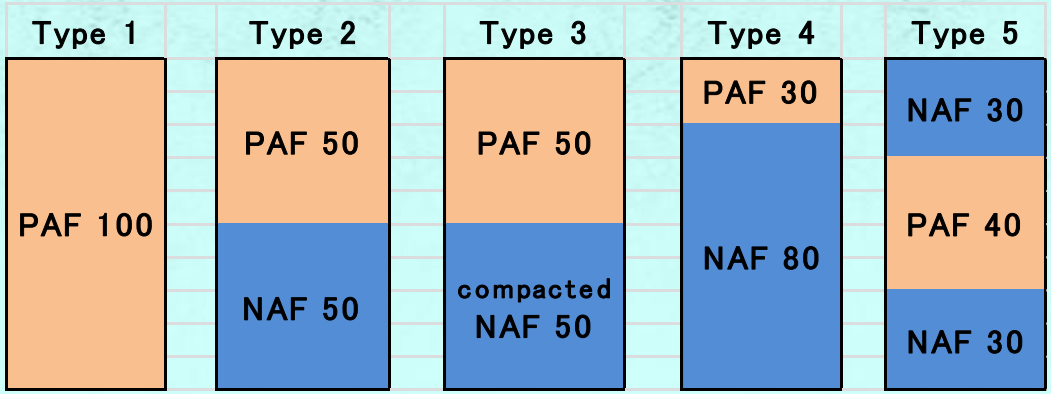
The layers have different characteristics, and acidic water may be prevented due to the layers inside of the site.



Acidic water may still be generated after constructing dumping site, however, it may be prevented when PAF/NAF rocks are formed alternately and NAF rocks are compacted.

However,

It is not clear in this research that PAF/NAF layers are formed alternatively inside of the site.



Acidic water generation can be prevented inside of dumping site by considering the formation of the layers and the amount of PAF/NAF rocks before constructing the site.

Thank you for your kind attention.

At Mae Moh Coal Mine