

Updates on Industrial Wastewater management in (Lao PDR)

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1. Overview of industrial waste water as pollution sources

- Lao PDR is a landlocked country surrounded by China, Vietnam, Cambodia, Thailand, Myanmar.
- Total land area: 236,800 km²
- Population: 7,598,176 (2022).
- GDP per capital: US\$2,551 (2022)

The country depends on natural resources for growth and exports, in particular, agriculture and forestry products, mining and hydroelectricity.

Industrial sector is mostly natural resource-based, and while manufacturing appears to be immature and small



2. Regulatory framework for industrial waste water management

1. Environment Impact Assessment Decree (2019 Amendment 2022)
2. Agreement of water sue (2019 Amendment 2022)
3. National Environmental Standard (2017)
4. Water and Water Resources Law (2017 Amendment 2022)
5. Industry Processing Law (2013)
6. Environment Protection Law (2012)
7. Waste from Industry Processing Management Regulation (2012); and
8. Industry Wastewater Discharge Regulation (2005).

Water and Water Resources Law (2017 Amendment 2022)
Article 30 Water Quality Standards and Wastewater Discharge Standards(revised)
Article 31 Wastewater discharge Permission (New)

Environment Protection Law (2012 Amendment 2022)
Article 3 Pollution Control Measures (revised)
Article 41 Environmental Certification (new)
Article 42 Permission on Pollution Emission (new)
Article 43 Environmental Compliance Certificate and Pollution Permit (new)

Agreement of water sue (2019 Amendment 2022)
Article 9 Project types or activities to apply use water permission(Surface water)
Article 23 Project types or activities to apply use water permission(Surface water)
Article 48 Certificate on water use permit

3 Industrial effluent standards

National environment standards 2017 (Standards for Water Pollution Control from General Industries)

Parameters	Symbols	Standards values that allows	Unit	Analysis methodology
potential of Hydrogen	pH	6-8.5	-	pH Meter
Total Dissolved Solid	TDS	≤2,500	mg/L	Dry evaporation at temperature 103-105 °C, 1 hour
Total Suspended Solid	TSS	≤50	mg/L	Glass Fiber Filter Disc
Temperature	T	≤40	°C	Temperature Meter
Color and Odor	-	None	-	General
Hydrogen Sulfide	H ₂ S	≤1.0	mg/L	Titration
Cyanide	CN ⁻	≤0.2	mg/L	Distillation and Pyridine Barbituric Acid
Fat, Oil and Grease	FOG	≤5.0	mg/L	Solvent Extraction by Weight
Formaldehyde	CH ₂ O	≤1.0	mg/L	Spectrophotometry
Phenol	C ₆ H ₅ OH	≤1.0	mg/L	Distillation and Aminoantipyrine Method 4
Chlorine	Cl ⁻	≤1.0	mg/L	Lodometric Method
Pesticide	-	None	mg/L	GC
Biological Oxygen Demand 5 Days	BOD ₅	≤30	mg/L	Azide Modification at 20 °C, 5 days
Total Nitrogen	TKN	≤ 100	mg/L	Kjeldahl
Chemical Oxygen Demand	COD	≤120	mg/L	Potassium Dichromate Digestion : Open Reflux or Closed Reflux

National environment standards 2017
(Standards for Water Pollution Control from General Industries)

Heavy metals				
Zinc	Zn	≤5.0	mg/L	AA/AES; ICP
Chromium Hexavalent	Cr ⁺⁶	≤0.25	mg/L	
Chromium Trivalent	Cr ⁺³	≤0.75	mg/L	
Copper	Cu	≤2.0	mg/L	AA/AES; ICP
Cadmium	Cd	≤0.03	mg/L	
Barium	Ba	≤1.0	mg/L	
Lead	Pb	≤0.2	mg/L	
Nickel	Ni	≤1.0	mg/L	
Manganese	Mn	≤5.0	mg/L	
Arsenic	As	≤0.25	mg/L	AA-Hydride Generation or ICP
Selenium	Se	≤0.02	mg/L	
Mercury	Hg	≤0.005	mg/L	AA - Cold Vapour Techique

4. Status of effluent monitoring/inspection

1. Project proponents must submit the Environment Impact Assessment (EIA) Report and Environmental Management Plan (EMP) to Ministry of Natural Resources and Environment (MONRE) for requesting EIA permission. MONRE plays the role of monitoring the following EMP;
2. Project proponents must submit the project proposal to Ministry of Industry and Commerce (MOIC) for requesting industrial permission. MOIC plays a role of monitoring the wastewater management and treatment process before its discharge to the environment;
3. Responsibilities for effluent industry wastewater inspection:
 - The central government follows EIA and EPM once time per year;
 - The local government monitoring follows Initial Environment Examination (IEE) tow times per year;
 - Project owner monitoring daily, weekly and monthly and then reporting of monitoring result to central and local government.

5. Compliance with regulations for effluent standards

- **For example: Changes of violation of treated wastewater quality**
 - Normally we rely on each facility to monitor and inspect industrial effluent themselves and report to the Department of Natural Resources and Environment Inspection MORE;
 - According to the information on EMP report form owner project on themselves monitoring result of water quality and central/local government almost of industries are following to EMP and EIA permission are meet the environmental quality standards.

6. Issues and challenges, future targets/plans for proper industrial wastewater management

- 1) Access to wastewater treatment technology is still demitted because most of it is imported from oversea ;
- 2) Investors have not paid enough attention to environmental management they are use medium- or low-technology for wastewater treatment plant;
- 3) Industrial wastewater management must promote quality investment, innovation/ smart technology and supported by the government;
- 4) Human capital development, advanced to monitoring industrial wastewater effluence and law enforcement;
- 5) Lack of efficient and accurate water quality data & information sharing

7. Conclusion

- Lao PDR will only be able to rely on growth based on its natural resources and low-tech industry;
- The development of industrial zone will take into account as technology of wastewater treatment plant must be standardized, if increasing volumes of untreated wastewater discharge to the waterbody/rivers, water environment may further deteriorate.

Thank you for your Attention

Q & A