The 21st WEPA Annual Meeting
September 8, 2025 in Putrajaya, Malaysia

Updates on Water Environment Governance in Industrial Wastewater Management

LAO PEOPLE'S DEMOCRATIC REPUBLIC

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Deputy Director of division
Ministry of Agriculture and Environment

1.1 Regulatory framework for wastewater management

Goal

- Maintain the environmental quality, decrease the pollution and impact to make the social and natural environment balance, sustainable, and protect natural resources (Law on Environment protection, Amendment 2024)
- Ensure water quality, quantity, and water resources are sustainable and sufficient to meet social needs…(Law on Water and Water resources, 2017)

Domestic Wastewater Measures

- Develop policies, laws, and regulations in water environment and sanitary sectors
- National Environmental Standard (2009, Amended 2017)
  - National Environmental Quality Standards (NEQS)
  - National Pollution Control Standards (NPCS)
- Develop infrastructure for wastewater management
- Implementation of pilot projects using decentralized wastewater treatment system 100% of population in provincial municipalities and districts utilize toilet with hygiene principle and 50% of wastewater are treated before discharged to river and basins in 2030

Industrial Wastewater Measures

- Promotion technical knowledge on wastewater management
- Capacity enhancement of the government staff for monitoring and inspection of industrial wastewater

Investment for wastewater management to prevent pollution
Human resource development/ Capacity development, etc.

- Government
  - Vision
  - Law and regulation
  - Environmental Standard

Private sector

- Local authorities
  - Implement at measure
  - Monitoring
  - Ordinance

1.2 Basic regulations on industrial wastewater management

Subject to regulation	
Types of industries	☒ All industries ☐ Selected industries
Applicable effluent volume	Laos uses National Pollution Control Standards not depend on the effluent volume
How are the standard values set?	☒ Uniform ☐ Depend on sectors ☐ Other (specify:)
Possibilities of setting more stringent standards	☒ Yes ☐ No
Transition periods, provisional standards, or other (to give industries time to adapt to emission standards)	☐ Transition period ☒ Provisional standards ☐ Other (specify:) (Please explain in a separate slide and indicate the slide number here)
Relevant laws to regulate effluent qualities from industries	• Water and Water Resources Law (2017 Amendment 2022) • National Environmental Standards (2017)

Monitoring and inspection	
Monitoring method	☒ Self (automated) ☐ Gov. or 3rd party
Monitoring parameter(s)	(Please specify the parameters in a separate slide and indicate the slide number here)
Frequency	Not uniformly fixed across all industries or situations and varies depending on the specific requirements stipulated in a facility's permits Generally, the monitoring frequency is defined in EIA/IEE and EMP report (once a year)
Inspecting agency	Ministry of Agriculture and Environment
Inspection	On-site inspections or emergency/ incident response inspections are conducted.
Reporting obligation	Periodic Routine Reports and Permit Renewal Reporting
Reporting to (whom)	Ministry of Agriculture and Environment and Local authorities
Number of regulated facilities	Number of EIA
How to identify the facility number	Environmental Compliance Certificate (ECC) and/or Permit For Releasing Polluted and Wastewater

1.3 Effluent quality standard parameters (Uniform)

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_2S	≤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_2O	≤1.0	mg/L	Spectrophotometry
Phenol	C_6H_5OH	≤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	TN	≤ 100	mg/L	Kjeldahl
Chemical Oxygen Demand	COD	≤120	mg/L	Potassium Dichromate Digestion ; Open Reflux or Closed Reflux

(Standards for Water Pollution Control from General Industries)

Parameters	Symbols	Standards values that allows	Unit	Analysis methodology
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

1.4 Basis for the standards

- The standard was developed by studying the standard of ASEAN countries, WHO, FAO, IFC and industry wastewater discharge regulation of Ministry of Industry and Commerce (2005).

- The key parameters were summarized and had consultation meeting with representative of ministries, academic institutions and private sector.

- Base on the industry wastewater discharge regulation, the national environmental standard (National Environmental Quality Standards, National Pollution Control Standards) were established in 2009 and amendment in 2017.

For this slide, please prepare brief explanations on how the effluent standards were determined for the key parameters relevant to industry/sector/facility. Similar to the reference PPT provided, please clearly and concisely outline the basis for the standard values.

Refer to the slide in the reference PPT as an example ('1.5 Basis for the standards')

1.5 <Measures taken to improve the compliance by industries>

- Promotion and dissemination of the regulation, national environmental standard to the relevant ministries, local authorities, private sectors, education institutions, and public societies.
- Organize workshop/ training on water environment for industrial sector
- Industrial entities shall organize training for environmental responsible staff
- The government/local authorities conduct monitoring to check the implementation as described in EMP.

Please provide information on the policies and measures that have been developed to improve compliance with industry regulations.

Refer to the slide in the reference PPT as an example '1.6 Provisional effluent standards in Japan'

1.6 Compliance: Incentives and Penalties

Incentive		Penalty	
Appeals to the public, such as awards and ranking	Award from minister for good practice on environmental management. It has three ranks such as A, B, and C Grades.	**Imprisonment**	No
Financial incentive	No	**Fine**	Yes, implemented inline with law on environmental protection and decree on environmental impact assessment. However, there is no fine measures on wastewater discharge that not follow the standard
Institutional incentives such as preferential approval	Yes, the entities will receive prioritization on approval of ECC	**Other**	
Others			

This slide outlines the incentives and penalties related to compliance. Please fill out the information in the tables accordingly, if applicable.

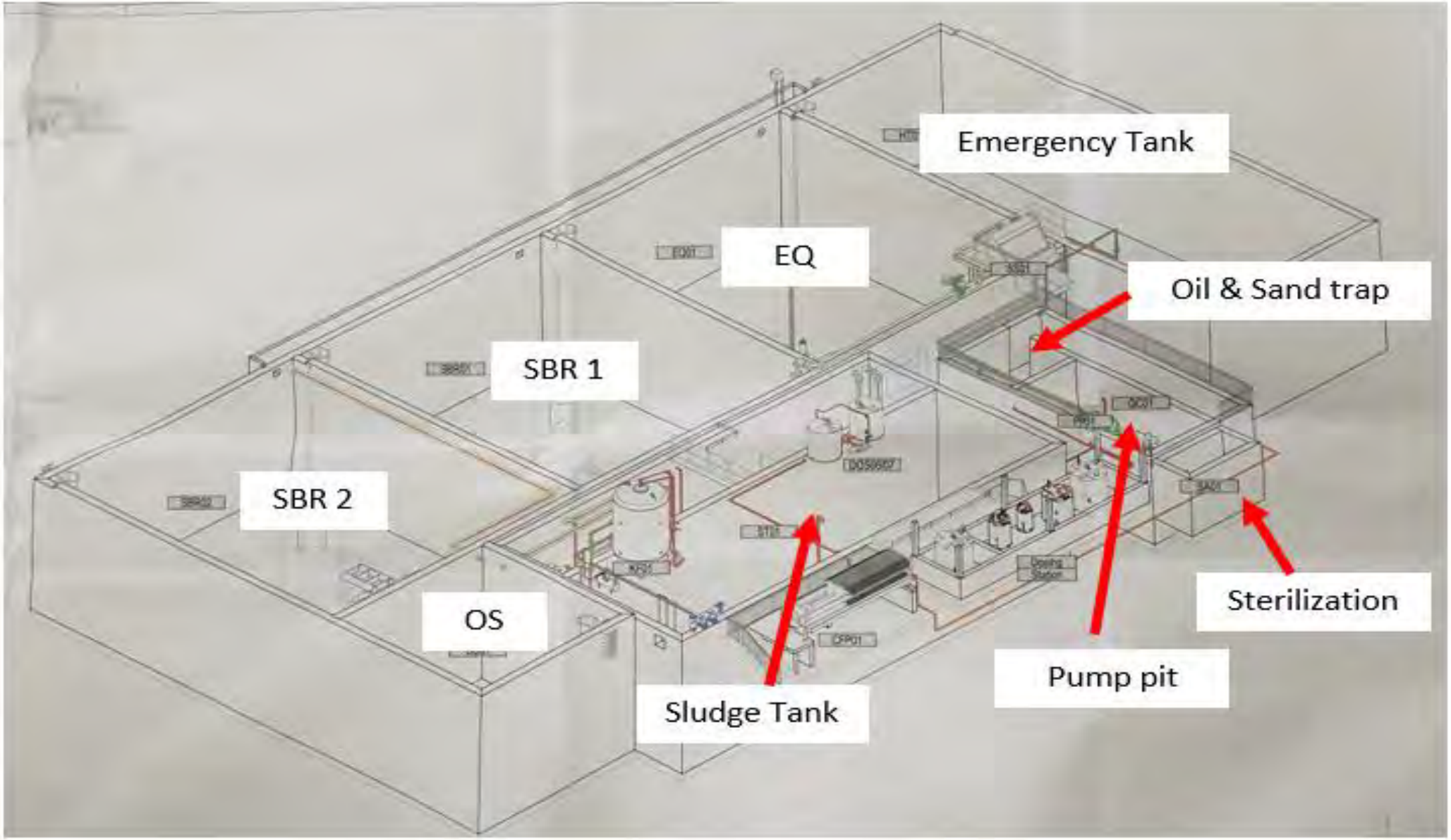
2 <Case study of industry>

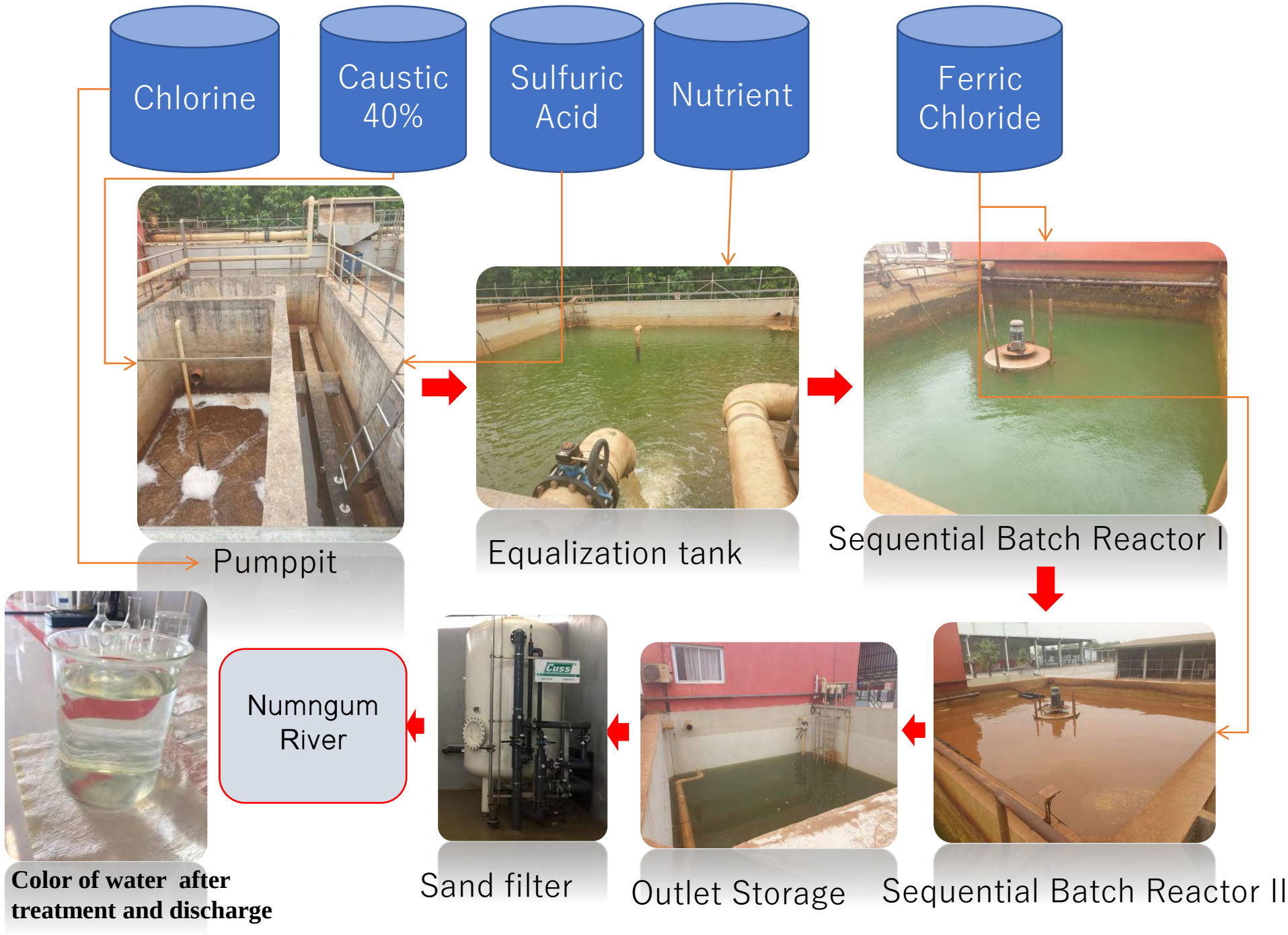
Lao Coca-Cola Bottling Company Limited

A private company incorporated in Lao PDR started in December 2012

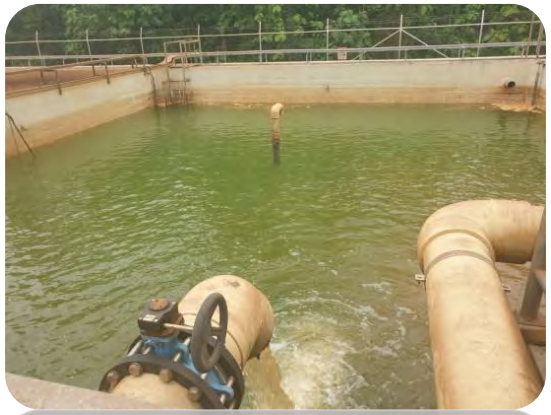
Wastewater treatment system

Layout of Wastewater Treatment System




Chlorine
Caustic 40%
Sulfuric Acid
Nutrient
Ferric Chloride
Pumppit
Equalization tank
Sequential Batch Reactor I
Sequential Batch Reactor II
Outlet Storage
Sand filter
Numngum River
Color of water after treatment and discharge

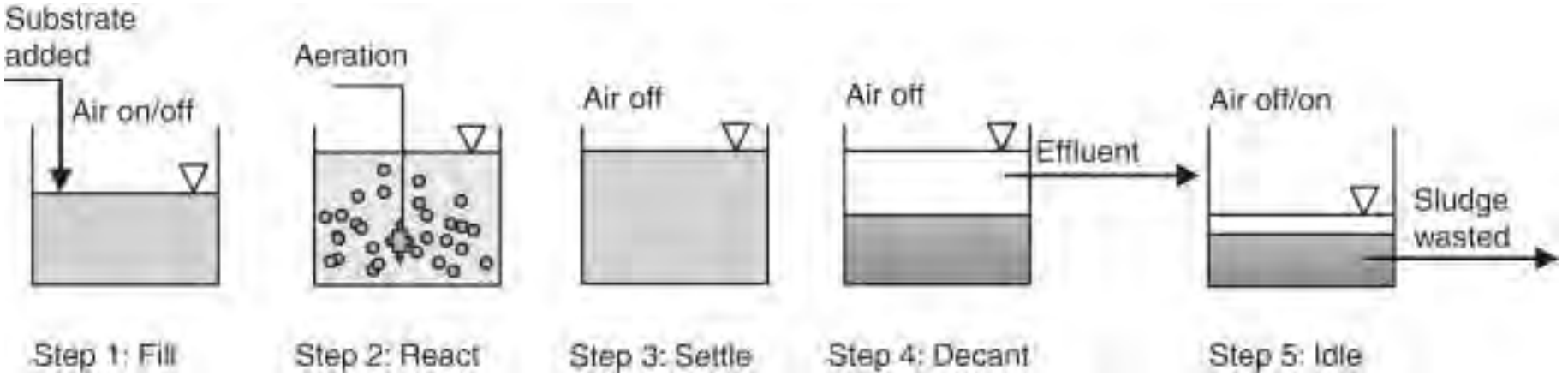
Sequential Batch Reactor System (SBR)



Equalization tank

Sequential Batch Reactor I

Sequential Batch Reactor II



Part of wastewater discharge is used for fish monitoring indicator

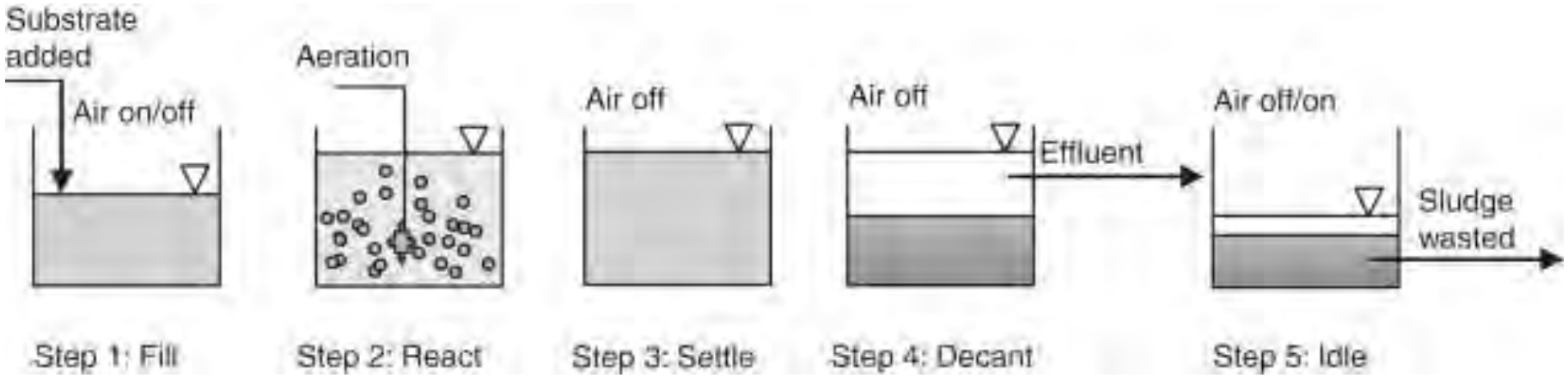
Fish pond

Outlet
Storage

Sand
filter

Discharge to

Sludge filter press system and disposal



Landfill KM32

Filter press machine

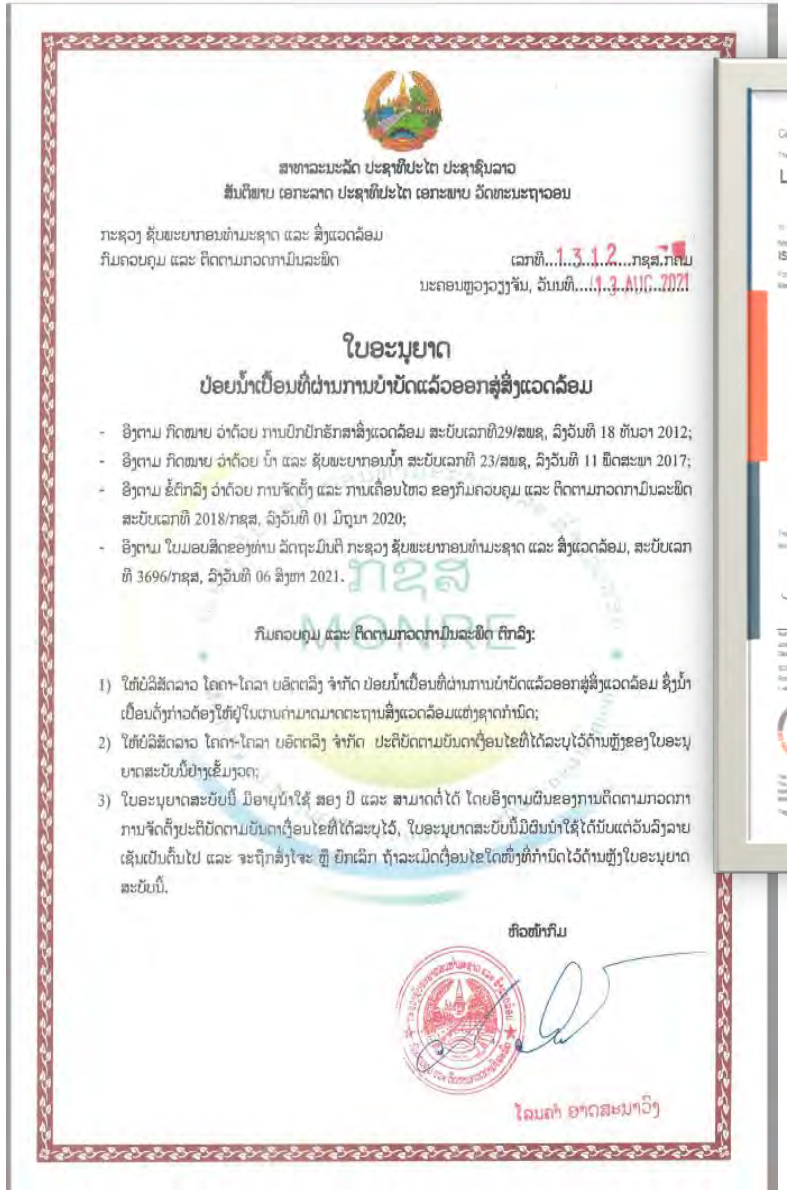
Recording the amount of water discharge and Water quality monitoring

LAO COCA-COLA BOTTLING.CO.,LTD

Waste Water Treatmment Report of November-2023

Parameter	NESs	Date	Wed 1	Thu 2	Fri 3	Sat 4	Sun 5	Mon 6	Tue 7	Wed 8	Thu 9	Fri 10	Sat 11	Sun 12	Mon 13	Tue 14	Wed 15	Thu 16
Outlet Storage 900 m³																		
pH	6.5 - 9.5	Daily	7.1	7.12	7.35	7.48	7.46	7.44	7.77	7.38	7.32	7.64	7.38	6.95	7.38	7.54	7.36	7.49
BOD_5	<40	Daily	8	7	10	6	6	7	6	7	5	2	6	3	6	5	6	5
COD mg/L	120	Daily	10	12	22	18	12	15	12	15	10	7	12	8	12	10	12	11
S Solid mg/L	< 20	Daily	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
TDS mg/L	< 2500	Daily	196	187	226	218	200	280	293	291	283	204	238	148	189	199	199	199
NH_4 mg/L	<4	Daily	0.8	0.6	0.9	0.7	0.8	0.2	0.6	0.7	0.3	0.6	0.5	1.5	1.2	1.3	1.2	1.4
Dissolved Oxygen mg/L	>4	Daily	6.5	6.4	6.7	6.2	6.3	6.4	4.1	5.2	5.8	4.6	4.7	4.6	6.3	6.2	6.4	6.1
P- value mg/L	< 1	Daily	1.3	1.2	1.6	1.3	1.1	1.3	1.5	1.2	1.1	1.9	1.8	1.5	0.92	0.34	0.28	0.39
Discharge to River (m³)			162.6	158.7	318.3	168.4	156.3	132.7	305	296.7	126.7	274.4	296.1	271.6	231.7	172.3	298.7	158.3
Total Waste Water Discharge to the River (m³)																		

Wastewater treated discharge permit and ISO Certificates



ສາທາລະນະລັດ ປະຊາທິປະໄຕ ປະຊາຊົນລາວ
ສັນຕິພາບ ເອກະລາດ ປະຊາທິປະໄຕ ເອກະພາບ ວັດທະນະຖາວອນ

ກະຊວງ ຊັບພະຍາກອນທຳມະຊາດ ແລະ ສິ່ງແວດລ້ອມ
ກົມຄວບຄຸມ ແລະ ຕິດຕາມກວດກາມົນລະພິດ

ເລກທີ...1312...ກຊສ.ກຄມ
ນະຄອນຫຼວງວຽງຈັນ, ວັນທີ...13 AUG 2021

ໃບອະນຸຍາດ
ປ່ອຍນ້ຳເປື້ອນທີ່ຜ່ານການບຳບັດແລ້ວອອກສູ່ສິ່ງແວດລ້ອມ

- ອີງຕາມ ກົດໝາຍ ວ່າດ້ວຍ ການປົກປັກຮັກສາສິ່ງແວດລ້ອມ ສະບັບເລກທີ29/ສພຊ, ລົງວັນທີ 18 ທັນວາ 2012;
- ອີງຕາມ ກົດໝາຍ ວ່າດ້ວຍ ນ້ຳ ແລະ ຊັບພະຍາກອນນ້ຳ ສະບັບເລກທີ 23/ສພຊ, ລົງວັນທີ 11 ພຶດສະພາ 2017;
- ອີງຕາມ ຂໍ້ຕົກລົງ ວ່າດ້ວຍ ການຈັດຕັ້ງ ແລະ ການເຄື່ອນໄຫວ ຂອງກົມຄວບຄຸມ ແລະ ຕິດຕາມກວດກາມົນລະພິດ ສະບັບເລກທີ 2018/ກຊສ, ລົງວັນທີ 01 ມິຖຸນາ 2020;
- ອີງຕາມ ໃບມອບສິດຂອງທ່ານ ລັດຖະມົນຕີ ກະຊວງ ຊັບພະຍາກອນທຳມະຊາດ ແລະ ສິ່ງແວດລ້ອມ, ສະບັບເລກທີ 3696/ກຊສ, ລົງວັນທີ 06 ສິງຫາ 2021.

ກົມຄວບຄຸມ ແລະ ຕິດຕາມກວດກາມົນລະພິດ ຕົກລົງ:

1) ໃຫ້ບໍລິສັດລາວ ໂຄຄາ-ໂກລາ ບອັດຕລິ ຈຳກັດ ປ່ອຍນ້ຳເປື້ອນທີ່ຜ່ານການບຳບັດແລ້ວອອກສູ່ສິ່ງແວດລ້ອມ ຊຶ່ງນ້ຳເປື້ອນດັ່ງກ່າວຕ້ອງໃຫ້ຢູ່ໃນເກນຄ່າມາດຕະຖານສິ່ງແວດລ້ອມແຫ່ງຊາດກຳນົດ;
2) ໃຫ້ບໍລິສັດລາວ ໂຄຄາ-ໂກລາ ບອັດຕລິ ຈຳກັດ ປະຕິບັດຕາມບັນດາເງື່ອນໄຂທີ່ໄດ້ລະບຸໄວ້ດ້ານຫຼັງຂອງໃບອະນຸຍາດສະບັບນີ້ຢ່າງເຂັ້ມງວດ;
3) ໃບອະນຸຍາດສະບັບນີ້ ມີອາຍຸນຳໃຊ້ ສອງ ປີ ແລະ ສາມາດຕໍ່ໄດ້ ໂດຍອີງຕາມຜົນຂອງການຕິດຕາມກວດກາ ການຈັດຕັ້ງປະຕິບັດຕາມບັນດາເງື່ອນໄຂທີ່ໄດ້ລະບຸໄວ້, ໃບອະນຸຍາດສະບັບນີ້ມີຜົນນຳໃຊ້ໄດ້ນັບແຕ່ວັນລົງລາຍເຊັນເປັນຕົ້ນໄປ ແລະ ຈະຖືກສັ່ງໃຈະ ຫຼື ຍົກເລີກ ຖ້າລະເມີດເງື່ອນໄຂໃດໜຶ່ງທີ່ກຳນົດໄວ້ດ້ານຫຼັງໃບອະນຸຍາດສະບັບນີ້.

ຫົວໜ້າກົມ

ໄລຍ ອາດສະໝາວົງ

Certificate TH20/13813

Lao Coca-Cola Bottling Co., Ltd.

ISO 14001:2015

For the following activities
Manufacturing of Non-Alcoholic Carbonated Soft Drink Beverages in Plastic Bottle

Certificate TH20/12987

Lao Coca-Cola Bottling Co., Ltd.

ISO 45001:2018

For the following activities
Manufacturing of Non-Alcoholic Carbonated Soft Drink Beverages in Plastic Bottle

Certificate TH18/11683

Lao Coca Cola Bottling Co., Ltd.

Food Safety System Certification FSSC 22000

Food Category CIV - Processing of ambient stable products

ISO14001

ISO45001

FSSC22000

Thank you for your attention

ຂອບໃຈ