

*Advancing Enhanced Wood Manufacturing Industries in
Laos and Australia ACIAR Project FST/2016/151*

**Study tour in the North of Laos on new perspective
toward Lao plantation timber industries 26th -28th
November 2022**



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1. Background

The Government of Lao PDR (GoL) has policies that are directed towards economic growth and poverty alleviation and has recognised the plantation sector as one of the sectors that can improve economic growth in rural areas. In the 2014 Agriculture Development Strategy to 2025 and Vision 2030, processed wood products are identified as one of the nine priority commodities to contribute to the industrialisation and modernisation of the Lao economy. Over the past three decades, the GoL has implemented policies to encourage the development of plantations by smallholders and the private sector and as a result, there are now significant areas of plantations in several regions, some of which are approaching merchantable age. The plantation estate comprises 446,000 ha, of which 271,000 ha is rubber trees for rubber latex production (DoF 2015), largely corporately owned. The area of plantations for current timber production remains small, with 163,000 ha under different species, ownership and investment arrangements. Eucalypts comprise the largest area of these timber plantations, with 67,000 ha primarily owned and used by foreign companies. Teak, with 50,000 ha, is the other main timber plantation species with plantations predominantly owned by Laos smallholders and offers opportunities for improved processing and product development.

Capacity building through current project support could be considered as one of the effective approaches in strengthening understanding of related stakeholders on the current wood industry circumstances, i.e. plantation wood processing enterprises and plantation tree owned by farmers and corporate partners of investors. It was noted that the Ministry of Industry and Commerce (MOIC) is responsible for wood processing industry tasks, the task now has been handling over totally to the Ministry of Agriculture and Forestry (MAF),. In addition, the Department of Forestry (DOF) has established a new unit called the "*Timber and NTFPs Business Management Division*" the task of which is to work closely with the wood processing sector in Laos. However, the responsibility has shifted but additional staff have not been allocated to DoF to attend to the task. Thus, organizing study tour between NUOL, VALTIP-ACIAR fellows with MOIC and DOF' staff would provide an opportunity to exchange idea and knowledge through the trip to plantation areas and wood processing companies in Louang Namtha and Louang Prabang province.

Objectives of the study tour are to

- To expose participants from different backgrounds to different viewpoints that impact the plantation timber industry, to identify options to enhance the sustainable timber supply chain and what action should be taken to solve existing problems and barriers.
- To build a network among participants from a wide range of stakeholders, government agencies, NGOs, and the private sector through a field trip.

The study tour was financed by VALTIP3-ACIAR the project No FST/2016/151

Itinerary and Participants

A list of study tour participants is provided in Table 1. Participants consisted of Lao PDR ministerial policymakers in wood processing which is called timber and NTFPs Business management division is working on wood processing decrees and policy, the Queensland Government Department of Agriculture and Fisheries, the National University of Laos researchers and the Ministry of Industry and Commerce. The tour itinerary is provided in Table 2. The trip occurred over 3 days from 26-28th November 2022. The sites visited were in two provinces, Luang Namtha and Luang Prabang. Travel was via the new Lao-China railway. Day 1 and Day 2 were spent in Luang Namtha province with small factories manufacturing bamboo-based made papers, and on Day 2 rubberwood veneer processing factory was visited, but the company was producing the teak sawn wood. Day 3 was well spent looking at two teak sawmills and processing plants and a charcoal facility close to Luang Prabang City.

Table 1. Study tour participants

No	Name of the primary contact person	Organisation
1	Professor Latsamy Boupba	The Dean of the Faculty of Forestry Science, NUoL
2	Mr Stephen Midgley	Salwood Asia Pacific Pty Ltd - Services in Forestry
3	Dr Khamtan Phonetip	VALTIP3- Project Coordinator
4	Ms Sompardthana Tiemaliya	VALTIP3 team
5	Mr Vansy Phengthajaim	VALTIP3 team
6	William Leggate	Department of Agriculture and Fisheries, Brisbane, Queensland, Australia
7	Adam Faircloth	Department of Agriculture and Fisheries, Brisbane, Queensland, Australia
8	Mr Stuart Ling	VATLIP3 team
9	Mr Siviengngern Bountailue	MOIC-Department of Industry and Handicraft
10	Mr Vanhphone Mixay	Technical staff -MOIC Department of Import Export
11	Mr Bounthi Siliphan	Deputy of the Timber and NTFPs business Management Division, DOF
12	Mr Nouanchan Souphannasy	Technical staff - the Timber and NTFPs Business Management Division, DOF
13	Ms Soythanv Mienmany	VALTIP3 team

Table 2. Study tour itinerary

No	Company	Comments
1	Ta Pherng bamboo pulp factory	Chinese owners' are categorised as a small businesses producing traditional burning papers used for funeral in traditional Chinese practices
2	SORYA Furniture Factory Individual Enterprise	Initially, rubber latex trading and rubber timber veneers processing, but now there are no rubberwood logs available due to the latex is still being produced by rubber tree at appx. 25 years old of tree age.
3	Sanghai Kokngiew Teak Processing Company	Medium sized teak sawn timber processing which has their representative store in Shanghai and all products are sent to China
3	Charcoal facility	A family individual charcoal processing and linked investment with Sanghai Kokngiew Teak company
3	Phila Agriculture Development Company	Medium teak processing factory (finger joints, sawn broads, and teak charcoals), and exporting to Thailand and China are the main market

2. Field trip itinerary

Day-1, 26th November 2022, LuangNamtha province

Ta Pherng pulp factory (Bamboo based)



(a) Buying prices of bamboo at the gate mill

Participants were welcomed by the District of Agriculture and Forestry (DAFO) of the Viengkhoukhar District, Luang Namtha Province (figure b). The Ta Pherng factory is a small chemi-mechanical mill which produces traditional cultural papers for the Chinese market. The final product used for burning at traditional Chinese funerals (figure c).



(b) Welcome by the chief of DAFO @ Ta Pherng paper (c) Final products are ready to send to China Factory

The mill produced 90 tonnes of paper in the year 2021; basically, cheap bamboo culms were purchased at the mill gate and chipped using a very basic "no-frills" chipper. Soak the chips in alkali, beat the fibres, washed and spread on a small paper dryer then heated from below by coal-fired furnace. Consumed 100 tonnes of bamboo last year and want to expand to 200 tonnes this year. At the time of the visit, the mill paid 550 – 600 kip/kg at the mill gate for bamboo culms (figure a). In the year 2020, the mill paid 400 kip/kg, but resulting in the mill receiving very few materials. Currently, the mill has 10 employees and is in a development phase; this is the only paper manufacturing factory in the district (although the PAFO Chief mentioned subsequently that there were 3 in the province). While the visiting time the mill has

been suspended for two months because of a lack of raw material, and the District of Natural Resource and Environment is concerned about the disposal of effluent (the same concerns that caused the Chinese Government to close almost all small bamboo pulp mills in China)¹. No facilities for chemical recycling were noted and effluent appeared to be discharged into the stream. This deserves some follow-up the mill uses alkaline cement pastes (material in large liquid containers) as a source of NaOH, as shown in figure (d). The Environmental Impact Assessment report from the factory owners was not available by the time of the visit. The solid, liquid, and gas waste and noise generated by wood processing projects are all required to meet the emission standards and requirements proposed by the national and local environmental protection departments. (For example, the attachment: Chinese National Standard for "Discharge standard of water pollutants for pulp and paper industry".) No evidence was seen that effluent discharges from the mill were being monitored.



(d) chemical use for soaking bamboo chips

¹ References:

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<http://www.china.org.cn/english/environment/50650.htm>)

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Day-2, 27th November 2022, LuangNamtha province
Manufacturing veneers from Rubberwood



(e) Rubber latex and timber buyer company

The factory (Sorya Furniture Factory Individual Enterprise) is located in BoumPhieng village with 100% Lao owners as registered names (figure e), but all of the supervisors and operators were Chinese. The VALTIP3 team was a warm welcome by Mr Laoly , a current sawmill manager who also manages the rubber latex factory (figure g). The VALTIP3 team had visited this factory a few months before the study tour. Since the last visit, the factory is lacking rubberwood logs, and now they are processing teak (round log and sawn boards), as shown in figure (f). The main teak market is rough, kiln dried lumber.



(f) a second roof for the teak sawnwood facility



(g) the visited team in front of the factory

The mill both veneer and plywood equipment but insufficient logs so they are not operating. The mill has the capacity to process 100 – 120 m³ of logs/day. They aim to provide the service to Chinese furniture market. It was found 3 m³ of teak log produces 1 m³ of teak veneer. Heart rot in the teak is a problem.

Logs are segregated into 2 log classes:

- A = straight >30 cm small end dimension (sed)
- B = >17 <30 cm sed.

Serious insect attack was noted on untreated rubber veneers in storage.

One wood-fired kiln was operating and 4 additional kilns were under construction.

A pressure chamber on site suggests a future interest in sawn rubber wood (borax treatment to control bluestain and mold).

At the visiting time, a mill manager was asked, "how will he manage his mill if rubber timbers are not ready to harvest yet?", and he responded that he had been planning to move his machinery to the 52 Km near Phone Hong and the Burapha mill) where his friend had a sawn mill there and is close to materials such as eucalypts. His products, like rubber latex and teak, were sent to China. The buying rubber trees was the same price as our visit last time (report could be found at www.laoplantation.org).

Day-3, 28th November 2022, Luang Prabang Province

Shanghai Kokngiew Teak Processing

The first place to visit in Luang Prabang province was Shanghai Kokngiew Teak Processing, where the main products are sawn teak and finger joint broads; the Chinese own the factory. The factory is located around 3 kilometres south of the Luang Prabang railway station and a four-minute drive from Kokngiew village. The Lao manager (Miss Bouali) welcomed the team with her Chinese partners (figure i), and interviews conducted while walking around the teak processing line. The factory exports its teak lumbers to China around 100 cubic meters per month, and the main product is sawn boards (figure h), while small pieces are turned into laminated boards. During the visit, the mill was burning sawdust and wood off-cuts. When asked about the complainant from the villagers nearby, the manager responded that they had been following the procedure from the District Office of Environment and Natural Resources. A current approach of clearing sawdust at this factory was using burning every day which might cause a breathing problem for surrounded people as picture in figure (j).



(h) teak lumber staceds ready to load on a truck



(i) Warmly welcome by Lao and Chinese managers

Quoted annual log input figures seem confused – the informant suggests 1000 m³/year, which seems far too low. Working back from export figures of 2 x 60 m³ products per month and a wood recovery for finished panels of 60% = 200 m³/month = 2,400 m³ annually. Most wood is sourced from northern Luang Prabang province – Pak Seng, Pak Ou. Some large logs from Sayaboury. The mill purchases wood from brokers/traders and casual drive-in sales. They have some traders/buyers who work solely for the mill. Log prices (delivered mill gate) are:

- Log diameter of 14 - 20 cm sed is 1.9 million kip/m³ (= US\$110)
- Log diameter of 20 – 25 cm sed – 2.5 million kip/m³ (= US\$145)
- Log diameter of >25 cm sed – 3.5 million kip/m³ (= US203)

Large, high-quality logs are segregated for special orders for higher-quality products.

All logs are standard 2.4 metres long. No log grading – they do not accept logs with obvious defects



(J) an ignition spot from Shanghai sawmill in Kokngiew village

Production.

The main production is ends/edge glued panels, and the sole market is China – to the parent company in Shanghai. Prices vary from US\$80 – 100US\$/m³, which seems too low (according to the discussion with Miss Bouli). All wood is kiln-dried (length of time depends upon the effectiveness of air-drying and dimensions of the boards) – this helps obtain a Lao phytosanitary certificate for the Chinese market – which is necessary for cross-border trade. The company was exporting 2 truckloads of finished product per month, each carrying 50 – 60 m³ using a 22 wheels truck. A 40-foot container's empty weight is 3,750kg and can be loaded to a maximum overall weight of 29 tons (26,300kg) – 22.5 tonnes of teak finished product. Costs of transport: 20 – 25 million kip (\$1160 – 1450; = \$38 – 48/m³) to transport a truckload shipment to Shanghai (assume 30 tonnes shipment for a 22-wheel Chinese truck). Currently, use trucks for transport but plan to transition to the railway once the logistics systems function. Shipments are transferred from Lao-registered trucks to Chinese-registered trucks at the border. Cross-border trade is straightforward once the processes and protocols have been established. For a shipment to Shanghai, it takes one day to the border, 2 days to clear Lao export processes, 3 days to clear Chinese import processes, and 2 days of truck transport to Shanghai. 5 days of waiting at the border offer no added value and opportunities for generous payments for goodwill!

Regarding export prices for teak products.

The earlier VALTIP 3 study used China Customs data to analyse patterns of trade in teak wood products between Laos and China (Midgley, 2020). The most up-to-date data we had access to at that stage was for 2020. The data for HS Product: 44072910 *Teak wood, sawn lengthwise, thick >6mm*, is provided in kilograms, and this was converted to cubic metres using a notional density of 650kg/m³ (Midgley, 2020). In 2020, Laos sold 7,475 cubic metres. The total declared value of Chinese imports from Laos for this product in 2020 was US\$2,657,000 – offering an average unit price of US\$355/m³. China's global imports in 2020 for HS Product: 44072910 were 19,340 m³ valued at US\$11,070,000 – offering an average declared price of US\$572/m³. This tells that teak exported from Lao PDR is very competitively priced (Global average US \$572; Lao average \$355) (Midgley, 2020). The most basic export product from the mill in Ban Kok Ngiew would be HS Product: 44072910 *Teak wood, sawn lengthwise, thick >6mm*, and the laminated panels and other products such as finished flooring would logically command a higher selling price. Global pricing is more nuanced than simple averages, but it demonstrates that the average export prices for Lao teak-sawn wood are low by global standards. This encourages us to question the answers provided by the Shanghai - Kok Ngiew, where we were told that the mill received US\$80 - \$100/m³ (less than the price of the logs) for their teak products at the border.

Phila Agriculture Development Company

In the afternoon session, the team was visited Phila Agriculture Development Company (PAD). Lao owners registered this company with a gas station which includes the sawmill behind the gas station. The sawmill is located on the border of Kokngiew and Enh villages at the three-junction entry to Luang Prabang District and Luang Prabang railway station. Opposite the gas station, there is a substantial teak processing factory operated by a Chinese company, Shanghai (operating under the Phila business and factory license) – Products for Export is marked with: Shanghai Xunbin Industrial Co., Ltd.). However, the team was visiting only the PAD site that is run by the Lao owner. Currently, the company is selling 2 truckloads (assume 22-wheelers = 60 tonnes = 92 m³ product) per month to Thailand; the company has orders from Iraq as well.

Log supply.

Resource supply is mainly from the north of LP province by using boats to transfer logs, and the price depends on an offer made for a boatload of logs and converted into several truckloads – an experienced visual estimate of both quantity and quality. Regardless of log quality, there is no premium for high-grade logs. Despite the falling value of the Lao kip exchange, farmers still get a stumpage of 80,000 kip for a tree of 80cm dbh- high labour and fuel prices are the main drivers in increasing harvesting costs. Have things changed for growers over the past 25 years?

Processing.

The mill's processing capacity is 10 m³/day or about 3000 m³/month or 3,600 m³ annually (this mill is smaller than the Shanghai- Kok Ngiew mill, yet the stated resource needs are higher?). During the visit, the mill was undertaking a contract for kiln-drying on behalf of an enterprise from Sayaboury. No standard drying schedule was used but just decided by days selected by the dry kiln controllers of the company. Now, a significant commitment to maximising recovery through finger-jointed products and selling 3 grades of finger-jointed timber. The main parameter in grading is the proportion of heartwood Table 3

Table3: Prices of Phila's production

Grade	Dimensions	Volume for a bundle of 10 planks (m ³)	Price at Thai Border Gate (baht) for a bundle of 10 planks.	Price at Thai Border Gate (Baht and US\$/a bundle)
A	1.7 cm x 4.2 cm x 250 cm	0.001785	400	224 baht: US\$6.30
B	1.7 cm x 3.8 cm x 250 cm	0.001615	360	223 baht: US\$6.27
C	1.5 cm x 3.2 cm x 250 cm	0.0012	200	167 baht: US\$4.69

Charcoal facility.

This facility is located just within the border of Ban Enh village and is linked to Shanghai Xunbin Industrial Co., Ltd, the Chinese factory operating under the Phila business and factory license.

Run as a concession from the Pilar Chinese sawmill, all materials are off-cuts as raw material, and the mill is paid a set commission fee of 6 million kip for each truckload of charcoal produced. Stacks of teak off-cuts are covered by damp sawdust and burned for 3 – 5 days, depending on temperature, humidity and ambient conditions. Only run 2 kilns at a time due to village protests about the offensive smell.



(K) a lady who ran charcoal productions and packed charcoals

A 22-wheel truck can carry 1600 bags of charcoal (= 28 – 36 tonnes), because a bag = 18 – 23 kg, charcoal valued at 800 kip/kg (loaded on truck) = 14,400 – 18,400 kip/bag. Almost all production is directed to the Chinese

markets. The main leader at the facility is a female from Ban Enh, and she is supported by 2 new casuals (man and wife) from PhoneXay. The experienced lady is paid 100,000 kip/day to stack the kiln charges, unstack, fill, and close the bags of charcoal. She works with all of these tasks; she said that she used to own this block of land, but it was in the railway company concession, which the company is allowing her to use while there is no operation on this land. But the company can take the land back when they want, and no concession will not be provided.

3. Outcomes

At the conclusion of the tour, the Laos industry and ministry tour members were given an evaluation survey form to gauge the study tour's success and identify strengths and weaknesses. In total, two participants took part in the survey; the first is listed in Table 1.

The survey contained six general questions to gauge the industry and ministry tour member's general satisfaction with the study tour, as shown in Table 4. Overall, the participants surveyed were delighted with the study tour, particularly in the areas of new knowledge gained and potential for adoption in Laos

General Questions	Disagree	Agree	Strongly Agree
Overall, the activity was stimulating and relevant			5
The activity was coordinated and presented			5
The duration of the activity was appropriate			5
I learned new ideas, approaches and/or skills which I will be able to apply in the future		4	5
The practices observed should/could be changed in these timber resources		4	
Total	8		20

Table 4. General survey questions to gauge participant satisfaction (the numbers represent study tour members)

The survey included five main questions as following:

1. What did you gain from the study tour?

- It seems that teak prices for farmers have changed little over the last 25 years – I asked Pila's daughter about this, and she replied that high labour and fuel prices are increasing harvesting costs – but farmers still get 80,000 for an 80cm tree, despite the falling value of the kip.
- Also, Phila owner mentioned that there was a great demand from Vietnamese traders a few months ago, which increased teak prices, but that prices have now returned to normal because it seems that the border was closed to teak exports, possibly by Vietnam.
- Wages are still very low – no wonder they are struggling to find workers? Are their timber margins so squeezed that they can't afford any more? Is there collusion in Luang Prabang between buyers – is there any transfer pricing, in which the Chinese company deliberately pays a low price to reduce tax? It would be interesting to see if Paklay is now starting to pay workers higher wages and growers higher prices as the kip depreciates?
- It was great to observe first-hand different wood processing operations in Laos and to experience the beautiful Laos scenery and cultural aspects. Also, the interaction between the study tour participants was excellent and will help with new projects in Laos.

2. How could the practices which you observed in Teak, Rubbers and Bamboo resources be changed in Laos?

- It would be good to have a study to see if the teak is being properly valued by the Lao government and if they are losing a lot of revenue to transfer pricing. This could be a policy study.
- Study if the wood properties of teak coppice are the same as planted teak – maybe there is some research already on this in Thailand.
- Some of the issues that need addressing are in the policy and incentive domain, such as the transfer pricing issue noted in the teak log and product pricing, environmental approvals/emissions, etc., as noted in the bamboo pulp factory and the charcoal facility, labour pricing etc. The rubber log peeling mill could benefit from more available suitable quality log resources to maintain production – however, issues here with the price that they are prepared to pay to growers and proximity to senile rubber trees available for harvest. There is also a priority in helping Laos processors minimise fungal and insect damage to rubberwood – urgently need improvements in wood protection practices.

3. Who should be involved in the change?

- The Faculty of Economics at NUoL could be a partner along with FFS – we need the expertise of both faculties if a study on transfer pricing and wood processing is to succeed.
- FoF
- Action is required across the value and supply chains from many stakeholders– government, researchers (universities), forest growers, wood processors, foreign aid groups, etc. It could be undertaken via the next ACIAR project.

4. What action do it need to take to manage better timber resources?

- Still need incentives for farmers to grow teak – but I worry that with these prices (same as about 20 years ago), farmers will not replant so much.
- Best practice management systems for timber resources are very well established internationally – probably more communication, extension, knowledge transfer, and demonstrations would help – however, there are also economical and policy barriers that need addressing

5. How could the tour be improved?

- No suggestion – I was not there the whole time.
- The tour was excellent – I would be keen to participate in another one to see more plantations and processors

Acknowledgements

The authors would like to thank the Australian Centre for Agricultural Research (ACIAR) for funding the study tour and the tour delegates from MOIC and MAF (DOF) for their interest and participation in the activities.

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Annex 1. Chinese National Standard for "*Discharge standard of water pollutants for pulp and paper industry*".

ICS 13.060.30

Z 60



中华人民共和国国家标准

GB3544-2008 代替 GB3544-2001

制浆造纸工业水污染物排放标准

Discharge standard of water pollutants for pulp and paper industry

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前 言

为贯彻《中华人民共和国环境保护法》、《中华人民共和国水污染防治法》、《中华人民共和国海洋环境保护法》、《国务院关于落实科学发展观 加强环境保护的决定》等法律、法规和《国务院关于编制全国主体功能区规划的意见》，保护环境，防治污染，促进制浆造纸工业生产工艺和污染治理技术的进步，制定本标准。本标准规定了制浆造纸工业企业水污染物排放限值、监测和监控要求。为促进区域经济与环境协调发展，推动经济结构的调整和经济增长方式的转变，引导工业生产工艺和污染治理技术的发展方向，本标准规定了水污染物特别排放限值。制浆造纸工业企业排放大气污染物（含恶臭污染物）、环境噪声适用相应的国家污染物排放标准，产生固体废物的鉴别、处理和处置适用国家固体废物污染控制标准。本标准首次发布于 1983 年，1992 年第一次修订，2001 年第二次修订。此次修订主要内容：

- 1、根据落实国家环境保护规划、履行国际公约和环境保护管理和执法工作的需要，调整了排放标准体系，增加了控制排放的污染物项目，提高了污染物排放控制要求；
- 2、规定了污染物排放监控要求和水污染物排放基准排水量；
- 3、将可吸附有机卤素指标调整为强制执行项目。

自本标准实施之日起，《造纸工业水污染物排放标准》（GB3544—2001）、《关于修订〈造纸工业水污染物排放标准〉的公告》（环发[2003]152 号）废止。

本标准由环境保护部科技标准司组织制订。

本标准由山东省环境保护局、山东省环境规划研究院、环境保护部环境标准研究所、山东省环境保护科学研究设计院等单位起草。

本标准环境保护部 2008 年 4 月 29 日批准。

本标准自 2008 年 8 月 1 日起实施。本标准由环境保护部解释。

制浆造纸工业水污染物排放标准

1 适用范围

本标准规定了制浆造纸企业或生产设施水污染物排放限值。

本标准适用于现有制浆造纸企业或生产设施的水污染物排放管理。

本标准适用于对制浆造纸工业建设项目的环境影响评价、环境保护设施设计、竣工环境保护验收及其投产后的水污染物排放管理。

本标准适用于法律允许的污染物排放行为。新设立污染源的选址和特殊保护区域内现有污染源的管理，按照《中华人民共和国大气污染防治法》、《中华人民共和国水污染防治法》、

《中华人民共和国海洋环境保护法》、《中华人民共和国固体废物污染环境防治法》、《中华人民共和国放射性污染防治法》、《中华人民共和国环境影响评价法》等法律、法规、规章的相关规定执行。

本标准规定的水污染物排放控制要求适用于企业向环境水体的排放行为。

企业向设置污水处理厂的城镇排水系统排放废水时，有毒污染物可吸附有机卤素

（AOX）、二噁英在本标准规定的监控位置执行相应的排放限值；其他污染物的排放控制要求由企业与企业与城镇污水处理厂根据其污水处理能力商定或执行相关标准，并报当地环境保护主管部门备案；城镇污水处理厂应保证排放污染物达到相关排放标准要求。

建设项目拟向设置污水处理厂的城镇排水系统排放废水时，由建设单位和城镇污水处理厂按前款的规定执行。

2 规范性引用文件

本标准内容引用了下列文件或其中的条款。

GB/T 6920-1986	水质 pH 值的测定 玻璃电极法
GB/T 7478-1987	水质 铵的测定 蒸馏和滴定法
GB/T 7479-1987	水质 铵的测定 纳氏试剂比色法
GB/T 7481-1987	水质 铵的测定 水杨酸分光光度法
GB/T 7488-1987	水质 五日生化需氧量（BOD ₅ ）的测定 稀释与接种法
GB/T 11893-1989	水质 总磷的测定 钼酸铵分光光度法

GB/T 11894-1989	水质 总氮的测定 碱性过硫酸钾消解紫外分光光度法
GB/T 11901-1989	水质 悬浮物的测定 重量法
GB/T 11903-1989	水质 色度的测定 稀释倍数法
GB/T 11914-1989	水质 化学需氧量的测定 重铬酸盐法
GB/T 15959-1995	水质 可吸附有机卤素（AOX）的测定 微库仑法
HJ/T 77-2001	水质 多氯代二苯并二噁英和多氯代二苯并呋喃的测定 同位素稀释高分辨毛细管气相色谱 / 高分辨质谱法
HJ/T 83-2001	水质 可吸附有机卤素（AOX）的测定 离子色谱法
HJ/T 195-2005	水质 氨氮的测定 气相分子吸收光谱法
HJ/T 199-2005	水质 总氮的测定 气相分子吸收光谱法

《污染源自动监控管理办法》（国家环境保护总局令第 28 号）

《环境监测管理办法》（国家环境保护总局令第 39 号）

3 术语和定义

下列术语和定义适用于本标准。

3.1 制浆造纸企业

指以植物（木材、其他植物）或废纸等为原料生产纸浆，及（或）以纸浆为原料生产纸张、纸板等产品的企业或生产设施。

3.2 现有企业

指本标准实施之日前已建成投产或环境影响评价文件已通过审批的制浆造纸企业。

3.3 新建企业

指本标准实施之日起环境影响文件通过审批的新建、改建和扩建制浆造纸建设项目。

3.4 制浆企业

指单纯进行制浆生产的企业，以及纸浆产量大于纸张产量，且销售纸浆量占总制浆量 80% 及以上的制浆造纸企业。

3.5 造纸企业

指单纯进行造纸生产的企业，以及自产纸浆量占纸浆总用量 20% 及以下的制浆造纸企业。

3.6 制浆和造纸联合生产企业

指除制浆企业和造纸企业以外、同时进行制浆和造纸生产的制浆造纸企业。

3.7 废纸制浆和造纸企业

指自产废纸浆量占纸浆总用量 80%及以上的制浆造纸企业。

3.8 排水量

指生产设施或企业向企业法定边界以外排放的废水的量，包括与生产有直接或间接关系的各种外排废水（如厂区生活污水、冷却废水、厂区锅炉和电站排水等）。

3.9 单位产品基准排水量

指用于核定水污染物排放浓度而规定的生产单位纸浆、纸张（板）产品的废水排放量上限值。

4 水污染物排放控制要求

4.1 自 2009 年 5 月 1 日起至 2011 年 6 月 30 日现有制浆造纸企业执行表 1 规定的水污染物排放限值。

表 1 现有企业水污染物排放限值

企业生产类型			制浆企业	制浆和造纸联合生产企业		造纸企业	污染物排放监控位置
				废纸制浆和造纸企业	其他制浆和造纸企业		
排放 限 值	1	pH 值	6~9	6~9	6~9	6~9	企业废水总排放口
	2	色度（稀释倍数）	80	50	50	50	企业废水总排放口
	3	悬浮物（mg/L）	70	50	50	50	企业废水总排放口
	4	五日生化需氧量（BOD ₅ , mg/L）	50	30	30	30	企业废水总排放口
	5	化学需氧量（COD _{Cr} , mg/L）	200	120	150	100	企业废水总排放口
	6	氨氮（mg/L）	15	10	10	10	企业废水总排放口
	7	总氮（mg/L）	18	15	15	15	企业废水总排放口
	8	总磷（mg/L）	1.0	1.0	1.0	1.0	企业废水总排放口
	9	可吸附有机卤素（AOX, mg/L）	15	15	15	15	车间或生产设施废水排放口
单位产品基准排水量，吨/吨（浆）			80	20	60	20	排水量计量位置与污染物排放监控位置一致
说明：							
1、可吸附有机卤素（AOX）指标适用于采用含氯漂白工艺的情况。							

2、纸浆量以绝干浆计。
3、核定制浆和造纸联合生产企业单位产品实际排水量，以企业纸浆产量与外购商品浆数量的总和为依据。

4.2 自 2011 年 7 月 1 日起，现有制浆造纸企业执行表 2 规定的水污染物排放限值。

4.3 自 2008 年 8 月 1 日起，新建制浆造纸企业执行表 2 规定的水污染物排放限值。

表 2 新建企业水污染物排放限值

企业生产类型			制浆企业	制浆和造纸联合生产企业	造纸企业	污染物排放监控位置
排放 限值	1	pH 值	6~9	6~9	6~9	企业废水总排放口
	2	色度（稀释倍数）	50	50	50	企业废水总排放口
	3	悬浮物（mg/L）	50	30	30	企业废水总排放口
	4	五日生化需氧量 （BOD ₅ , mg/L）	20	20	20	企业废水总排放口
	5	化学需氧量 （COD _{Cr} , mg/L）	100	90	80	企业废水总排放口
	6	氨氮(mg/L)	12	8	8	企业废水总排放口
	7	总氮(mg/L)	15	12	12	企业废水总排放口
	8	总磷(mg/L)	0.8	0.8	0.8	企业废水总排放口
	9	可吸附有机卤素 （AOX, mg/L）	12	12	12	车间或生产设施废水排放口
	10	二噁英（pgTEQ/L）	30	30	30	车间或生产设施废水排放口
单位产品基准排水量，吨/吨（浆）			50	40	20	排水量计量位置与污染物排放监控位置一致
说明： 1、可吸附有机卤素（AOX）和二噁英指标适用于采用含氯漂白工艺的情况。 2、纸浆量以绝干浆计。 3、核定制浆和造纸联合生产企业单位产品实际排水量，以企业纸浆产量与外购商品浆数量的总和为依据。 4、企业自产废纸浆量占企业纸浆总用量的比重大于 80%的，单位产品基准排水量为 20 吨/吨（浆）。 5、企业漂白非木浆产量占企业纸浆总用量的比重大于 60%的，单位产品基准排水量为 60 吨/吨（浆）。						

4.4 根据环境保护工作的要求，在国土开发密度较高、环境承载能力开始减弱，或水环境容量较小、生态环境脆弱，容易发生严重水环境污染问题而需要采取特别保护措施的地区，

应严格控制企业的污染物排放行为，在上述地区的企业执行表 3 规定的水污染物特别排放限值。

执行水污染物特别排放限值的地域范围、时间，由国务院环境保护行政主管部门或省级人民政府规定。

表 3 水污染物特别排放限值

企业生产类型			制浆企业	制浆和造纸联合 生产企业	造纸企业	污染物排放监控位置
排放 限值	1	pH 值	6~9	6~9	6~9	企业废水总排放口
	2	色度（稀释倍数）	50	50	50	企业废水总排放口
	3	悬浮物（mg/L）	20	10	10	企业废水总排放口
	4	五日生化需氧量 （BOD ₅ , mg/L）	10	10	10	企业废水总排放口
	5	化学需氧量 （COD _{Cr} , mg/L）	80	60	50	企业废水总排放口
	6	氨氮(mg/L)	5	5	5	企业废水总排放口
	7	总氮(mg/L)	10	10	10	企业废水总排放口
	8	总磷(mg/L)	0.5	0.5	0.5	企业废水总排放口
	9	可吸附有机卤素 （AOX, mg/L）	8	8	8	车间或生产设施废水排 放口
	10	二噁英（pgTEQ/L）	30	30	30	车间或生产设施废水排 放口
单位产品基准排水量，吨/吨（浆）			30	25	10	排水量计量位置与污染 物排放监控位置一致
说明：						
1、可吸附有机卤素（AOX）和二噁英指标适用于采用含氯漂白工艺的情况。						
2、纸浆量以绝干浆计。						
3、核定制浆和造纸联合生产企业单位产品实际排水量，以企业纸浆产量与外购商品浆数量的总和为依据。						
4、企业自产废纸浆量占企业纸浆总用量的比重大于 80%的，单位产品基准排水量为 15 吨/吨（浆）。						

4.5 水污染物排放浓度限值适用于单位产品实际排水量不高于单位产品基准排水量的情况。若单位产品实际排水量超过单位产品基准排水量，须按公式（1）将实测水污染物浓度换算为水污染物基准水量排放浓度，并以水污染物基准水量排放浓度作为判定排放是否达标的依据。产品产量和排水量统计周期为一个工作日。

在企业的生产设施同时生产两种以上产品、可适用不同排放控制要求或不同行业国家污染物排放标准，且生产设施产生的污水混合处理排放的情况下，应执行排放标准中规定的最严格的浓度限值，并按公式（1）换算水污染物基准水量排放浓度：

$$C_{\text{基}} = \frac{Q_{\text{总}}}{\sum Y_i Q_i} \times C_{\text{实}} \quad (1)$$

式中：

$C_{基}$ 一水污染物基准水量排放浓度，mg/L；

$Q_{总}$ 一排水总量，吨；

Y_i 一第 i 种产品产量，吨；

$Q_{基i}$ 一第 i 种产品的单位产品基准排水量，吨/吨；

$C_{实}$ 一实测水污染物浓度，mg/L。

若 $Q_{总}$ 与 $\sum Y_i Q_{基i}$ 的比值小于 1，则以水污染物实测浓度作为判定排放是否达标的依据。

5 水污染物监测要求

5.1 对企业排放废水采样应根据监测污染物的种类，在规定的污染物排放监控位置进行，有废水处理设施的，应在该设施后监控。在污染物排放监控位置须设置永久性排污口标志。

5.2 新建企业应按照《污染源自动监控管理办法》的规定，安装污染物排放自动监控设备，并与环境保护主管部门的监控设备联网，并保证设备正常运行。各地现有企业安装污染物排放自动监控设备的要求由省级环境保护行政主管部门规定。

5.3 对企业污染物排放情况进行监测的频次、采样时间等要求，按国家有关污染源监测技术规范的规定执行。

二噁英指标每年监测一次。

5.4 企业产品产量的核定，以法定报表为依据。

5.5 对企业排放水污染物浓度的测定采用表 4 所列的方法标准。

表 4 水污染物浓度测定方法标准

序号	污染物项目	方法标准名称	方法标准编号
1	pH 值	水质 pH 值的测定 玻璃电极法	GB/T 6920-1986

	色度	水质 色度的测定 稀释倍数法	GB/T 11903-1989
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2			
3	悬浮物	水质 悬浮物的测定 重量法	GB/T 11901-1989
4	五日生化需氧量	水质 五日生化需氧量（BOD ₅ ）的测定 稀释与接种法	GB/T 7488-1987
5	化学需氧量	水质 化学需氧量的测定 重铬酸盐法	GB/T 11914-1989
6	氨氮	水质 铵的测定 蒸馏和滴定法	GB/T 7478-1987
		水质 铵的测定 纳氏试剂比色法	GB/T 7479-1987
		水质 铵的测定 水杨酸分光光度法	GB/T 7481-1987
		水质 氨氮的测定 气相分子吸收光谱法	HJ/T 195-2005
7	总氮	水质 总氮的测定 碱性过硫酸钾消解紫外分光光度法	GB/T 11894-1989
		水质 总氮的测定 气相分子吸收光谱法	HJ/T 199-2005
8	总磷	水质 总磷的测定 钼酸铵分光光度法	GB/T 11893-1989
9	可吸附有机卤素（AOX）	水质 可吸附有机卤素（AOX）的测定 微库仑法	GB/T 15959-1995
		水质 可吸附有机卤素（AOX）的测定 离子色谱法	HJ/T 83-2001
10	二噁英	水质 多氯代二苯并二噁英和多氯代二苯并呋喃的测定 同位素稀释高分辨毛细管气相色谱 / 高分辨质谱法	HJ/T 77-2001

5.6 企业须按照有关法律和《环境监测管理办法》的规定，对排污状况进行监测，并保存原始监测记录。

6 实施与监督

6.1 本标准由县级以上人民政府环境保护行政主管部门负责监督实施。

6.2 在任何情况下，企业均应遵守本标准的水污染物排放控制要求，采取必要措施保证污染防治设施正常运行。各级环保部门在对企业进行监督性检查时，可以现场即时采样或监测的结果，作为判定排污行为是否符合排放标准以及实施相关环境保护管理措施的依据。在发现企业耗水或排水量有异常变化的情况下，应核定企业的实际产品产量和排水量，按本标准的规定，换算水污染物基准水量排放浓度。