UNEP IE - UNITED NATIONS ENVIRONMENT PROGRAMME
INDUSTRY AND ENVIRONMENT

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INDUSTRY & ENVIRONMENT

EMISSION STANDARDS & GUIDELINES

INFORMATION CLEARINGHOUSE

(IE-ESGIC)

Volume II

PULP & PAPER INDUSTRY

EFFLUENT DISCHARGE STANDARDS

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INTRODUCTION

What is the purpose of this document?

Establishing environmental standards and guidelines for potentially polluting industrial wastes: liquid effluents, air emissions and solid wastes, is an important first step for countries concerned about regulating industrial activities as part of their environmental pollution control strategies. UNEP IE has confirmed the need for information on such guidelines from the fact that more than 10 percent of the technical/scientific inquiries handled by the UNEP IE Query-Response Service concern air emission standards, effluent standards and other regulatory requirements for industrial activities.

To help in responding to these frequent requests, UNEP IE has set up an in-house database called *Industry and Environment Emission Standards and Guidelines Information Clearinghouse (IE-ESGIC)*.

UNEP IE feels that this information, even if not exhaustive, could be useful to its partners, and has therefore decided to publish *IE-ESGIC Compendiums* covering a range of industrial sectors.

This compendium for the pulp and paper industry has been prepared to provide helpful information to governments, industry, international organizations and non-governmental organizations, trade unions, research institutes and individuals that are interested in countries' effluent discharge standards for the industry.

How was the information collected, reviewed and compiled?

The initial information set was prepared by reviewing references available at UNEP IE, for a selection of countries. These data were reviewed by relevant experts or INFOTERRA national focal points in the countries covered, who provided comments and further material for inclusion.

How is the compendium structured?

The compendium consists of three parts. The first chapter give an overview of the various approaches to the regulation of industrial releases, other regulatory mechanisms for industrial activities, and major pollutants in effluents discharged from the pulp and paper industry. The second chapter describes ways in which countries have dealt with the problem, including examples of existing standards and guidelines in a number of countries. The last part provides some standards or guidelines developed by international organizations or conferences.

How should this compendium be used?

The extracts presented here should be treated as a preliminary source of information on countries' environmental regulations. They are summaries of raw data extracted from documents available at UNEP IE or from additional reference material provided by experts or national focal point in each country, without further evaluation or interpretation.

The numerical standards need to be interpreted with care, taking into account the way in which each regulation is actually applied. Direct comparisons of national standards are not always possible. For example, some standards may be applied directly to the effluents from industrial plants, while others may be general government guidelines, on the basis of which an inspectorate decides allowable limits for industrial discharges.

Due to space constraints and complexity of data coverage, the IE-ESGIC mainly presents national regulations. However, in some countries local administrations

have considerable powers in the field of pollution control and often impose different or more stringent requirements than those established at national level.

Due to the development of environmental technologies and policies, regulations continue to evolve. Therefore each extract may not necessarily reflect the current situation of each country at the time of reading.

Bearing the above in mind, users in need of complete information are recommended to contact the authoritative organizations of each country. For reference, the list of national focal points used for this compendium is presented in Appendix 1.

Finally, this report should be regarded as a working paper, reproduced without official editing. If articles are quoted from this document, the data source should be based on the document or publisher provided in the citation part of each article rather than this compendium, or UNEP IE.

How can we improve this document?

The IE-ESGIC is updated periodically to reflect changes in legislation. UNEP IE welcomes any information for such updates, as well as comments on contents (please see Appendix 2: Input sheet for additional inclusion). The exchange of data on industrial discharge standards between UNEP IE and its partners will provide fresh and useful information to those who require it, while enabling UNEP IE to keep its database up-to-date.

Overview of environmental discharge standards for the pulp and paper industry

OVERVIEW OF ENVIRONMENTAL DISCHARGE STANDARDS FOR THE PULP AND PAPER INDUSTRY

i. Approaches to the regulation of industrial releases

Control mechanisms for industrial releases vary greatly between countries, reflecting the specific historical, administrative and legal traditions of each. No international environmental standards can apply around the world, though there are some guidelines set up by international organizations and some international conventions dealing with transboundary environmental issues. Each region and country has its own needs and must set its own standards accordingly.

Industrial releases are normally regulated by media-specific standards under laws for the protection environmental quality or human health. There are two main approaches to the regulation of industrial releases.

The most common way is through the setting and enforcement of environmental discharge standards. Governments set limits to be achieved and it is left to industry to find the most effective way of achieving them. In its simplest form, a uniform standard will apply to all industries throughout the country. Occasionally separate sets of limits for specific industries/processes/sub-processes may be introduced.

The other approach is to specify the level or type of technology that must be installed to meet the legal objectives. Usually industry is required to install "best available" or "best practicable technology." This approach put more emphasis on the availability of suitable technology rather than on assessment of the assimilative capacity of the local environment. The competent authorities may publish information on a number of industries as a guide to the means by which they would determine whether adequate technological controls have been employed. Such information often includes guidelines on industrial discharges.

In a few countries, limits are defined for the quality of the receiving environment (i.e. ambient quality) rather than the discharges. In practice however, plant permits will use a combination of the two.

There may be separate sets of standards for different types of receptors. Standards for effluents may vary depending on whether they are discharged to inland or coastal waters. When wastewater is discharged into a public sewage system, the authorities usually specify the effluent standards necessary to protect the sewer and sewage treatment system.

Also, a distinction is often made between new and existing plants. Where this distinction is made, existing plants are usually granted a more lenient standard, or are allowed a period of grace before being required to comply with stricter standards. New plants are usually required to comply with the latest standard from the start.

In many countries, environmental responsibilities are divided between local or regional and central governments. While some regulations may be set at national level, local administrations often have considerable powers in the field of pollution control and can often impose different or more stringent requirements than those established at national level.

Industry, often through its trade associations, can also assist in establishing best practices for their members, and publish codes of practice. These codes may even be adopted by policy-makers to be used as legal guidance in setting standards for compliance.

Environmental legislation is only effective when it is supported by effective compliance and enforcement measures. Most countries now have environmental standards in place. But in order to ensure that all companies equally comply with them, governments also need to establish institutional procedures such as environmental permitting, inspection and enforcement. For these administrative

mechanisms to work effectively, adequate staff and resources are required.

From the technical and economic viewpoints, if standards are too ambitious or unrealistic, their implementation will be unworkable. Setting up the discharge standards is a gradual process requiring continuous evaluation and modifications, taking into account the technical or economic conditions of the region. Thus the final standards "evolve" rather than being "created".

Regarding the expression of discharge standards, most countries adopt one of the following approaches:

- in terms of the concentration of pollutants in effluents or air emission streams; or

- in terms of the allowable quantity of pollutants discharged, usually per certain period, unit of raw material input or product output.

The concentration of pollutants is theoretically determinable at a single instant but in practice is taken as the average concentration of a number of samples. On the other hand, the quantity measure, being flow dependent, must be determined by a series of analyses of concentrations and flow rates over a specified time period.

ii. Other regulatory provisions for industrial activities

Discharge standards can only a part of the wider framework of environmental regulation for industrial activities. While the regulation of environmental releases retains a vital role, other control instruments are also indispensable to minimize environmental impacts of industrial plants, including the following:

- Environmental impact assessment;

  Environmental impact assessment contributes to the decision-making process by focusing on the environmental issues surrounding industrial and other projects before, during and after they are implemented. A systematic consideration of environmental impacts often leads to the identification of alternative process options, and of mitigation measures for pollution, and as a result can have a major influence on the design of a project.

- Land-use planning and zoning for industries;

  Where an external impact is expected from a plant, correct siting is one of the most important environmental decisions to be made. The environmental impact assessment process provides valuable information for zoning or siting decisions. However, siting criteria or regulations may also exist under planning laws.

- Ambient environmental quality standards;

  In addition to regulating actual discharges, some countries also apply ambient environmental standards. In such cases, allowed discharge limits must be consistent with these standards. Some countries do not have discharge standards, but instead specify the desired quality of the receiving environment, which may not be exceeded.

- Waste disposal;

  When solid wastes are generated, it is necessary to ensure that such wastes, including contaminated sludges, are kept in special areas and containers and are disposed of in a safe manner, taking their characteristics into consideration.

- Standards for storage, transport, labelling and packaging of certain chemicals;

  The Code of Practice prepared by UN Committee on the Transport of Dangerous

Goods is often used as the basic document for national legislation.

- Ban on the use of certain chemicals;

  The use of certain chemicals is now banned in some countries due to their hazardous nature. The UN also publishes the Consolidated List of Products whose Consumption and/or Sale Have Been Banned, Withdrawn, Severely Restricted or Not Approved by Governments.

- Product and process standards;

  In some instances, pollution control has been achieved by the use of product or process standards (e.g. the problem of sulphur oxides emissions from the burning of fuel-oil has sometimes been confronted by specifying maximum concentrations of sulphur in the fuel-oil).

- Limits for occupational health and safety;

  This problem is likely to be addressed in most countries under general industrial safety regulations. International organizations such as ILO (International Labour Office) and WHO (World Health Organization) also publish guidelines, mostly for exposure to airborne pollutants, noise and radiation.

- Emergency planning;

  Some operations have the possibility to generate major accidents which endanger local populations. In such cases, it is recommended to establish emergency plans complementary to general emergency planning. UNEP IE has developed the *APELL - Awareness and Preparedness for Emergencies at Local Level - Programme*, including the publication of handbooks and other documents.

- Site remediation and liability;

  Many governments are now requiring by law that companies clean up sites that have been contaminated by leakage of chemicals.

- Environmental auditing;

  Auditing is a periodic review of environmental performance and is not confined to verifying compliance to regulations. Full environmental auditing is still not required under law, and is regarded as an internal tool.

- International conventions;

  Through signature and ratification, members of a convention signify their commitment to the convention's goals, which are implemented through national legislation. Important conventions for industry include:

  * UN Framework Convention on Climate Change
  * Montreal Protocol on Substances that Deplete the Ozone Layer
  * London Convention on the Dumping of Waste at Sea
  * Basel Convention on the Transboundary Movement of Hazardous Wastes
  * London Guidelines on International Trade in Chemicals

iii. Main pollutants in effluents from the pulp and paper industry

Effluent characteristics vary depending on the raw materials, manufacturing processes, and reuse/recycling methods.

The most significant pollution originates from the bleaching and pulping processes of raw fibre materials (wood, straw, bagasse, recycled fibre, etc). Depending on the raw material used, wastewaters from these processes contain large quantities of lignin and hemicellulose. The characteristics of these wastewaters are their high quantities of BOD, COD, chromaticity, and SS.

Mechanical pulping operations usually generate fewer pollutants.

The BOD in the mill effluent is usually a considerable part of the wood components dissolved in the pulping and bleaching processes, whereas that of COD mainly consists of high molecular weight substances of lignin and carbohydrate origin. Such components are usually coloured. The major part of SS comes from fibres and fibre particles. A problem with effluent from processes using rice straw and similar materials is a high silica content.

The toxic effects of pulp mill discharges have been studied intensively in recent years. In bleaching of chemical pulp using molecular chlorine, a wide spectrum of chlorinated organic compounds, such as 2378-TCDD and 2378-TCDF, is produced. AOX (Absorbable Organic Chlorine) is usually adopted as a parameter for these pollutants. A local chlorine production plant may itself generate significant pollution, depending on the process used. Mercury cell production is especially problematical.

Pulp and paper manufacturing still uses large volumes of water in most stages of processing, but extensive reuse and recycle, and segregation of relatively clean used water from more contaminated water and condensates have now become common practice. Such measures enable mills to significantly reduce their requirements for fresh water, with a corresponding reduction of volumes of effluents requiring treatment. A considerable reduction of fibre, chemical and heat loss, and of contamination of receiving waters has been achieved simultaneously.

National environmental standards for the pulp and paper industry

****
***** Record No. Pp-1

Headline: Environmental guidelines for new bleached eucalypt kraft pulp mills in Australia

1. Descriptors

1.1. Country: Australia

1.2. Industry: Pulp and paper industry

1.3. Mode: Discharge standards

1.4. Medium: Water/Effluent

1.5. Parameters: TSS, BOD, AOX, 2378-TCDD, oil & grease, fish toxicity

2. Legal reference

2.1. Title of the law/regulations: Commonwealth of Australia - Environmental Guidelines for New Bleached Eucalypt Kraft Pulp Mills.

2.2. Date issued: 1989

2.3. Date amended: -

3. Summary

The following limits are set on pollutants in the liquid effluent stream to be discharged into the receiving waters:

category	parameter	standard	unit
new bleached eucalypt kraft pulp mills	TSS	8 (*1)	kg/ADt
	BOD	7 (*2)	kg/ADt
	AOX	1 (*3)	kg/ADt
	AOX	2.5 (*4)	kg/ADt
	2378-TCDD	no detectable increase in the receiving water (or 20 ppq)	
	dioxins	5 ppt (*5)	
	oil & grease	no visible contamination (*6)	
	acute toxicity:		
	96hr LC50 rainbow trout	100	%
	48hr LC50 daphnia	100	%

*1) 24 hr composite.

*2) One day max.

*3) Yearly moving average based on actual tonnage for the year.

*4) Any day test based on the rated capacity of the mill.

*5) TCDD equivalents.

*6) Daily sample.

*7) kg/ADt: in kilograms per air dried tonne of pulp produced.

4. Citation

4.1. Title of document:	Environmental Guidelines for New Bleached Eucalypt Kraft Pulp Mills.
4.2. Publisher:	Commonwealth of Australia
4.3. Date published:	1989
4.4. Publisher Reference Code:	-
4.5. IEO Library Code:	60.4/PAPI

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***** Record No. Pp-2

Headline: Federal effluent standards in Brazil

1. Descriptors

1.1. Country: Brazil

1.2. Industry: All industries including pulp and paper industry

1.3. Mode: Discharge standards

1.4. Medium: Water/Effluent

1.5. Parameters: pH, temperature, settleable matter, mineral oil, vegetable oil, floating matter, ammonium, total arsenic, barium, boron, cadmium, cyanide, lead, copper, chromium (VI), chromium (III), stannum, phenol index, soluble iron, fluorine, soluble manganese, mercury, nickel, silver, selenium, sulphate, sulphite, zinc, organo-phosphoric and total carbonates, carbon sulphate, trichloroethane, chloroform, tetrachlorocarbon, dichloroethane, organo-chloric compounds not listed above

2. Legal reference

2.1. Title of the law/regulations: Conselho Nacional do Meio Ambiente Resolução No. 20, 18 June 1986, Article 21

2.2. Date issued: 18 June 1986

2.3. Date amended: -

3. Summary

parameter	limit	unit
pH	5-9	-
temperature	40	°C
settleable matter	1	ml/l
mineral oil	20	mg/l
vegetable oil	50	mg/l
floating matter	absent	-
ammonium	5.0	mg/l
total arsenic	0.5	mg/l
barium	5.0	mg/l
boron	5.0	mg/l
cadmium	0.2	mg/l
cyanide	0.2	mg/l
lead	0.5	mg/l
copper	1.0	mg/l
chromium (VI)	0.5	mg/l
chromium (III)	2.0	mg/l
stannum	4.0	mg/l
phenol index	0.5	mg/l
soluble iron	15.0	mg/l
fluorine	10.0	mg/l
soluble manganese	1.0	mg/l
mercury	0.01	mg/l
nickel	2.0	mg/l
silver	0.1	mg/l
selenium	0.05	mg/l
sulphate	1.0	mg/l
sulphite	1.0	mg/l
zinc	5.0	mg/l

organo-phosphoric compounds and total carbonates	1.0	mg/l
carbon sulphate	1.0	mg/l
trichloroethane	1.0	mg/l
chloroform	1.0	mg/l
tetrachlorocarbon	1.0	mg/l
dichloroethane	1.0	mg/l
organo-chloric compounds not listed above	0.05	mg/l

4. Citation

4.1. Title of document: "Legislação Federal Controle da poluição ambiental"

4.2. Publisher: CETESB - Companhia de Tecnologia de Saneamento Ambiental

4.3. Date published: 1993

4.4. Publisher Reference Code: -

4.5. IEO Library Code: -

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***** Record No. Pp-3

Headline: Effluent standards in São Paulo State in Brazil

1. Descriptors

1.1. Country: Brazil, local (São Paulo)

1.2. Industry: All industries including pulp and paper industry

1.3. Mode: Discharge standards

1.4. Medium: Water/Effluent

1.5. Parameters: pH, temperature, settleable matter, soluble matter, BOD, arsenic, barium, boron, cadmium, cyanide, lead, copper, chromium (VI), total chromium, stannum, phenol, iron, soluble iron, fluorine, soluble manganese, mercury, nickel, silver, selenium, zinc

2. Legal reference

2.1. Title of the law/regulations: Conselho Nacional do Meio Ambiente Resolução No. 20, 18 June 1986, Article 21; Estado São Paulo Decreto No. 8468, 8 September 1976, Article 18

2.2. Date issued: -

2.3. Date amended: -

3. Summary

parameter	limit	unit
pH	5.0-9.0	-
temperature	40	°C
settleable matter	1	ml/l
soluble matter	100	mg/l
BOD	60	mg/l
arsenic	0.2	mg/l
barium	5.0	mg/l
boron	5.0	mg/l
cadmium	0.2	mg/l
cyanide	0.2	mg/l
lead	0.5	mg/l
copper	1.0	mg/l
chromium (VI)	0.1	mg/l
total chromium	5.0	mg/l
stannum	4.0	mg/l
phenol	0.5	mg/l
iron	0.5	mg/l
soluble iron	15.0	mg/l
fluorine	10.0	mg/l
soluble manganese	1.0	mg/l
mercury	0.01	mg/l
nickel	2.0	mg/l
silver	0.02	mg/l
selenium	0.02	mg/l
zinc	5.0	mg/l

4. Citation

4.1. Title of document:	"Legislação Estadual Controle da poluição ambiental, Estado de São Paulo"
4.2. Publisher:	CETESB - Companhia de Tecnologia de Saneamento Ambiental
4.3. Date published:	1994
4.4. Publisher Reference Code:	-
4.5. IEO Library Code:	-

****
***** Record No. Pp-4

Headline: Regulations pursuant to the Fisheries Act, as amended in 1992

1. Descriptors

1.1. Country:	Canada
1.2. Industry:	Pulp and paper industry
1.3. Mode:	Discharge standards
1.4. Medium:	Water/Effluent
1.5. Parameters:	BOD, SS, acute lethality

2. Legal reference

2.1. Title of the law/regulations:	Federal Fisheries Act, Pulp and Paper Effluent Regulations.
2.2. Date issued:	May 20, 1992
2.3. Date amended:	-

3. Summary

The Federal Government revoked the 1971 Pulp and Paper Effluent Regulations and promulgated the 1992 Pulp and Paper Effluent Regulations prescribing limits related to the effluent from pulp and paper mills and off-site treatment facilities (where applicable). Some provinces have also established their own regulations, provided that they are at least as stringent as those established by the Federal Government.

category	parameter	standards (*1) I	standards (*1) II	unit
pulp and paper mills	BOD	12.5	7.5	kg/metric ton product
	SS	18.75	11.25	kg/metric ton product
mills producing dissolving grade sulphite pulp	BOD	45	27	kg/metric ton product
	SS	62.5	37.5	kg/metric ton product
all pulp and paper mills	acute lethality	at least 50% of the test fish (rainbow trout) must survive for 96 hours in 100% effluent.		

*1) I : Daily maximum.
II: Monthly average.

*2) Loading limit = standard multiplied by the highest value of the 90th percentiles of the daily production of finished product (tonnes/day) at the mill for any of the previous three years.

*3) Limits for mills under an authorization are based on percent removals of contaminants.

*4) Limits for off-site treatment facilities that fall under the regulations (i.e. most of the water they treat comes from a single mill) are based on a percent removal of contaminants.

4. Citation

4.1. Title of document:	Direct communication with Environment Canada, Conservation and Protection. Environmental Protection-Ontario Region on Canadian Effluent Regulations for Pulp and Paper Industry
4.2. Publisher:	-
4.3. Date published:	Dec. 1994
4.4. Publisher Reference Code:	-
4.5. IEO library Code:	-

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***** Record No. Pp-5

Headline: Regulations under the 1988 Canadian Environmental Protection Act

1. Descriptors

1.1. Country: Canada

1.2. Industry: Pulp and paper industry

1.3. Mode: Discharge standards

1.4. Medium: Water/Effluent

1.5. Parameters: 2378-TCDD, 2378-TCDF

2. Legal reference

2.1. Title of the law/regulations: Canadian Environmental Protection Act, Pulp and Paper Mill Effluent Chlorinated Dioxins and Furans Regulations.

2.2. Date issued: May 20, 1992

2.3. Date amended: -

3. Summary

The Federal Government developed regulations under the 1988 Canadian Environmental Protection Act (CEPA) that controls the discharge of persistent toxics such as 2378-TCDD, 2378-TCDF.

category	parameter	standard	unit
chlorine bleaching plants (using chlorine or chlorine dioxide)	2378-TCDD	non-detectable (15 ± 5)	pg/l
	2378-TCDF	non-detectable (50)	pg/l

4. Citation

4.1. Title of document: Direct communication with Environment Canada, Conservation and Protection, Environmental Protection-Ontario Region on Canadian Effluent Regulations for Pulp and Paper Industry

4.2. Publisher: -

4.3. Date published: Dec. 1994

4.4. Publisher Reference Code: -

4.5. IEO library Code: -

****
***** Record No. Pp-6

Headline: Alberta Province goal of limiting AOX

1. Descriptors

1.1. Country:	Canada, local (Alberta)
1.2. Industry:	Pulp and paper industry
1.3. Mode:	Discharge standards
1.4. Medium:	Water/Effluent
1.5. Parameter:	AOX

2. Legal reference

2.1. Title of the law/regulations:	No regulations - Licence to Operate of Use Pursuant to Section 4 of the Clean Water Act
2.2. Date issued:	-
2.3. Date amended:	-

3. Summary

category	parameter	standard	unit
pulp and paper mills	AOX	2.0 (*1)	kg/metric ton product
		1.0 (*2)	kg/metric ton product
		0.5 (*3)	kg/ADMT (*4)

*1) Maximum limitation being discussed.

*2) Possible provincial goal by the end of 1991.

*3) Possible provincial goal by the end of 1995.

*4) ADMT; Air Dried Metric Ton.

4. Citation

4.1. Title of document:	Clean Water Act
4.2. Publisher:	Government of Alberta
4.3. Date published:	-
4.4. Publisher Reference Code:	-
4.5. IEO library Code:	-

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***** Record No. Pp-7

Headline: New guidelines in British Colombia

1. Descriptors

1.1. Country:	Canada, local (British Colombia)
1.2. Industry:	Pulp and paper industry
1.3. Mode:	Discharge standards
1.4. Medium:	Water/Effluent
1.5. Parameter:	AOX

2. Legal reference

2.1. Title of the law/regulations:	Pulp Mill and Pulp and Paper Mill Liquid Effluent Control Regulations
2.2. Date issued:	Dec. 13, 1990
2.3. Date amended:	-

3. Summary

The BC Provincial Government has issued new guidelines which will contain among other things an AOX limitations.

category	parameter	standard	unit
pulp and paper mills	AOX	2.5 (*1)	kg/metric ton product
		1.5 (*2)	kg/metric ton product
		0.0 (*3)	kg/metric ton product

*1) by 1991.

*2) by 1994.

*3) By 2000-2002, New regulations to eliminate AOX from effluent, Jan. 1992.

While these standards have not been officially established, they are being incorporated into orders and permits. Mills are designing systems to meet the limits and the dates established.

4. Citation

4.1. Title of document:	"Pulp Mill and Pulp and Paper Mill Liquid Effluent Control Regulations"
4.2. Publisher:	Government of British Columbia
4.3. Date published:	1990
4.4. Publisher Reference Code:	-
4.5. IEO library Code:	-

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***** Record No. Pp-8

Headline: Municipal/Industrial strategy for abatement

1. Descriptors

1.1. Country: Canada, local (Ontario)

1.2. Industry: Pulp and paper industry

1.3. Mode: Discharge standards

1.4. Medium: Water/Effluent

1.5. Parameters: BOD, SS, AOX, phosphorus, chloroform, toluene, phenol, 2378-TCDD, 2378-TCDF, TEQ, acute lethality

2. Legal reference

2.1. Title of the law/regulations: Effluent Monitoring and Effluent Limits - Pulp and Paper Sector

2.2. Date issued: August 1993

2.3. Date amended: -

3. Summary

In 1985, the Province launched the MISA program with the goal of elimination of persistent toxic compounds from the waters of the Province of Ontario. This program addressed all mills and resulted in the development of the following limits:

category	parameter	standards (*1) I	standards (*1) II	unit (*2)
sulphate (kraft) and sulphite-mechanical mills	BOD	10.0	5.00	kg/MT product
	SS	13.4	7.87	kg/MT product
	AOX I	3.22	2.5	kg/MT product
	(*3) II	1.93	1.5	kg/MT product
	III	1.03	0.8	kg/MT product
	phosphorus	0.142	0.0863	kg/MT product
	chloroform	0.00372	0.00188	kg/MT product
	toluene	0.000215	0.000215	kg/MT product
	phenol	0.000413	0.000413	kg/MT product
	2378-TCDD	non-detectable (20)		pg/l
	2378-TCDF	non-detectable (50)		pg/l
	TEQ	60		pg/l
	acute lethality	at least 50% of the test species must survive for 96 hours in 100% effluent.		
corrugating medium and other mills (*5)	BOD	4.57	2.91	kg/MT product
	SS	7.76	4.57	kg/MT product
	phosphorus	0.0825	0.0502	kg/MT product
	chloroform	0.00217	0.00109	kg/MT product
	toluene	0.000215	0.000215	kg/MT product
	phenol	0.000240	0.000240	kg/MT product
	2378-TCDD	non-detectable (20)		pg/l
	2378-TCDF	non-detectable (50)		pg/l
	TEQ	60		pg/l
	acute lethality	at least 50% of the test species must survive for 96 hours in 100% effluent.		

*1) I : Daily maximum.
II: Monthly average.

*2) kg/MT: kg/metric ton.

*3) I : To January 31, 1996.
II : To January 31, 2000.
III: After January 31, 2000.

*4) Loading limit = standard multiplied by the highest value of the 90th percentiles of the daily production of finished product (tonnes/day) at the mill for any of the previous three years.

*5) AOX limits only apply to bleach plant mills. Mills must submit information outlining methods which could eliminate AOX by the year 2002.

*6) Other mills include deinking, board, fine papers and tissue mills.

4. Citation

4.1. Title of document:	Direct communication with Environment Canada, Conservation and Protection, Environmental Protection-Ontario Region on Canadian Effluent Regulations for Pulp and Paper Industry
4.2. Publisher:	-
4.3. Date published:	Dec. 1994
4.4. Publisher Reference Code:	-
4.5. IEO library Code:	-

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***** Record No. Pp-9

Headline: Regulations under the Quality of the Environment Law

1. Descriptors

1.1. Country:	Canada, local (Quebec)
1.2. Industry:	Pulp and paper industry
1.3. Mode:	Discharge standards
1.4. Medium:	Water/Effluent
1.5. Parameter:	AOX, 2378-TCDD, 2378-TCDF

2. Legal reference

2.1. Title of the law/regulations:	Regulations under the Quality of the Environment Law
2.2. Date issued:	Oct., 1992
2.3. Date amended:	-

3. Summary

New regulations for Quebec were published in October in 1992. In addition to regulating TSS, BOD, PCBs and total hydrocarbons, the limits on the discharges of organochlorines were established.

category	parameter	standard	unit
softwood mills	AOX	2.0 (*1)	kg/metric ton bleached product (30 day average)
hardwood mills	AOX	1.5 (*1)	kg/metric ton product (30 day average)
all mills	AOX	0.8 (*2)	kg/metric ton product (30 day average)
all mills	2378-TCDD	15 (*3)	ppq

*1) Effective 1 Jan. 1994 to 29 Sep. 1995.

*2) Effective 1 Jan. 2001.

*3) total equivalent toxicity of 2378-TCDD.

4. Citation

4.1. Title of document:	Regulations for Pulp and Paper Mills
4.2. Publisher:	Government of Quebec
4.3. Date published:	Oct. 22, 1992
4.4. Publisher Reference Code:	-Q-2, r 12
4.5. IEO library Code:	-

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***** Record No. Pp-10

Headline: New discharge standards of water pollutants for pulp and paper industry in China

1. Descriptors

1.1. Country: China

1.2. Industry: Pulp and paper industry

1.3. Mode: Discharge standards

1.4. Medium: Water/Effluent

1.5. Parameter: Discharge volume, pH, BOD, COD, SS, AOX

2. Legal reference

2.1. Title of the law/regulations: The Environmental Protection Law of China, the Water Pollution Prevention and Control Law of China, the Ocean Environmental Protection Law of China, the Standard of Ocean Water Quality (GB 3097), and the Environmental Quality Standard for Surface Water (GB 3838)

2.2. Date issued: Approved on 18 May and put into effect on 1 July 1992

2.3. Date amended: -

3. Summary

(1) Projects approved to construct and mills put into production before 1 January 1989.

category	parameter	standards (*1) I	II	III	unit
Wood pulp and paper making					
unbleached	discharge volume	220.0	220.0	220.0	m^3/t product
	pH	6-9	6-9	6-9	-
	BOD	150	180	600	mg/l
	COD	350	400	1000	mg/l
	SS	200	250	400	mg/l
bleached	discharge volume	320.0	320.0	320.0	m^3/t product
	pH	6-9	6-9	6-9	-
	BOD	150	180	600	mg/l
	COD	350	400	1000	mg/l
	SS	200	250	400	mg/l
Non-wood pulp and paper making					
unbleached	discharge volume	270.0	270.0	270.0	m^3/t product
	pH	6-9	6-9	6-9	-
	BOD	150	200	600	mg/l
	COD	350	450	1000	mg/l
	SS	200	250	400	mg/l
bleached	discharge volume	370.0	370.0	370.0	m^3/t product
	pH	6-9	6-9	6-9	-

	BOD	150	200	600	mg/l
	COD	350	450	1000	mg/l
	SS	200	250	400	mg/l
Paper, paperboard and pulpboard making only					
	discharge volume	80.0	80.0	80.0	m^3/t product
	pH	6-9	6-9	6-9	-
	BOD	60	80	500	mg/l
	COD	150	200	1000	mg/l
	SS	100	250	400	mg/l

(2) Projects approved to construct and mills put into production between 1 January 1989 and 30 June 1992.

category	parameter	standards (*1) I	II	III	unit
Wood pulp and paper making					
unbleached	discharge volume	190	190	190	m^3/t product
	pH	6-9	6-9	6-9	-
	BOD	30	150	600	mg/l
	COD	100	350	800	mg/l
	SS	70	200	400	mg/l
bleached	discharge volume	280	280	280	m^3/t product
	pH	6-9	6-9	6-9	-
	BOD	30	150	600	mg/l
	COD	100	350	800	mg/l
	SS	70	200	400	mg/l
Non-wood pulp and paper making					
unbleached	discharge volume	230	230	230	m^3/t product
	pH	6-9	6-9	6-9	-
	BOD	30	150	600	mg/l
	COD	100	450	1000	mg/l
	SS	70	200	400	mg/l
bleached	discharge volume	330	330	330	m^3/t product
	pH	6-9	6-9	6-9	-
	BOD	30	150	600	mg/l
	COD	100	450	1000	mg/l
	SS	70	200	400	mg/l
Paper, paperboard and pulpboard making only					
	discharge volume	70.0	70.0	70.0	m^3/t product
	pH	6-9	6-9	6-9	-
	BOD	30	60	500	mg/l
	COD	100	150	500	mg/l
	SS	70	200	400	mg/l

(3) Projects approved to construct and mills put into production after 1 July 1992.

category	parameter	standards I	II	III	unit
Wood pulp and paper making					
unbleached	discharge volume	150	150	150	m^3/t product
	pH	6-9	6-9	6-9	-
	BOD	4.5	15.0	75	kg/t
		30	100	500	mg/l

	COD	15.0	52.5	120	kg/t
		100	350	800	mg/l
	SS	10.5	30	60	kg/t
		70	200	400	mg/l
bleached	discharge volume	240	240	240	m^3/t product
	pH	6-9	6-9	6-9	-
	BOD	7.2	28.8	120	kg/t
		30	120	500	mg/l
	COD	24.0	84.0	192	kg/t
		100	350	800	mg/l
	SS	16.8	48	96	kg/t
		70	200	400	mg/l
	AOX	1.5	2.5	-	kg/t
		8	10	-	mg/l
Non-wood pulp and paper making					
unbleached	discharge volume	190	190	190	m^3/t product
	pH	6-9	6-9	6-9	-
	BOD	5.7	28.5	114	kg/t
		30	150	600	mg/l
	COD	19.0	85.5	171	kg/t
		100	450	900	mg/l
	SS	13.3	38	76	kg/t
		70	200	400	mg/l
bleached	discharge volume	290	290	290	m^3/t product
	pH	6-9	6-9	6-9	-
	BOD	8.7	43.5	174	kg/t
		30	150	600	mg/l
	COD	29.0	130.5	261	kg/t
		100	450	900	mg/l
	SS	20.3	58	116	kg/t
		70	200	400	mg/l
	AOX	1.5	2.5	-	kg/t
		7	9	-	mg/l
Paper, paperboard and pulpboard making only					
	discharge volume	60.0	60.0	60.0	m^3/t product
	pH	6-9	6-9	6-9	-
	BOD	1.8	3.6	-	kg/t
		30	60	400	mg/l
	COD	6.0	9.0	-	kg/t
		100	150	500	mg/l
	SS	4.2	6	-	kg/t
		70	100	400	mg/l

*1) I : Applied to effluents discharged into grade III water bodies of GB 3838, in which water body protection areas are expected, and grade II ocean water bodies of GB 3097.

II : Applied to effluents discharged into grade IV and V water bodies of GB 3838 and grade III ocean water body of 3097.

III: Applied to effluents discharged into the municipal sewers equipped with secondary effluent treatment plants. Unless secondary treatment plant is equipped, the above regulation must be implemented according to the function requirements of the receiving water bodies.

In water bodies of grade I, II and water body protection areas of grade III of GB 3097, as well as in ocean bodies of grade I of GB 3097, any new discharging source is forbidden to construct. When rebuilding and enlarging of existing pulp and paper mills, the total pollutant discharging quantities could not be increased.

*2) AOX is a reference parameter.

*3) Allowable quantity limits expressed in kg/t product are technical reference parameters.

4. Citation

4.1. Title of document:	"Discharge Standards of Water pollutants for Paper Industry"
4.2. Publisher:	Environmental Protection Agency of China and Technological Supervision Agency of China
4.3. Date published:	18 May 1992
4.4. Publisher Reference Code:	GB 3544-92
4.5. IEO library Code:	-

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***** Record No. Pp-11

Headline: The national goals for environmental protection by the forest industry in Finland

1. Descriptors

1.1. Country: Finland

1.2. Industry: Pulp and paper industry

1.3. Mode: Discharge standards

1.4. Medium: Water/Effluent

1.5. Parameter: BOD, phosphorus, AOX, COD, BOD

2. Legal reference

2.1. Title of the law/regulations: The Water Act (1961) and the Act on the Prevention of Marine Pollution

2.2. Date issued: -

2.3. Date amended: -

3. Summary

In its programme of objectives to be reached by 1995 the Government has set the following goals for the pulp and paper industry. The programme was extended in 1991 to cover the mechanical forest industry as well:

category	parameter	standard	unit
pulp and paper	BOD_7	160	tonnes per day
	phosphorus	1.5	tonnes per day
pulp	AOX	1.4	kg per tonne of pulp
	COD	65	kg per tonne of pulp
	phosphorus	60	g per tonne of pulp
fibreboard	BOD_7	10	kg per tonne

4. Citation

4.1. Title of document: "Environmental Report 1993"

4.2. Publisher: Finnish Forest Industries Federation

4.3. Date published: 1993

4.4. Publisher Reference Code: -

4.5. IEO library Code: -

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***** Record No. Pp-12

Headline: Maximum permitted amounts of suspended solids and oxygen-consuming substances in wastewaters from chemical pulp mills in France

1. Descriptors

1.1. Country: France

1.2. Industry: Pulp and paper industry

1.3. Mode: Discharge standards

1.4. Medium: Water/Effluent

1.5. Parameter: SS, BOD

2. Legal reference

2.1. Title of the law/regulations: -

2.2. Date issued: -

2.3. Date amended: -

3. Summary

The control of wastewaters from existing chemical and semi-chemical pulp mills is based on a July 1972 agreement between the Ministry for the Environment and the Chairman of the French Confederation of Paper, Board and Cellulose Industries.

The agreement established a programme for the reduction of pollution, to be carried out in the following stages:

- reduction of amount of suspended solids,
- reduction of amount of oxygen-consuming substances,
- elimination of sludges and solid wastes,
- color reduction,
- elimination or utilization of spent liquor.

Compliance with the limit was to be achieved by certain dates, depending on the size of the mill concerned and its "geographical priority", the latter reflecting the importance of the area in which the mill is situated, from the point of view of water supplies.

category	parameter	standards (*1) I	standards (*1) II	unit
kraft pulping:				
unbleached	SS	2.5	10	kg/tonne
	BOD	-	5	kg/tonne
bleached	SS	10	20	kg/tonne
	BOD	-	9	kg/tonne
sulphite pulping:				
with elimination or utilization of spent liquor	SS	12.5	50	kg/tonne
	BOD	-	45	kg/tonne
without elimination or utilization of spent liquor	SS	15	85	kg/tonne
	BOD	-	80	kg/tonne
neutral sulphite semi-chemical pulping:				

capacity > 150 tons/day	SS	5	5	kg/tonne
	BOD	-	8	kg/tonne
capacity < 150 tons/day	SS	13	60	kg/tonne
	BOD	-	60	kg/tonne

*1) I : Stage 1.
II: Stage 2.

4. Citation

4.1. Title of document:	"Compendium of Environmental Guidelines and Standards for Industrial Discharges"
4.2. Publisher:	WHO
4.3. Date published:	1983
4.4. Publisher Reference Code:	EFP/83.49
4.5. IEO library Code:	-

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***** Record No. Pp-13

Headline: Effluent standards for pulp and paper industry in Germany

1. Descriptors

1.1. Country: Germany

1.2. Industry: Pulp and paper industry

1.3. Mode: Discharge standards

1.4. Medium: Water/Effluent

1.5. Parameter: BOD, COD, AOX, Fish Toxicity

2. Legal reference

2.1. Title of the law/regulations: Nineteenth General Administrative Regulation Concerning the Minimum Requirements to Be Met by Effluent Discharges into Waters (Pulp and Paper Industry)

2.2. Date issued: 1989

2.3. Date amended: -

3. Summary

category	parameter	standard	unit
sulphite pulp mills	BOD	5	kg/metric ton pulp
	COD	70	kg/metric ton pulp
	AOX	1.0	kg/metric ton pulp
	G_F (*1)	2	-

*1) Fish toxicity as dilution factor.

4. Citation

4.1. Title of document: "Neunzehnte Allgemeine Verwaltungsvorschrift, Teil A, über Mindestanforderungen an das Einleiten von Abwasser in Gewässer (Zellstofferzeugung), 19. Abwasser Vw V, Teil A - Vom 18. Mai 1989

4.2. Publisher: Der Bundesminister für Umwelt, Naturschutz und Reaktorsicherheit

4.3. Date published: 1989

4.4. Publisher Reference Code: Gemeinsames Ministerialblatt, 6 June 1989

4.5. IEO library Code: -

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***** Record No. Pp-14

Headline: Industrial effluent standards in India

1. Descriptors

1.1. Country: India

1.2. Industry: Pulp and paper industry

1.3. Mode: Discharge standards

1.4. Medium: Water/Effluent

1.5. Parameter: pH, TSS, BOD, sodium absorption rate

2. Legal reference

2.1. Title of the law/regulations: The Environmental (Protection) Act, 1986 and the Environment (Protection) Fourth Amendment Rules, 1987

2.2. Date issued: -

2.3. Date amended: -

3. Summary

category	parameter	standards (*1) I	standards (*1) II	unit
small Pulp and Paper Industry	pH	5.5-9	5.5-9	-
	SS	100	100	mg/l
	BOD	30	100	mg/l
	sodium absorption ratio	-	26	-

*1) I: Discharge into inland surface water.
II: Disposal on land.

4. Citation

4.1. Title of document: "Pollution Control Legislation"

4.2. Publisher: Tamil Nadu Pollution Control Board

4.3. Date published: 1989

4.4. Publisher Reference Code: -

4.5. IEO Library Code: -

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***** Record No. Pp-15

Headline: Effluent quality standard for pulp and paper industry in Indonesia

1. Descriptors

1.1. Country: Indonesia

1.2. Industry: Pulp and paper industry

1.3. Mode: Discharge standards

1.4. Medium: Water/Effluent

1.5. Parameter: BOD, COD, TSS, pH, effluent flow

2. Legal reference

2.1. Title of the law/regulations: Decree of the State Minister for Population and Environment, Number: KEP-03/MENKLH/II/1991

2.2. Date issued: Feb. 1991

2.3. Date amended: -

3. Summary

category	parameter	standards (*1) I	standards (*1) II
pulp mill	BOD	150 mg/l	15 kg/ton
	COD	350 mg/l	35 kg/ton
	TSS	200 mg/l	20 kg/ton
	pH	6-9	-
	effluent flow	100 m^3 per ton of air dried pulp	
paper factory	BOD	125 mg/l	10 kg/ton
	COD	250 mg/l	20 kg/ton
	TSS	125 mg/l	10 kg/ton
	pH	6-9	-
	effluent flow	80 m^3 per ton of paper product	
pulp and paper factory	BOD	150 mg/l	25.5 kg/ton
	COD	350 mg/l	59.5 kg/ton
	TSS	150 mg/l	25.5 kg/ton
	pH	6-9	-
	effluent flow	170 m^3 per ton of air dried pulp and paper product	

*1) I: Maximum concentration.
II: Maximum pollution load.

*2) Except pH, maximum concentration of each parameter in the aforementioned table shall be stated in milligram per liter of waste water.

*3) Maximum pollution load of each parameter in the aforementioned table is stated in kg parameter per ton of air dried pulp or paper product.

*4) Especially for thin paper, maximum effluent flow is 200 m^3 per ton of paper product.

4. Citation

4.1. Title of document:	"Decree of the State Minister for Population and Environment, Number: KEP-03/MENKLH/II/1991, RE: Effluent Quality Standards for Existing Operations"
4.2. Publisher:	BAPEDAL: Environmental Impact Management Agency, with EMDI: Environmental Management Development in Indonesia
4.3. Date published:	1991
4.4. Publisher Reference Code:	-
4.5. IEO Library Code:	-

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***** Record No. Pp-16

Headline: National effluent standards for substances related to the protection of human health

1. Descriptors

1.1. Country: Japan

1.2. Industry: All industries including pulp and paper industry

1.3. Mode: Discharge Standards

1.4. Medium: Water/Effluent

1.5. Parameters: Cadmium and its compounds, cyanide compounds, organic phosphorus compounds, lead and its compounds, chromium (VI) compounds, arsenic and its compounds, total mercury, alkyl mercury compounds, PCB, dichloromethane, carbontetrachloride, 12-dichloroethane, 11-dichloroethylene, cis12-dichloroethylene, 111-trichloroethane, 112-trichloroethane, trichloroethylene, tetrachloroethylene, 13-dichloropropylene, thiram (TMTD), simazine (CAT), thiobencarb, benzene, selenium

2. Legal reference

2.1. Title of the law/regulations: Water Pollution Control Law, Cabinet Order for Establishment of the Effluent Standard (No.54-1993)

2.2. Date issued: 21 June 1971

2.3. Date amended: 1974, 1975,1976, 1977, 1981, 1985, 1986, 1993

3. Summary

category	parameter	limit	unit
-	cadmium and its compounds	0.1	mg/l
-	cyanide compounds	1	mg/l
-	org. phosphorus compounds (*1)	1	mg/l
-	lead and its compounds	0.1	mg/l
-	chromium (VI) compounds	0.5	mg/l
-	arsenic and its compounds	0.1	mg/l
-	total mercury	0.005	mg/l
-	alkyl mercury compounds	Not detectable (*2)	
-	PCB	0.003	mg/l
-	dichloromethane	0.2	mg/l
-	carbontetrachloride	0.02	mg/l
-	12-dichloroethane	0.04	mg/l
-	11-dichloroethylene	0.2	mg/l
-	cis12-dichloroethylene	0.4	mg/l
-	111-trichloroethane	3	mg/l
-	112-trichloroethane	0.06	mg/l
-	trichloroethylene	0.3	mg/l
-	tetrachloroethylene	0.1	mg/l
-	13-dichloropropylene	0.02	mg/l
-	thiram (TMTD)	0.06	mg/l
-	simazine (CAT)	0.03	mg/l
-	thiobencarb	0.2	mg/l
-	benzene	0.1	mg/l
-	selenium	0.1	mg/l

*1) Organic phosphorus compounds; parathion, methyl parathion,

methyldimethon and EPN only.

*2) Not detectable; the substance must be below the level detectable by the method designed by the Director General of the Environment Agency.

*3) Prefectures may set more stringent standards.

4. Citation

4.1. Title of document:	Cabinet Order for Establishment of the Effluent Standard (No.54-1993)
4.2. Publisher:	Environment Agency, Government of Japan
4.3. Date published:	27 Dec. 1993
4.4. Publisher Reference Code:	-
4.5. IEO Library Code:	-

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***** Record No. Pp-17

Headline: National effluent standards for substances related to the protection of living environment

1. Descriptors

1.1. Country: Japan

1.2. Industry: Pulp and paper industry

1.3. Mode: Discharge Standards

1.4. Medium: Water/Effluent

1.5. Parameters: pH, BOD, COD, SS, oil and fat, phenols, copper, zinc, iron, manganese, chromium, fluorine, coliform, nitrogen, phosphorus

2. Legal reference

2.1. Title of the law/regulations: Water Pollution Control Law

2.2. Date issued: 21 June 1971

2.3. Date amended: 1974, 1975,1976, 1977, 1981, 1985, 1986

3. Summary

category	parameter	limit	unit
all industries	pH	5.8 - 8.6 (*3)	-
	pH	5.0 - 9.0 (*4)	-
	BOD (*5)	160	mg/l
		120	mg/l (daily average)
	COD	160 (*6)	mg/l
		120 (*6)	mg/l (daily average)
	SS	200	mg/l
		150	mg/l (daily average)
	N-hexan extracts	5	mg/l (mineral oil)
	N-hexan extracts	30	mg/l (animal fat and vegetal oil)
	phenols	5	mg/l
	copper	3	mg/l
	zinc	5	mg/l
	dissolved iron	10	mg/l
	dissolved manganese	10	mg/l
	chromium	2	mg/l
	fluorine	15	mg/l
	coliform	3000	/ml (daily average)
	nitrogen (*8)	120	mg/l
		60	mg/l (daily average)
	phosphorus (*8)	16	mg/l
		8	mg/l (daily average)
pulp and paper industry	COD	20-270 (*7)	mg/l (daily average)

*1) The above standards are applied to the effluents from industrial plants whose volume of effluents is not less than 50 m^3 per day.

*2) Prefectures may set more stringent standards.

*3) For effluents discharged into public water bodies other than coastal seas.

*4) For effluents discharged into coastal seas.

*5) The BOD value is applied effluents discharged to public waters other than coastal seas and lakes.

*6) The COD(Mn) value is applied only to effluents discharged into coastal waters and lakes.

*7) This COD value is applied only to effluents which can affect the water qualities in Tokyo Bay, Ise Bay or Seto Inland Sea areas currently under 'areawide total pollutant load control'.

*8) The phosphorus and nitrogen standards are applicable to lakes and reservoirs in which problems due to eutrophication may occur. Also covered are rivers flowing into the lakes and reservoirs.

4. Citation

4.1. Title of document:	"Quality of the Environment in Japan 1989"
4.2. Publisher:	Environment Agency, Government of Japan
4.3. Date published:	1991
4.4. Publisher Reference Code:	-
4.5. IEO Library Code:	-

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***** Record No. Pp-18

Headline: Recommendations on effluent standards for Nitrogen and Phosphorus in Japan

1. Descriptors

1.1. Country: Japan

1.2. Industry: All industries including pulp and paper industry

1.3. Mode: Discharge Standards

1.4. Medium: Water/Effluent

1.5. Parameters: Nitrogen, Phosphorus

2. Legal reference

2.1. Title of the law/regulations: Water Pollution Control Law (1971), The Recommendations on the Environmental Quality Standards and So Forth Regarding Nitrogen and Phosphorus in the Coastal Seas Returned by the Central Council on Environmental Pollution Control (1993.5.6.)

2.2. Date issued: -

2.3. Date amended: -

3. Summary

category	parameter	standard		unit
		maximum	daily ave.	
all industries	nitrogen	120	60	mg/l
	phosphorus	16	8	mg/l

*1) The above effluent standards are applicable to the bays or inland seas in danger of eutrophication problems, including Public Water Areas flowing into them. The bay or inland sea is in principal considered as in danger of eutrophication problems when its 'Closeness Index' is more than 1. The 'Closeness Index' is defined as below:

Closeness Index = $rS \cdot Db / We \cdot De$

where rS : square root of the area
Db : maximum depth of the bay
We : width of the bay entrance
De : maximum depth of the bay entrance

*2) Interim standards for specific industries, at most for 5 years.

4. Citation

4.1. Title of document: The Recommendations on the Environmental Quality Standards and So Forth Regarding Nitrogen and Phosphorus in the Coastal Seas

4.2. Publisher:	The Central Council on Environmental Pollution Control, Government of Japan
4.3. Date published:	May 6, 1993
4.4. Publisher Reference Code:	-
4.5. IEO Library Code:	-

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***** Record No. Pp-19

Headline: Dioxins Control Guidelines by the Japan Federation for Paper Industries (20/12/1990)

1. Descriptors

1.1. Country:	Japan
1.2. Industry:	Pulp and paper industry
1.3. Mode:	Discharge standards
1.4. Medium:	Water/effluent
1.5. Parameter:	AOX

2. Legal reference

2.1. Title of the law/regulations:	Dioxins Control Guidelines by the Japan Federation for Paper Industries (20/12/1990)
2.2. Date issued:	1990
2.3. Date amended:	-

3. Summary

By the end of 1993, all pulp mills should reduce organic chlorine compounds in their effluents to less than 1.5 kg AOX per ton pulp.

category	parameter	standard	unit
pulp mills	AOX	1.5	kg/ton pulp

To achieve the above, mills should take the following measures in their practice/installation;

a. further delignification of pulp before bleaching,
b. improved washing of the unbleached pulp,
c. in bleaching process;
   - apply oxygen bleaching,
   - reduce chlorine consumption per K(kappa)-value,
   - substitute chlorine dioxide for some chlorine gas (at chlorine step),
   - substitute oxygen for chlorine (at alkali step),
d. coagulation or biological treatment of effluent,
e. disposal of effluent treatment sludge by incineration.

4. Citation

4.1. Title of document:	Dioxins Control Guidelines (20/12/1990)
4.2. Publisher:	Japan Federation for Paper Industries
4.3. Date published:	1990
4.4. Publisher Reference Code:	-
4.5. IEO library Code:	-

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***** Record No. Pp-20

Headline: Industrial effluent standards in Korea

1. Descriptors

1.1. Country: Korea

1.2. Industry: All industries including pulp and paper industry

1.3. Mode: Discharge Standards

1.4. Medium: Water/Effluent

1.5. Parameters: pH, temperature, colour, BOD, COD, SS, oil & grease, phenols, cyanide, arsenic, cadmium, copper, organic phosphorus compounds, lead, chromium, chromium (VI), mercury, dissolved manganese, zinc, fluoride, PCB, E. coli., dissolved iron, trichloroethylene, tetrachloroethylene, total nitrogen, total phosphorus, anionic surfactant

2. Legal reference

2.1. Title of the law/regulations: Environmental Protection Act

2.2. Date issued: -

2.3. Date amended: 1986

3. Summary

The industrial effluent regulations in Korea are classified mainly by the area to which industrial facilities discharge their effluents. Moreover, the important control parameters such as BOD, COD and SS are further sub-classified by the daily maximum discharge rate as can be seen in the footnote.

1) Effluent standard for all industries in Korea till the end of 1995.

parameter	limit (*1)	(*2)	(*3)	(*4)	unit
pH	5.8-8.6	5.8-8.6	5.8-8.6	5.8-8.6	-
temperature	40	40	40	40	°C
colour (*9)	200	300	400	400	unit
BOD (*5)	50	80	100	30	mg/l
BOD (*6)	50	100	150	30	mg/l
COD (*5)	50	80	100	50	mg/l
COD (*6)	50	100	150	50	mg/l
SS (*5)	50	80	100	70	mg/l
SS (*6)	50	100	150	70	mg/l
oil & grease (N-hexan extracts)					
- mineral oil	1	5	5	5	mg/l
- animal fat/ vegetal oil	5	30	30	30	mg/l
phenols	1	3	3	3	mg/l
arsenic	0.1	0.5	0.5	0.5	mg/l
cyanide	0.2	1	1	1	mg/l
cadmium	0.02	0.1	0.1	0.1	mg/l
chromium(total)	0.5	2	2	2	mg/l
chromium (VI)	0.1	0.5	0.5	0.5	mg/l
copper	0.5	3	3	3	mg/l
lead	0.2	1	1	1	mg/l

dissolved manganese	2	10	10	10	mg/l
mercury	ND(*7)	0.005	0.005	0.005	mg/l
zinc	1	5	5	5	mg/l
fluoride	3	15	15	15	mg/l
organic phosphorus compounds	0.2	1	1	1	mg/l
PCB	ND	0.003	0.003	0.003	mg/l
E. coli.	100	3000	3000	3000	(*8)
dissolved iron	2	10	10	10	mg/l
trichloroethylene	0.06	0.3	0.3	0.3	mg/l
tetrachloroethylene	0.02	0.1	0.1	0.1	mg/l

2) Announced to be revised from the first January of 1996.

parameter	limit				unit
	(*1)	(*2)	(*3)	(*4)	
BOD (*5)	30	60	80	30	mg/l
BOD (*6)	40	80	120	30	mg/l
COD (*5)	40	70	90	40	mg/l
COD (*6)	50	90	130	40	mg/l
SS (*5)	30	60	80	30	mg/l
SS (*6)	40	80	120	30	mg/l
total nitrogen	30	60	60	60	mg/l
total phosphorus	4	8	8	8	mg/l
anionic surfactant	3	5	5	5	mg/l

*1) For Clean Area (protected area).

*2) For Area I (for potable use after filtration).

*3) For Area II (for potable use after advanced treatment).

*4) For Special Area (the final treatment facilities of industrial combinat).

*5) For facilities with total waste water discharge rates higher than 3000 m^3/day.

*6) For facilities with total waste water discharge rates lower than 3000 m^3/day.

*7) Not detectable; the substance must be below the level detectable.

*8) MPH/100ml.

*9) Only for textile industry.

4. Citation

4.1. Title of document: Direct communication with Korea Research Institute of Chemical Technology on the environmental effluent standard for industrial facilities in Korea.

4.2. Publisher: -

4.3. Date published: June 1994

4.4. Publisher Reference Code: -

4.5. IEO Library Code: -

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***** Record No. Pp-21

Headline: Chlorinated organic effluent standards for bleached pulp in Norway

1. Descriptors

1.1. Country:	Norway
1.2. Industry:	Pulp and paper industry
1.3. Mode:	Discharge standards
1.4. Medium:	Water/Effluent
1.5. Parameter:	AOX

2. Legal reference

2.1. Title of the law/regulations:	-
2.2. Date issued:	-
2.3. Date amended:	-

3. Summary

category	parameter	standard	unit
kraft mills	AOX	2	kg/metric ton pulp
sulphite mills	AOX	1	kg/metric ton pulp

4. Citation

4.1. Title of document:	"Energy and Resource-Saving Technologies in the Pulp and Paper Industry" prepared by a Government rapporteur from the United States of America, Working Party on Low and Non-Waste Technology and Re-utilization and Recycling of Waste, Ninth Session 18-20 November 1991, Senior Advisors to ECE Governments on Environmental and Water Problems.
4.2. Publisher:	UN Economic Commission for Europe
4.3. Date published:	1991
4.4. Publisher Reference Code:	ENVWA/WP.2/R.1/Rev1, 23 October 1991
4.5. IEO library Code:	60.4/WPER

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***** Record No. Pp-22

Headline: The Norwegian target for the reduction of effluent pollutants from pulp and paper industry

1. Descriptors

1.1. Country:	Norway
1.2. Industry:	Pulp and paper industry
1.3. Mode:	Discharge standards
1.4. Medium:	Water/Effluent
1.5. Parameter:	COD, SS, AOX

2. Legal reference

2.1. Title of the law/regulations:	The Pollution Act
2.2. Date issued:	1981
2.3. Date amended:	-

3. Summary

The major polluters in the Norwegian pulp and paper industry; chemical pulp mills, integrated mills producing newsprint and magazine-paper and NSSC- and CTMP-mills; are by 1995 obliged to reduce their discharges of COD and SS by 50-70 % compared to the level in 1987. The degree of reduction is depending mainly on the state of the recipient.

The Norwegian long term target with respect to AOX is to eliminate the use of all chlorine-containing chemicals in the bleach plants. In the meantime the regulations set by PARCOM, 1 kg AOX per tonne for bleached chemical pulp to be attained within 1995 are followed.

Nutrients are only regulated in a few cases in Norway. This is due to the insignificant contribution from pulp and paper industry to the total emission of nutrients.

Discharge reduction shall be achieved primarily by process closure, then by external biological and/or chemical waste water treatment, if such treatment is called for by the recipient.

4. Citation

4.1. Title of document:	"Study on Nordic Pulp and Paper Industry and the Environment"
4.2. Publisher:	Nordic Council of Ministers
4.3. Date published:	1993
4.4. Publisher Reference Code:	ISBN 92 9120 384x
4.5. IEO library Code:	-

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***** Record No. Pp-23

Headline: Environmental licence for pulp and paper industry in Sweden

1. Descriptors

1.1. Country:	Sweden
1.2. Industry:	Pulp and paper industry
1.3. Mode:	Discharge standards
1.4. Medium:	Water/Effluent
1.5. Parameter:	AOX, COD, SS

2. Legal reference

2.1. Title of the law/regulations:	Environmental Protection Act
2.2. Date issued:	1969
2.3. Date amended:	-

3. Summary

In Sweden pulp and paper mills and other industrial facilities are requested to apply for an environmental license according to the Environmental Protection Act. When stipulating the terms for a license, the authorities take into consideration the internal and external measures that are technically possible and economically feasible in order to abate pollution and to prevent or minimize adverse effects on the environment. Environmental licenses mostly stipulate conditions in the form of upper limit values for discharges both into water and into the atmosphere. The most important parameters for regulating the effluent are AOX and COD. SS is also used, and sometimes BOD_7, phosphorus and nitrogen. Licenses can also include conditions for measures to be taken, such as installation of oxygen delignification and biological treatment plants. Each industry is treated individually. This means that effluent standards (guidelines) don't exist in Sweden.

In the Swedish Governmental Bill, "A living Environment" (taken in June 1990), it is stated that the objective for all good environmental work should be to limit the discharges from the industry by the year 2000 to such level that no harm is done to the environment. The implication of this in extent of discharge level must be clarified through continued research and environmental monitoring.

More detailed levels for the future effluent have been stated of the Nordic Ministers of the Environment (see p.93-94). These levels should be regarded as goals.

4. Citation

4.1. Title of document:	Direct communication with Swedish Pulp and Paper Association on Swedish Effluent Regulations for Pulp and Paper Industry
4.2. Publisher:	-
4.3. Date published:	June 1995
4.4. Publisher Reference Code:	-
4.5. IEO library Code:	-

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***** Record No. Pp-24

Headline: Effluent standards in Taiwan

1. Descriptors

1.1. Country: Taiwan

1.2. Industry: Pulp and paper industry

1.3. Mode: Discharge Standards

1.4. Medium: Water/Effluent

1.5. Parameters: Temperature, pH, BOD, COD, TSS, transparency, nitrate-N, oil & grease, anion active agent, arsenic, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, selenium, silver, zinc, boron, sulphide, fluoride, formaldehyde, phenols, cyanide, PCB, organic phosphorus compounds, amino-formate compounds, aldrin, dieldrin, endrin, lindane, DDT isomers, herbicides, endosulfan, toxaphene, pentachlorophenol and its compounds, pentachloronitrobenzene

2. Legal reference

2.1. Title of the law/regulations: Effluent Standards (1987) under the Water Pollution Control Law (1974)

2.2. Date issued: -

2.3. Date amended: -

3. Summary

category	parameter	standard	unit
all industries	temperature	35 (*3)	°C
	pH	5.0-9.0	-
	nitrate-N	100	mg/l
	oil & grease		
	(N-hexan extracts)	10	mg/l (mineral oil)
		30	mg/l (animal fat and vegetal oil)
	fluoride	15.0	mg/l
	phenols	5.0	mg/l
	anion active agent	10.0	mg/l
	cyanide	1.0	mg/l
	arsenic	0.5	mg/l
	cadmium	0.1	mg/l
	total chromium	2.0	mg/l
	chromium (VI)	0.5	mg/l
	copper	3.0	mg/l
	dissolved iron	10.0	mg/l
	dissolved manganese	10.0	mg/l
	lead	1.0	mg/l
	mercury (total)	0.005	mg/l
	mercury (organic)	not detectable	-
	nickel	1.0	mg/l
	selenium	0.5	mg/l
	silver	0.5	mg/l
	zinc	5.0	mg/l
	boron	1.0	mg/l
	sulphide	1.0	mg/l
	formaldehyde	3.0	mg/l
	PCB	not detectable	-
	total organic		

	phosphorus compounds	0.5	mg/l
	total amino-formate compounds	0.5	mg/l
	aldrin, dieldrin	not detectable	-
	endrin	not detectable	-
	lindane	not detectable	-
	heptachlor isomers	not detectable	-
	DDT isomers	not detectable	-
	herbicides	1.0	mg/l
	endosulfan	0.03	mg/l
	toxaphene	0.005	mg/l
	pentachlorophenol and its compounds	not detectable	
	pentachloro-nitrobenzene	0.05	mg/l
pulp industry	COD	400	mg/l
	SS	300	mg/l
	transparency	15<	cm
paper making industry	BOD	80	mg/l
	COD	300	mg/l
	SS	200	mg/l

*1) Regional authorities may set more stringent standards depending on local conditions.

*2) Not detectable; the substance must be below the level detectable by the method designed by the government.

*3) When effluent is discharged directly into coastal water, the surface temperature difference between the effluent and the receiving water should not exceed 4 °C in the area within 500 m from the outlet.

4. Citation

4.1. Title of document: Environmental Protection Laws in Taiwan

4.2. Publisher: Japan Environmental Management Association for Industry (JEMAI)

4.3. Date published: 1991

4.4. Publisher Reference Code: -

4.5. IEO Library Code: -

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***** Record No. Pp-25

Headline: Regulations for effluent from textile industry in the UK

1. Descriptors

1.1. Country	UK
1.2. Industry	Pulp and paper industry
1.3. Mode	Discharge standards
1.4. Medium	Water/Effluent to sewer
1.5. Parameters	waste water flow, TSS, BOD, COD, pH

2. Legal reference

2.1. Title of the law/regulations:	The Environmental Protection Act 1990 (EPA 1990), the Water Industry Act, 1991 and the Water Resources Act, 1991
2.2. Date issued:	-
2.3. Date amended:	-

3. Summary

Under the Environmental Protection Act, an IPC system (Integrated Pollution Control) is being introduced at present. Most paper mills are likely to come under the IPC.

By January 31 1996 operators of prescribed processes - including paper mills - must have applied for an authorisation to Her Majesty's Inspectorate of Pollution (HMIP). This will require e.g. the use of "Best Available Techniques Not Entailing Excessive Costs" (BATNEEC).

No particular emission standards are in force for the paper industry (nor for any other industry). Emission limit values are set in consents issued to paper mills (and other polluters) by the National River Authorities (NRA) in England and Wales, and by the River Purification Boards in Scotland. The basis for the consent is e.g. the Water Quality Objectives for receiving water, taking into account all other discharges to this water, and EC directives. Regulated parameters are normally waste water flow, TSS, BOD, COD and pH. Consents are given for the discharge of effluents both to receiving waters and to municipal sewage systems.

4. Citation

4.1. Title of document:	"Techno-Economic Study on the Reduction Measures, Based on Best Available Techniques on Emissions (Water, Wastes, Air) from the paper and Board Manufacturing Industry"
4.2. Publisher:	DG XI of the Commission of EU
4.3. Date published:	1994
4.4. Publisher Reference Code:	-
4.5. IEO Library Code:	-

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***** Record No. Pp-26

Headline: Best Available Technology (BAT) limitations for 2378-TCDD and other chlorinated organic pollutants for the chlorine bleached chemical pulping subcategories.

1. Descriptors

1.1. Country:	USA
1.2. Industry:	Pulp and paper industry
1.3. Mode:	Discharge standards
1.4. Medium:	Water/Effluent
1.5. Parameter:	2378-TCDD and other chlorinated organic pollutants

2. Legal reference

2.1. Title of the law/regulations:	-
2.2. Date issued:	-
2.3. Date amended:	-

3. Summary

Under the Clean Water Act Amendment of 1987, USEPA is in the process of revising the effluent limitations guidelines for the pulp and paper industry. Primary focus of this revision will be to develop Best Available Technology (BAT) limitations for 2378-TCDD and other chlorinated organic pollutants for the chlorine bleached chemical pulping subcategories. EPA's schedule calls for proposal of the revised BAT regulations by July 1993, and promulgation of the final regulation by July 1995.

4. Citation

4.1. Title of document:	"Energy and Resource-Saving Technologies in the Pulp and Paper Industry" prepared by a Government rapporteur from the United States of America, Working Party on Low and Non-Waste Technology and Re-utilization and Recycling of Waste, Ninth Session 18-20 November 1991, Senior Advisors to ECE Governments on Environmental and Water Problems.
4.2. Publisher:	UN Economic Commission for Europe
4.3. Date published:	1991
4.4. Publisher Reference Code:	ENVWA/WP.2/R.1/Rev1, 23 October 1991
4.5. IEO library Code:	60.4/WPER

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***** Record No. Pp-27

Headline: BPT effluent limitations for pulp, paper and paperboard point source in USA

1. Descriptors

1.1. Country: USA

1.2. Industry: Pulp and paper industry

1.3. Mode: Discharge standards

1.4. Medium: Water/Effluent

1.5. Parameter: BOD, TSS, pH, zinc

2. Legal reference

2.1. Title of the law/regulations: The Clean Water Act

2.2. Date issued: 1977

2.3. Date amended: -

3. Summary

Effluent limitations representing the decree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT)

Except the following subcategories, non-continuous dischargers shall not be subject to the maximum day and average of 30 consecutive days effluent limitations, but shall be subject to annual average effluent limitations determined by dividing the average of 30 consecutive days limitations for BOD by 1.00 to 3.00 and TSS by 1.50 to 3.00, depending on each subcategory.

- Unbleached kraft
- Semi-chemical
- Unbleached kraft-neutral sulfite semi-chemical (cross recovery)
- Paperboard from wastepaper
- Deink

category	parameter	limits (*1) I	limits (*1) II	unit
Unbleached kraft	BOD	5.6	2.8	kg/kkg of product
	TSS	12.0	6.0	kg/kkg of product
	pH	6.0-9.0	6.0-9.0	-
Semi-chemical				
ammonia base mills	BOD	8.0	4.0	kg/kkg of product
	TSS	10.0	5.0	kg/kkg of product
	pH	6.0-9.0	6.0-9.0	-
sodium base mills	BOD	8.7	4.35	kg/kkg of product
	TSS	11.0	5.5	kg/kkg of product
	pH	6.0-9.0	6.0-9.0	-
Unbleached kraft -neutral sulfite semi-chemical (cross recovery)	BOD	8.0	4.0	kg/kkg of product
	TSS	12.5	6.25	kg/kkg of product
	pH	6.0-9.0	6.0-9.0	-

Paper board from wastepaper

noncorrugaing medium finish	BOD	3.0	1.5	kg/kkg of product
	TSS	5.0	2.5	kg/kkg of product
	pH	6.0-9.0	6.0-9.0	-
corrugaing medium finish	BOD	5.7	2.8	kg/kkg of product
	TSS	9.2	4.6	kg/kkg of product
	pH	6.0-9.0	6.0-9.0	-

Dissolving kraft

-	BOD	23.6	12.25	kg/kkg of product
	TSS	37.3	20.05	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
from wet barking operations	BOD	3.2	1.7	kg/kkg of product
	TSS	6.9	3.75	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
log or chip washing operations	BOD	0.35	0.2	kg/kkg of product
	TSS	0.70	0.4	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
log flumes or ponds	BOD	0.6	0.35	kg/kkg of product
	TSS	1.45	0.8	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-

Market bleached kraft

-	BOD	15.45	8.05	kg/kkg of product
	TSS	30.4	16.4	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
from wet barking operations	BOD	2.3	1.2	kg/kkg of product
	TSS	5.3	2.85	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
log or chip washing operations	BOD	0.2	0.1	kg/kkg of product
	TSS	0.6	0.3	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
log flumes or ponds	BOD	0.4	0.2	kg/kkg of product
	TSS	1.15	0.6	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-

BCT bleached kraft

-	BOD	13.65	7.1	kg/kkg of product
	TSS	24.0	12.9	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
from wet barking operations	BOD	2.25	1.2	kg/kkg of product
	TSS	5.75	3.1	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
log or chip washing operations	BOD	0.25	0.15	kg/kkg of product
	TSS	0.65	0.35	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
log flumes or ponds	BOD	0.45	0.25	kg/kkg of product
	TSS	1.25	0.7	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-

Fine bleached kraft

-	BOD	10.6	5.5	kg/kkg of product
	TSS	22.15	11.9	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
from wet barking	BOD	1.95	1.0	kg/kkg of product
	TSS	5.3	2.85	kg/kkg of product

operations	pH	5.0-9.0	5.0-9.0	-
log or chip washing operations	BOD	0.2	0.1	kg/kkg of product
	TSS	0.55	0.3	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
log flumes or ponds	BOD	0.35	0.2	kg/kkg of product
	TSS	1.15	0.6	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
Papergrade sulfite (blow pit wash)				
bisulfite liquor/surface condensers	BOD	31.8	16.55	kg/kkg of product
	TSS	43.95	23.65	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
bisulfite liquor/ barometric condensers	BOD	34.7	18.05	kg/kkg of product
	TSS	52.2	28.1	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
acid sulfite liquor/surface condensers	BOD	32.3	16.8	kg/kkg of product
	TSS	43.95	23.65	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
acid sulfite liquor/ barometric condensers	BOD	35.55	18.5	kg/kkg of product
	TSS	52.2	28.1	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
from wet barking operations	BOD	2.7	1.45	kg/kkg of product
	TSS	7.5	3.95	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
log or chip washing operations	BOD	0.15	0.1	kg/kkg of product
	TSS	2.55	1.35	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
log flumes or ponds	BOD	0.35	0.2	kg/kkg of product
	TSS	1.7	0.9	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
Dissolving sulfite pulp				
nitration grade pulp	BOD	41.4	21.5	kg/kkg of product
	TSS	70.65	38.05	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
biscose grade pulp	BOD	44.3	23.0	kg/kkg of product
	TSS	70.65	38.05	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
cellophane grade pulp	BOD	48.05	24.95	kg/kkg of product
	TSS	70.65	38.05	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
acetate grade pulp	BOD	50.80	26.40	kg/kkg of product
	TSS	70.65	38.05	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
from wet barking operations	BOD	0.7	0.35	kg/kkg of product
	TSS	0.15	0.1	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
log or chip washing operations	BOD	0.15	0.1	kg/kkg of product
	TSS	0.15	0.1	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
log flumes or ponds	BOD	0.15	0.1	kg/kkg of product
	TSS	0.15	0.1	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
Groundwood-chemi-mechanical				

-	BOD	13.5	7.05	kg/kkg of product
	TSS	19.75	10.65	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
from wet barking operations	BOD	0.9	0.45	kg/kkg of product
	TSS	2.6	1.45	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
log or chip washing operations	BOD	0.05	0.05	kg/kkg of product
	TSS	0.25	0.15	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
log flumes or ponds	BOD	0.15	0.05	kg/kkg of product
	TSS	0.55	0.3	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
using zinc hydro-sulfite	zinc	0.34	0.17	kg/kkg of product
Groundwood-thermo-mechanical				
-	BOD	10.6	5.55	kg/kkg of product
	TSS	15.55	8.35	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
from wet barking operations	BOD	0.9	0.45	kg/kkg of product
	TSS	2.7	1.45	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
log or chip washing operations	BOD	0.05	0.05	kg/kkg of product
	TSS	0.30	0.15	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
log flumes or ponds	BOD	0.15	0.1	kg/kkg of product
	TSS	0.60	0.35	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
using zinc hydro-sulfite	zinc	0.26	0.13	kg/kkg of product
Groundwood-CMN papers				
-	BOD	7.45	3.9	kg/kkg of product
	TSS	12.75	6.85	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
from wet barking operations	BOD	1.15	0.55	kg/kkg of product
	TSS	2.0	1.1	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
log or chip washing operations	BOD	0.15	0.05	kg/kkg of product
	TSS	0.20	0.15	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
log flumes or ponds	BOD	0.25	0.1	kg/kkg of product
	TSS	0.45	0.25	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
using zinc hydro-sulfite	zinc	0.30	0.15	kg/kkg of product
Groundwood-fine papers				
-	BOD	6.85	3.6	kg/kkg of product
	TSS	11.75	6.3	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
from wet barking operations	BOD	1.1	0.55	kg/kkg of product
	TSS	1.95	1.1	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
log or chip washing operations	BOD	0.15	0.05	kg/kkg of product
	TSS	0.2	0.15	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-

log flumes or ponds	BOD	0.2	0.05	kg/kkg of product
	TSS	0.4	0.25	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
using zinc hydro-sulfite	zinc	0.275	0.135	kg/kkg of product
Soda				
-	BOD	13.7	7.1	kg/kkg of product
	TSS	24.5	13.2	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
from wet barking operations	BOD	2.05	1.1	kg/kkg of product
	TSS	5.25	2.8	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
log or chip washing operations	BOD	0.15	0.1	kg/kkg of product
	TSS	0.5	0.25	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
log flumes or ponds	BOD	0.3	0.2	kg/kkg of product
	TSS	1.1	0.55	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
Deink	BOD	18.1	9.4	kg/kkg of product
	TSS	24.05	12.95	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
Nonintegrated-fine papers				
wood fiber finish	BOD	8.2	4.25	kg/kkg of product
	TSS	11.0	5.9	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
cotton fiber finish	BOD	17.4	9.1	kg/kkg of product
	TSS	24.3	13.1	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
Nonintegrated-tissue papers	BOD	11.4	6.25	kg/kkg of product
	TSS	10.25	5.0	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
Tissue from wastepaper	BOD	13.7	7.1	kg/kkg of product
	TSS	17.05	9.2	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
Papergrade sulfite (drum wash)				
bisulfite liquor/surface condensers	BOD	26.7	13.9	kg/kkg of product
	TSS	43.95	23.65	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
bisulfite liquor/ barometric condensers	BOD	29.4	15.3	kg/kkg of product
	TSS	52.2	28.1	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
acid sulfite liquor/surface condensers	BOD	29.75	15.5	kg/kkg of product
	TSS	43.95	23.65	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
acid sulfite liquor/ barometric condensers	BOD	32.5	16.9	kg/kkg of product
	TSS	52.2	28.1	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
continuous digesters	BOD	38.15	19.85	kg/kkg of product
	TSS	53.75	28.95	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
from wet barking	BOD	3.05	1.6	kg/kkg of product
	TSS	7.5	3.95	kg/kkg of product

operations	pH	5.0-9.0	5.0-9.0	-
log or chip washing operations	BOD	0.35	0.2	kg/kkg of product
	TSS	2.55	1.35	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
log flumes or ponds	BOD	0.7	0.35	kg/kkg of product
	TSS	1.7	0.9	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
Unbleached kraft and semi-chemical	[reserved]			
Wastepaper-molded products	BOD	4.4	2.3	kg/kkg of product
	TSS	10.8	5.8	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
Non-integrated-lightweight papers				
-	BOD	24.1	13.2	kg/kkg of product
	TSS	21.6	10.6	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
electrical grade paper	BOD	38.0	20.9	kg/kkg of product
	TSS	34.2	16.7	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
Nonintegrated-filter and nonwoven papers	BOD	29.6	16.3	kg/kkg of product
	TSS	26.6	13.0	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
Nonintegrated-paperboard	BOD	6.5	3.6	kg/kkg of product
	TSS	5.8	2.8	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-

*1) I : Maximum for any 1 day.
II: Average of daily values for 30 consecutive days.

4. Citation

4.1. Title of document:	"Code of Federal Regulations, Parts 425 to 699, Revised as of July 1, 1992"
4.2. Publisher:	The Office of the Federal Register National Archives and Records Administration, USA
4.3. Date published:	1992
4.4. Publisher Reference Code:	-
4.5. IEO library Code:	-

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***** Record No. Pp-28

Headline: BAT effluent limitations for pulp, paper and paperboard point source in USA

1. Descriptors

1.1. Country: USA

1.2. Industry: Pulp and paper industry

1.3. Mode: Discharge standards

1.4. Medium: Water/Effluent

1.5. Parameter: Pentachlorophenol, trichlorophenol, zinc

2. Legal reference

2.1. Title of the law/regulations: The Clean Water Act

2.2. Date issued: 1977

2.3. Date amended: -

3. Summary

Effluent limitations representing the decree of effluent reduction attainable by the application of the best available technology economically achievable (BAT)

Any existing point source subject to each category must achieve the following effluent limitations, except that non-continuous dischargers shall not be subject to the maximum day mass limitations in kg/kkg (lb/1000 lb), but shall be subject to concentration limitations. Concentration limitations are only applicable to non-continuous dischargers. Pentachlorophenol and trichlorophenol limitations are only applicable at facilities where chlorophenolic-containing biocides are used. Permittees not using chlorophenolic-containing biocides must certify to the permit-issuing authority that they are not using these biocides. Zinc limitations are only applicable at facilities where zinc hydrosulfite is used as a bleaching agent. Permittees not using hydrosulfite as a bleaching agent must certify to the permit issuing authority that they are not using this bleaching compound.

category	parameter	limits (*1) I	limits (*1) II
Unbleached kraft	pentachlorophenol	0.00058	(0.011)(12.6)/y (*2)
	trichlorophenol	0.00053	(0.010)(12.6)/y
Semi-chemical	pentachlorophenol	0.0012	(0.029)(10.3)/y
	trichlorophenol	0.00043	(0.010)(10.3)/y
Unbleached kraft -neutral sulfite semi-chemical (cross recovery)	pentachlorophenol	0.00064	(0.011)(14.0)/y
	trichlorophenol	0.00059	(0.010)(14.0)/y
Paper board from wastepaper	pentachlorophenol	0.00087	(0.029)(7.2)/y
	trichlorophenol	0.00030	(0.010)(7.2)/y
Dissolving kraft	pentachlorophenol	0.0025	(0.011)(55.1)/y
	trichlorophenol	0.016	(0.068)(55.1)/y

Market bleached kraft	pentachlorophenol	0.0019	(0.011)(41.6)/y
	trichlorophenol	0.012	(0.068)(41.6)/y
BCT bleached kraft	pentachlorophenol	0.0016	(0.011)(35.4)/y
	trichlorophenol	0.010	(0.068)(35.4)/y
Fine bleached kraft	pentachlorophenol	0.0014	(0.011)(30.9)/y
	trichlorophenol	0.0088	(0.068)(30.9)/y
Papergrade sulfite (blow pit wash)			
pentachlorophenol (*3)		0.00058exp(0.017x)	((0.011)(12.67)exp(0.017x))/y
trichlorophenol		0.0036exp(0.017x)	((0.068)(12.67)exp(0.017x))/y
Dissolving sulfite pulp			
nitration, viscose, or cellophane grade pulps	pentachlorophenol	0.0030	(0.011)(66.0)/y
	trichlorophenol	0.019	(0.068)(66.0)/y
acetate grade pulp	pentachlorophenol	0.0033	(0.011)(72.7)/y
	trichlorophenol	0.021	(0.068)(72.7)/y
Groundwood -chemi-mechanical	[reserved]		
Groundwood-thermo-mechanical	pentachlorophenol	0.00097	(0.011)(21.1)/y
	trichlorophenol	0.00088	(0.010)(21.1)/y
	zinc	0.26	(3.0)(21.1)/y
Groundwood-CMN papers	pentachlorophenol	0.0011	(0.011)(23.8)/y
	trichlorophenol	0.00099	(0.010)(23.8)/y
	zinc	0.30	(3.0)(23.8)/y
Groundwood-fine papers	pentachlorophenol	0.0010	(0.011)(21.9)/y
	trichlorophenol	0.00092	(0.010)(21.9)/y
	zinc	0.27	(3.0)(21.9)/y
Soda	pentachlorophenol	0.0014	(0.011)(30.9)/y
	trichlorophenol	0.0088	(0.068)(30.9)/y
Deink			
fine or tissue paper	pentachlorophenol	0.0030	(0.029)(24.4)/y
	trichlorophenol	0.0069	(0.068)(24.4)/y
newsprint	pentachlorophenol	0.0030	(0.029)(24.4)/y
	trichlorophenol	0.0010	(0.010)(24.4)/y
Nonintegrated-fine papers			
wood fiber furnish	pentachlorophenol	0.0018	(0.029)(15.2)/y
	trichlorophenol	0.00064	(0.010)(15.2)/y
cotton fiber furnish	pentachlorophenol	0.0051	(0.029)(42.3)/y
	trichlorophenol	0.0018	(0.010)(42.3)/y
Nonintegrated-tissue papers	pentachlorophenol	0.0028	(0.029)(22.9)/y
	trichlorophenol	0.00096	(0.010)(22.9)/y
Tissue from wastepaper	pentachlorophenol	0.0030	(0.029)(25.2)/y
	trichlorophenol	0.0011	(0.010)(25.2)/y
Papergrade sulfite (drum wash)			
pentachlorophenol		0.00058exp(0.017x)	((0.011)(12.67)exp(0.017x))/y
trichlorophenol		0.0036exp(0.017x)	((0.068)(12.67)exp(0.017x))/y
Unbleached kraft and semi-chemical	pentachlorophenol	0.00064	(0.011)(14.0)/y
	trichlorophenol	0.00059	(0.010)(14.0)/y

Wastepaper-molded products	pentachlorophenol	0.0026	(0.029)(21.1)/y
	trichlorophenol	0.00088	(0.010)(21.1)/y
Non-integrated-lightweight papers			
-	pentachlorophenol	0.0059	(0.029)(48.7)/y
	trichlorophenol	0.0020	(0.010)(48.7)/y
electrical grade papers	pentachlorophenol	0.0093	(0.029)(76.9)/y
	trichlorophenol	0.0032	(0.010)(76.9)/y
Nonintegrated-filter and nonwoven papers	pentachlorophenol	0.0072	(0.029)(59.9)/y
	trichlorophenol	0.0025	(0.010)(59.9)/y
Nonintegrated-paperboard	pentachlorophenol	0.0016	(0.029)(12.9)/y
	trichlorophenol	0.00054	(0.010)(12.9)/y

*1) I : Maximum for any 1 day in kg/kkg (lb per 1000 lb) of product.
II: Maximum for any 1 day in mg/l.

*2) y = wastewater discharged in kgal per ton of product.

*3) x = percent sulfite in final product.

4. Citation

4.1. Title of document:	"Code of Federal Regulations, Parts 425 to 699, Revised as of July 1, 1992"
4.2. Publisher:	The Office of the Federal Register National Archives and Records Administration, USA
4.3. Date published:	1992
4.4. Publisher Reference Code:	-
4.5. IEO library Code:	-

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***** Record No. Pp-29

Headline: NSPS effluent limitations for pulp, paper and paperboard point source in USA

1. Descriptors

1.1. Country: USA

1.2. Industry: Pulp and paper industry

1.3. Mode: Discharge standards

1.4. Medium: Water/Effluent

1.5. Parameter: BOD, TSS, pH, zinc, Pentachlorophenol, trichlorophenol

2. Legal reference

2.1. Title of the law/regulations: The Clean Air Act

2.2. Date issued: 1977

2.3. Date amended: -

3. Summary

New source performance standards (NSPS)

Any new source subject to each category must achieve the following new source performance standards, except that non-continuous dischargers shall not be subject to the maximum day and average of 30 consecutive days effluent limitations for BOD and TSS, but shall be subject to annual average effluent limitations determined by dividing the average of 30 consecutive days limitations for BOD by 1.91 and TSS by 1.90 (*). Also, for non-continuous dischargers, concentration limitations (mg/l) shall apply, where provided. Concentration limitations will only apply to non-continuous dischargers. Only facilities where chlorophenolic-containing biocides are used shall be subject to pentachlorophenol and trichlorophenol limitations. Permittees not using chlorophenolic-containing biocides must certify to the permit-issuing authority that they are not using these biocides. Zinc limitations are only applicable at facilities where zinc hydrosulfite is used as a bleaching agent. Permittees not using hydrosulfite as a bleaching agent must certify to the permit issuing authority that they are not using this bleaching compound.

*) As for the following categories, the average is divided by 1.48 for BOD and 1.64 for TSS;

- Nonintegrated-tissue papers
- Nonintegrated-lightweight papers
- Nonintegrated-filter and nonwoven papers

category	parameter	limits (*1) I	limits (*1) II	unit
Unbleached kraft				
lineboard	BOD	3.4	1.8	kg/kkg of product
	TSS	5.8	3.0	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
bag papers and other mixed	BOD	5.0	2.7	kg/kkg of product
	TSS	9.1	4.8	kg/kkg of product

products	pH	5.0-9.0	5.0-9.0	-
Semi-chemical	BOD	3.0	1.6	kg/kkg of product
	TSS	5.8	3.0	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
Unbleached kraft -neutral sulfite semi-chemical (cross recovery)	BOD	3.9	2.1	kg/kkg of product
	TSS	7.3	3.8	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
Paper board from wastepaper				
noncorrugaing medium finish	BOD	2.6	1.4	kg/kkg of product
	TSS	3.5	1.8	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
corrugaing medium finish	BOD	3.9	2.1	kg/kkg of product
	TSS	4.4	2.3	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
Dissolving kraft	BOD	15.6	8.4	kg/kkg of product
	TSS	27.3	14.3	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
Market bleached kraft	BOD	10.3	5.5	kg/kkg of product
	TSS	18.2	9.5	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
BCT bleached kraft	BOD	8.5	4.6	kg/kkg of product
	TSS	14.6	7.6	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
Fine bleached kraft	BOD	5.7	3.1	kg/kkg of product
	TSS	9.1	4.8	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
Papergrade sulfite (blow pit wash)				
BOD		4.38exp(0.017x)	2.36exp(0.017x)	kg/kkg of product
TSS		5.81exp(0.017x)	3.03exp(0.017x)	kg/kkg of product
pH (*2)		5.0-9.0	5.0-9.0	-
Dissolving sulfite pulp				
nitration grade pulp	BOD	26.9	14.5	kg/kkg of product
	TSS	40.8	21.3	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
biscose grade pulp	BOD	28.7	15.5	kg/kkg of product
	TSS	40.8	21.3	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
cellophane grade pulp	BOD	31.2	16.8	kg/kkg of product
	TSS	40.8	21.3	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
acetate grade pulp	BOD	39.6	21.4	kg/kkg of product
	TSS	41.1	21.5	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
Groundwood-chemi-mechanical	[reserved]			
Groundwood-thermo-mechanical	BOD	4.6	2.5	kg/kkg of product
	TSS	8.7	4.6	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
Groundwood-CMN papers	BOD	4.6	2.5	kg/kkg of product
	TSS	7.3	3.8	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
Groundwood-fine	BOD	3.5	1.9	kg/kkg of product

papers	TSS	5.8	3.0	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
Soda	BOD	5.7	3.1	kg/kkg of product
	TSS	9.1	4.8	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
Deink				
fine paper	BOD	5.7	3.1	kg/kkg of product
	TSS	8.7	4.6	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
tissue paper	BOD	9.6	5.2	kg/kkg of product
	TSS	13.1	6.8	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
newsprint	BOD	6.0	3.2	kg/kkg of product
	TSS	12.0	6.3	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
Nonintegrated-fine papers				
wood fiber finish	BOD	3.5	1.9	kg/kkg of product
	TSS	4.4	2.3	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
cotton fiber finish	BOD	7.8	4.2	kg/kkg of product
	TSS	9.5	4.9	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
Nonintegrated-tissue papers	BOD	7.0	3.4	kg/kkg of product
	TSS	6.0	2.6	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
Tissue from wastepaper	BOD	4.6	2.5	kg/kkg of product
	TSS	10.2	5.3	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
Papergrade sulfite (drum wash)				
	BOD	4.38exp(0.017x)	2.36exp(0.017x)	kg/kkg of product
	TSS	5.81exp(0.017x)	3.03exp(0.017x)	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
Unbleached kraft and semi-chemical	BOD	3.9	2.1	kg/kkg of product
	TSS	7.3	3.8	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
Wastepaper-molded products	BOD	2.1	1.1	kg/kkg of product
	TSS	4.4	2.3	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
Non-integrated-lightweight papers				
-	BOD	13.7	6.7	kg/kkg of product
	TSS	12.0	5.2	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
electrical grade paper	BOD	24.1	11.7	kg/kkg of product
	TSS	21.1	9.2	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
Nonintegrated-filter and nonwoven papers	BOD	17.1	8.3	kg/kkg of product
	TSS	15.0	6.6	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-
Nonintegrated-paperboard	BOD	4.0	1.9	kg/kkg of product
	TSS	3.5	1.5	kg/kkg of product
	pH	5.0-9.0	5.0-9.0	-

*1) I : Maximum for any 1 day.

II: Average of daily values for 30 consecutive days.

*2) x = percent sulfite in final product.

category	parameter	limits (*1) I	limits (*1) II
Unbleached kraft			
lineboard	pentachlorophenol	0.00058	(0.015)(9.4)/y (*2)
	trichlorophenol	0.00053	(0.013)(9.4)/y
bag paper and other mixed products	pentachlorophenol	0.00058	(0.012)(11.4)/y
	trichlorophenol	0.00053	(0.011)(11.4)/y
Semi-chemical	pentachlorophenol	0.0012	(0.041)(7.3)/y
	trichlorophenol	0.00043	(0.014)(7.3)/y
Unbleached kraft -neutral sulfite semi-chemical (cross recovery)	pentachlorophenol	0.00064	(0.013)(11.5)/y
	trichlorophenol	0.00059	(0.012)(11.5)/y
Paper board from wastepaper			
noncorrugating medium furnish	pentachlorophenol	0.00087	(0.065)(3.2)/y
	trichlorophenol	0.00030	(0.023)(3.2)/y
corrugating medium furnish	pentachlorophenol	0.00087	(0.065)(3.2)/y
	trichlorophenol	0.00030	(0.023)(3.2)/y
Dissolving kraft	pentachlorophenol	0.0025	(0.012)(50.7)/y
	trichlorophenol	0.016	(0.074)(50.7)/y
Market bleached kraft	pentachlorophenol	0.0019	(0.013)(36.6)/y
	trichlorophenol	0.012	(0.077)(36.6)/y
BCT bleached kraft	pentachlorophenol	0.0016	(0.012)(31.7)/y
	trichlorophenol	0.010	(0.076)(31.7)/y
Fine bleached kraft	pentachlorophenol	0.0014	(0.014)(25.1)/y
	trichlorophenol	0.0088	(0.084)(25.1)/y
Papergrade sulfite (blow pit wash)			
	pentachlorophenol	0.00058exp(0.017x)	((0.015)(9.12)exp(0.017x))/y
	trichlorophenol (*3)	0.0036exp(0.017x)	((0.094)(9.12)exp(0.017x))/y
Dissolving sulfite pulp			
nitration grade pulps	pentachlorophenol	0.0030	(0.012)(59.0)/y
	trichlorophenol	0.019	(0.012)(59.0)/y
viscose grade pulp	pentachlorophenol	0.0030	(0.012)(59.0)/y
	trichlorophenol	0.019	(0.012)(59.0)/y
cellophane grade pulps	pentachlorophenol	0.0030	(0.012)(59.0)/y
	trichlorophenol	0.019	(0.076)(59.0)/y
acetate pulp	pentachlorophenol	0.0033	(0.012)(65.7)/y
	trichlorophenol	0.021	(0.075)(65.7)/y
Groundwood -chemi-mechanical	[reserved]		
Groundwood-thermo-mechanical	pentachlorophenol	0.00097	(0.017)(13.8)/y
	trichlorophenol	0.00088	(0.015)(13.8)/y
	zinc	0.17	(3.0)(13.8)/y
Groundwood-CMN	pentachlorophenol	0.0011	(0.016)(16.8)/y

papers	trichlorophenol	0.00099	(0.014)(16.8)/y
	zinc	0.21	(3.0)(16.8)/y
Groundwood-fine papers	pentachlorophenol	0.0010	(0.016)(15.4)/y
	trichlorophenol	0.00092	(0.014)(15.4)/y
	zinc	0.19	(3.0)(15.4)/y
Soda	pentachlorophenol	0.0014	(0.014)(25.1)/y
	trichlorophenol	0.0088	(0.084)(25.1)/y
Deink			
fine paper	pentachlorophenol	0.0030	(0.045)(15.9)/y
	trichlorophenol	0.0069	(0.104)(15.9)/y
tissue paper	pentachlorophenol	0.0030	(0.036)(19.5)/y
	trichlorophenol	0.0069	(0.085)(19.5)/y
newsprint	pentachlorophenol	0.0030	(0.044)(16.2)/y
	trichlorophenol	0.0010	(0.015)(16.2)/y
Nonintegrated-fine papers			
wood fiber furnish	pentachlorophenol	0.0018	(0.047)(9.4)/y
	trichlorophenol	0.00064	(0.016)(9.4)/y
cotton fiber furnish	pentachlorophenol	0.0051	(0.039)(31.1)/y
	trichlorophenol	0.0018	(0.014)(31.1)/y
Nonintegrated-tissue papers	pentachlorophenol	0.0028	(0.035)(19.1)/y
	trichlorophenol	0.00096	(0.012)(19.1)/y
Tissue from wastepaper	pentachlorophenol	0.0030	(0.045)(16.3)/y
	trichlorophenol	0.0011	(0.015)(16.3)/y
Papergrade sulfite (drum wash)			
	pentachlorophenol	0.00058exp(0.017x)	((0.015)(9.12)exp(0.017x))/y
	trichlorophenol	0.0036exp(0.017x)	((0.094)(9.12)exp(0.017x))/y
Unbleached kraft and semi-chemical	pentachlorophenol	0.00064	(0.013)(11.5)/y
	trichlorophenol	0.00059	(0.012)(11.5)/y
Wastepaper-molded products	pentachlorophenol	0.0026	(0.107)(5.7)/y
	trichlorophenol	0.00088	(0.037)(5.7)/y
Non-integrated-lightweight papers			
-	pentachlorophenol	0.0059	(0.037)(38.2)/y
	trichlorophenol	0.0020	(0.013)(38.2)/y
electrical grade papers	pentachlorophenol	0.0093	(0.033)(66.8)/y
	trichlorophenol	0.0032	(0.012)(66.8)/y
Nonintegrated-filter and nonwoven papers	pentachlorophenol	0.0072	(0.037)(47.5)/y
	trichlorophenol	0.0025	(0.013)(47.5)/y
Nonintegrated-paperboard	pentachlorophenol	0.0016	(0.033)(11.2)/y
	trichlorophenol	0.00054	(0.012)(11.2)/y

*1) I : Maximum for any 1 day. Kg/kkg (lb per 1000 lb) of product
II: Maximum for any 1 day. Mg/l.

*2) y = wastewater discharged in kgal per ton of product.

*3) x = percent sulfite in final product.

4. Citation

4.1. Title of document:	"Code of Federal Regulations, Parts 425 to 699, Revised as of July 1, 1992"
4.2. Publisher:	The Office of the Federal Register National Archives and Records Administration, USA
4.3. Date published:	1992
4.4. Publisher Reference Code:	-
4.5. IEO library Code:	-

International agreements and guidelines for the pulp and paper industry

****
***** Record No. Pp-30

Headline: Helsinki Convention Recommendation

1. Descriptors

1.1. Country: International (Baltic Sea Area: Helsinki Convention)

1.2. Industry: Pulp and paper industry

1.3. Mode: Discharge standards

1.4. Medium: Water/Effluent

1.5. Parameter: COD, BOD, phosphorus, AOX

2. Legal reference

2.1. Title of the law/regulations: Helsinki Convention

2.2. Date issued: 1988

2.3. Date amended: -

3. Summary

The Minister Declaration from February 1988 states that the emissions to the Baltic Sea of persistent, toxic and bioaccumulating compounds, heavy metals and nutrients shall be reduced by 50 % within 1995 compared with the situation in 1987.

Two Recommendations exist, one for the kraft pulp industry and one for the sulphite pulp industry, the latter also including neutral-sulphite-semi-chemical-(NSSC)-mills. The limits are shown in the table below.

category	parameter	standard	unit	term
kraft pulp	COD	65	kg/tonne	2000
	total phosphorus	0.06	kg/tonne	2000
	AOX (softwood)	2	kg/tonne	1.1.1995
	AOX (hardwood)	1	kg/tonne	1.1.1995
sulphite pulp				
bleached	COD	100	kg/tonne	1.1.2000
		150	kg/tonne	1.1.1995
	BOD	15	kg/tonne	1.1.2000
		20	kg/tonne	1.1.1995
	total phosphorus	0.08	kg/tonne	1.1.2000
		0.1	kg/tonne	1.1.1995
	AOX	1	kg/tonne	1.1.2000
		2-3	kg/tonne	1.1.1995
unbleached	COD	50	kg/tonne	1.1.2000
		90	kg/tonne	1.1.1995
	BOD	10	kg/tonne	1.1.2000
		15	kg/tonne	1.1.1995
	total phosphorus	0.05	kg/tonne	1.1.2000
		0.08	kg/tonne	1.1.1995
NSSC				
using fresh process water	COD	30	kg/tonne	1.1.1995
	BOD	6	kg/tonne	1.1.1995
	total phosphorus	0.05	kg/tonne	1.1.1995
using salt	COD	200	kg/tonne	1.1.1995

process water	BOD	15	kg/tonne	1.1.1995
	total phosphorus	0.15	kg/tonne	1.1.1995

4. Citation

4.1. Title of document:	"Study on Nordic Pulp and Paper Industry and the Environment"
4.2. Publisher:	Nordic Council of Ministers
4.3. Date published:	1993
4.4. Publisher Reference Code:	ISBN 92 9120 384x
4.5. IEO library Code:	-

****
***** Record No. Pp-31

Headline: Paris Convention

1. Descriptors

1.1. Country: International (North Sea Area: Paris Convention)

1.2. Industry: Pulp and paper industry

1.3. Mode: Discharge standards

1.4. Medium: Water/Effluent

1.5. Parameter: AOX

2. Legal reference

2.1. Title of the law/regulations: Paris Convention

2.2. Date issued: 1989 (proposal)

2.3. Date amended: -

3. Summary

At the Paris Convention meeting held in London on 17-19 January 1989, Sweden presented the following proposal aimed at the reduction of chlorinated substances from the production of bleached pulp.

a. As of 1 January 1994, the discharge of chlorinated organic substances should not, as an annual average, exceed the following values for each Contraction party's total production of:

category	parameter	standard	unit (*1)
softwood kraft pulp (bleached with chlorine chemicals)	AOX	2	
hardwood kraft pulp (bleached with chlorine chemicals)	AOX	1	
sulphite pulp (bleached with chlorine chemicals)	AOX	1	

*1) kg/metric ton.

b. The annual average values for each mill should, as a minimum, be based on one analysis a month. Analysis should be made on representative unsettled 24-hour samples.

4. Citation

4.1. Title of document: "Energy and Resource-Saving Technologies in the Pulp and Paper Industry" prepared by a Government rapporteur from the United States of America, Working Party on Low and Non-Waste Technology and Re-utilization and Recycling of Waste, Ninth Session 18-20 November 1991, Senior Advisors to ECE Governments on Environmental and Water Problems.

4.2. Publisher: UN Economic Commission for Europe

4.3. Date published:	1991
4.4. Publisher Reference Code:	ENVWA/WP.2/R.1/Rev1, 23 October 1991
4.5. IEO library Code:	60.4/WPER

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***** Record No. Pp-32

Headline: Proposals by Nordic Council of Ministers

1. Descriptors

1.1. Country: Nordic Council of Ministers (Denmark, Finland, Norway and Sweden)

1.2. Industry: Pulp and paper industry

1.3. Mode: Discharge standards

1.4. Medium: Water/Effluent

1.5. Parameter: AOX, COD, phosphorus, nitrogen

2. Legal reference

2.1. Title of the law/regulations: Proposals

2.2. Date issued: Nov. 1993

2.3. Date amended: -

3. Summary

(1) Any mills (to be met by the end of this century)

category	parameter	standard	unit
kraft pulp			
bleached	AOX	0.4	kg/tonne of air dry pulp
	COD	30	kg/tonne of air dry pulp
	total phosphorus	0.04	kg/tonne of air dry pulp
	total nitrogen	0.2	kg/tonne of air dry pulp
unbleached	COD	15	kg/tonne of air dry pulp
	total phosphorus	0.02	kg/tonne of air dry pulp
	total nitrogen	0.2	kg/tonne of air dry pulp
bleached sulphite pulp	AOX	0.3	kg/tonne of air dry pulp
	COD	70	kg/tonne of air dry pulp
	total phosphorus	0.08	kg/tonne of air dry pulp
	total nitrogen	0.6	kg/tonne of air dry pulp
chemi-thermo-mechanical pulp	COD	30	kg/tonne of air dry pulp
	total phosphorus	0.02	kg/tonne of air dry pulp
	total nitrogen	0.2	kg/tonne of air dries pulp
mechanical pulp	COD	10	kg/tonne of product
	total phosphorus	0.01	kg/tonne of product
	total nitrogen	0.2	kg/tonne of product
recycled fibre pulp	COD	10	kg/tonne of product
	total phosphorus	0.01	kg/tonne of product
	total nitrogen	0.2	kg/tonne of product

*1) All figures are set as annual averages.

*2) Any nitrogen discharge associated with the use of complexing agents should be added to the figure for total nitrogen given above.

*3) "Mechanical" pulp mills are integrated mills producing newsprint or magazine paper.

(2) New and considerably (in the order of 30 %) enlarged mills

category	parameter	standard	unit
kraft pulp			
bleached	AOX	0.2	kg/tonne of air dry pulp
	COD	15	kg/tonne of air dry pulp
	total phosphorus	0.02	kg/tonne of air dry pulp
	total nitrogen	0.15	kg/tonne of air dry pulp
unbleached	COD	8	kg/tonne of air dry pulp
	total phosphorus	0.01	kg/tonne of air dry pulp
	total nitrogen	0.15	kg/tonne of air dry pulp
bleached sulphite pulp	AOX	0.1	kg/tonne of air dry pulp
	COD	35	kg/tonne of air dry pulp
	total phosphorus	0.04	kg/tonne of air dry pulp
	total nitrogen	0.3	kg/tonne of air dry pulp
chemi-thermo-mechanical pulp	COD	15	kg/tonne of air dry pulp
	total phosphorus	0.01	kg/tonne of air dry pulp
	total nitrogen	0.1	kg/tonne of air dry pulp
mechanical pulp	COD	5	kg/tonne of product
	total phosphorus	0.005	kg/tonne of product
	total nitrogen	0.1	kg/tonne of product
recycled fibre pulp	COD	5	kg/tonne of product
	total phosphorus	0.005	kg/tonne of product
	total nitrogen	0.1	kg/tonne of product

*1) Any nitrogen discharge associated with the use of complexing agents should be added to the figure for total nitrogen given above.

*2) "Mechanical" pulp mills are integrated mills producing newsprint or magazine paper.

4. Citation

4.1. Title of document: "Study on Nordic Pulp and Paper Industry and the Environment"

4.2. Publisher: Nordic Council of Ministers

4.3. Date published: 1993

4.4. Publisher Reference Code: ISBN 92 9120 384x

4.5. IEO library Code: -

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***** Record No. Pp-33

Headline: The World Bank environmental guidelines for pulp and paper industry

1. Descriptors

1.1. Country: International (The World Bank)

1.2. Industry: Pulp and paper industry

1.3. Mode: Discharge standards

1.4. Medium: Water/Effluent

1.5. Parameter: BOD, TSS, zinc

2. Legal reference

2.1. Title of the law/regulations: Pulp and Paper Industry Effluent Guidelines

2.2. Date issued: 1983

2.3. Date amended: -

3. Summary

category	parameter	standard	unit (*2)
Bleached kraft pulp mills			
dissolving pulp	BOD	13.0	
	TSS	15.6	
market pulp	BOD	7.1	
	TSS	10.3	
fine paper pulp	BOD	4.7	
	TSS	7.4	
BCT pulp (*3)	BOD	6.4	
	TSS	10.3	
Sulfite pulp mills			
papergrade pulp	BOD	15.2	
	TSS	21.2	
dissolving pulp	BOD	22.7	
	TSS	26.2	
Soda pulp mills	BOD	5.8	
	TSS	8.3	
Groundwood pulp mills			
chemi-mech. pulp	BOD	3.5	
	TSS	5.9	
	zinc	0.13	
thermo-mech. pulp	BOD	2.6	
	TSS	4.4	
	zinc	0.10	
fine paper pulp	BOD	3.8	
	TSS	6.4	
	zinc	0.14	

CMN pulp (*4)	BOD	4.2
	TSS	7.0
	zinc	0.15
Deink paper mills	BOD	7.0
	TSS	12.6
Non-integrated paper mills		
fine paper	BOD	4.2
	TSS	4.2
tissue paper	BOD	4.7
	TSS	4.7
tissue paper (FWP) (*5)	BOD	4.7
	TSS	4.7
Unbleached kraft pulp mills	BOD	2.8
	TSS	6.0
NSSC - ammonia pulps (*7)	BOD	4.0
	TSS	5.0
NSSC - sodium pulps	BOD	4.4
	TSS	5.5
Unbleached kraft - NSSC pulps	BOD	4.0
	TSS	6.2

*1) In all cases pH = 6.0-9.0.

*2) Maximum of average daily values in any 30-day period. Maximum daily value not to exceed 2 times 30-day average.

*3) BCT = Pulp used to manufacture paperboard, coarse papers, and tissue papers.

*4) CMN = Pulp used to manufacture, coarse, molded fiber and newsprint papers

*5) FWP = From waste paper.

*6) NSSC = Neutral sulfite semi-chemical process.

4. Citation

4.1. Title of document:	"Environmental Guidelines"
4.2. Publisher:	Office of Environmental Affairs, the World Bank
4.3. Date published:	July, 1984
4.4. Publisher Reference Code:	-
4.5. IEO library Code:	250.1/EGWC

Appendix

APPENDIX 1: LIST OF INFOTERRA NATIONAL FOCAL POINTS

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APPENDIX 2: INPUT SHEET FOR ADDITIONAL INCLUSION

The UNEP IE welcomes any comments or information for additional inclusion in this Compendium, IE-ESGIC database.

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Title of the law/regulations: _____

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3) Promote the use of safe and clean technologies;
4) Stimulate the exchange of information and experience throughout the world.

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Some recent UNEP IE Publications

Industry & Environment (quarterly) deals with issues relevant to industrial development, such as auditing, waste management, industry-specific problems, environmental news.

Industry and Environment Emission Standards and Guidelines
Information Clearinghouse (IE/ESGIC) Compendiums

Volume I — *Textile Industry Effluent Discharge Standards*
88 p., 1996. Price FF 150/US$ 30

Volume IIIa — *Iron & Steel Industry Air Emission Standards*
136 p., 1996. Price FF 150/US$ 30

Volume IIIb — *Iron & Steel Industry Effluent Discharge Standards*
106 p., 1996. Price FF 150/US$ 30

Technical Report Series

Environmental Management in the Electronics Industry: Semiconductor Manufacture and Assembly - Technical Report n°23. ISBN 92 807 1410 3, 161 p., 1995. Price FF 175/US$ 35

The Textile Industry and the Environment - Technical Report n°16. ISBN 92 807 1367 1, 120 p., 1994.
Price: FF 175/US$ 35

Environmental Aspect of Industrial Wood Preservation - Technical Report n°20. ISBN 92 807 1403 1, 150 p., 1994. Price: FF 150/US$ 30

Environmental Management of Nickel Production - Technical Report n°15. ISBN 92 807 1366 3, 90 p., 1993. Price: FF 200/US$ 40

From Regulation to Industry Compliance: Building Institutional Capabilities - Technical Report n°11.
ISBN 92 807 1342 X, 62 p., 1992. Price: FF 200/US$ 40

Environmental Aspects of Selected Non-Ferrous Metals (Cu, Ni, Pb, Zn, Au) Ore Mining - Technical Report
n° 5. ISBN 92 807 1295 X, 1992. Price: FF 250/US$ 50

Tanneries and the Environment - Technical Report n°4. ISBN 92 807 1276 4, 119 p., 1991.
Price: FF 200/US$ 40

Environmental Aspects of the Metal Finishing Industry - Technical Report n°1. ISBN 92 807 1216 0, 91 p., 1989. Price: FF 200/US$ 40

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