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Recommendation on Best Available Techniques in the Chemical Industry

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The Commission,

recalling Paragraph 1 of Article 2 of the Danube River Protection Convention in which the Contracting Parties shall strive at achieving the goals of a sustainable and equitable water management, including the conservation, improvement and the rational use of surface waters and ground water in the catchment area as far as possible;

recalling also Paragraph 2 of Article 2 of the Danube River Protection Convention according to which the Contracting Parties pursuant to the provisions of this Convention shall cooperate on fundamental water management issues and take all appropriate legal, administrative and technical measures, to at least maintain and improve the current environmental and water quality conditions of the Danube River and of the waters in its catchment area and to prevent and reduce as far as possible adverse impacts and changes occurring or likely to be caused;

recalling further Paragraph 2 b of Article 5 of the Danube River Protection Convention in which the Contracting Parties shall separately or jointly adopt legal provisions providing for requirements including time limits to be met by waste water discharges;

recalling further Paragraph 1 of Article 7 of the Danube River Protection Convention in which the Contracting Parties taking into account the proposals from the International Commission shall set emission limits applicable to individual industrial sectors or industries in terms of pollution loads and concentrations and based in the best possible way on low- and non-waste technologies at source.
Where hazardous substances are discharged, the emission limits shall be based on the best available techniques for the abatement at source and/or for waste water purification;

recalling further Part 1 of Annex 1 of the Danube River Protection Convention in which best available techniques are defined;

recommends to the Contracting Parties of the Danube River Protection Convention that the following measures should be applied in Chemical Industry:

1. Technical In-Plant Measures for the Reduction of Waste Water Volume and Abatement of Pollution Load

Waste water should only be discharged if waste water volume and pollution load are minimised by in-plant measures using best available techniques, i.a.

- automatic control of processes;
- separation of process water from cooling water;
- separate pre-treatment of waste water containing substances which due to their specific properties should preferably be removed prior to the final treatment;
- in-process recovery of high COD-level streams (e. g above 10 g/l);
- combined treatment of different waste waters containing hazardous substances only if an adequate reduction of the pollutant load is achieved compared to the purification of every single waste water stream;

* All activities that are mentioned in Annex I of Council Directive 96/61/EC

- use of water-saving techniques in washing and cleaning processes such as water circulation and counter-current washing;
- multiple use of process water;
- indirect cooling systems and condensation of vapours and organic liquids instead of direct cooling systems;
- processes for generating vacuum, which do not produce waste water, should be used if there is the possibility that hazardous substances get into the water;
- separate treatment of waste waters containing high concentrations of heavy metals;
- processing of mother-liquors, e. g. for recovery of materials or energy;
- substitution of the use of hazardous substances by less hazardous substances or preferably non-hazardous substances where such alternatives are available;
- production schedules as to reduce frequency of equipment cleaning;
- equipment design as contained system and allowing for easy cleaning in particular for batch processes;
- adequate equipment for monitoring of effluent parameters should be used, e. g. flow, pH and oxygen demand.

2. Reduction of Pollution Load by End-of-Pipe Measures

After implementation of relevant measures listed under 1., plants of the chemical industry discharging into water bodies should meet the following requirements under 2.1 - 2.5. Plants which discharge via sewer to municipal waste water treatment plants should meet the requirements under 2.3 and 2.4.
Sampling should be grab sampling, 2-hour, 8-hour or 24-hour sampling.
The mixing or diluting of different waste waters (i.e. mixing of treated process water with cooling water) for the purpose of compliance with the limit values established for the effluent should not be allowed.

2.1. Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD) or Total Organic Carbon (TOC)

For plants discharging into water bodies the reduction of COD- or TOC-load in pre- and final waste water treatment facilities should be at least 80 %. This requirement should also be regarded as fulfilled when BAT has been applied and the concentration in the effluent of the plant of COD is lower than 300 mg/l or the concentration of TOC is lower than 100 mg/l. The reduction of BOD should be at least 99 % or the BOD-concentration in the effluent should be lower than 30 mg/l.

2.2. Phosphorus and Nitrogen

For plants discharging into water bodies the concentration of total-Phosphorus in effluent should not exceed 2 mg/l and for total-Nitrogen should not exceed 50 mg/l. The requirement for Nitrogen is also fulfilled if the concentration does not exceed 75 mg/l and the reduction rate is at least 75 %.

2.3. Absorbable Organic Halogen (AOX)

For plants discharging into water bodies or connected to municipal sewerage system the concentration of AOX should not exceed 1 mg/l. This requirement should also be regarded

as fulfilled if the reduction of the AOX-load in the pre- and final waste water treatment facilities is at least 80 %.

2.4. Heavy metals

For plants discharging into water bodies or connected to municipal sewerage system the concentration should not exceed the following values:

Mercury (Hg)	0,05	mg/l
Cadmium (Cd)	0,2	mg/l
Copper (Cu)	0,5	mg/l
Nickel (Ni)	0,5	mg/l
Lead (Pb)	0,5	mg/l
Chromium (Cr-total))	0,5	mg/l
Chromium (Cr-VI)	0,1	mg/l
Zinc (Zn)	2,0	mg/l

These requirements should neither be exceeded in the effluent after final treatment for plants discharging into water bodies nor in the effluent connected to municipal sewerage system.

2.5. Toxicity of the effluent

At least once a year for plants discharging more than 500 m^3/d into water bodies the toxicity effect of the waste water should be determined by two toxicity tests which could be chosen out of the following four toxicity tests:

– toxicity to fish
– toxicity to invertebrates (Daphniidae)
– toxicity to algae
– toxicity to bacteria.

2.6. Analysing methods

BOD = BOD_5 = five-day biochemical oxygen demand consumption with suppression of nitrification.
COD = COD_{cr} = chemical oxygen demand consumption using the dichromate method.

Internationally accepted standardised sampling, analysing and quality assurance methods (e.g. CEN-standards, ISO-standards, DIN-standards and OECD-Guidelines) should be used whenever available.

Recommends also that this Recommendation should be implemented for new plants as from 1 January 2002 and for existing plants from 1 January 2006;

Recommends further that the Contracting Parties should report (see Annex 1) to the Commission on implementation of this Recommendation in 2003 and there after every three years.

Annex 1

Reporting Format for ICPDR Recommendation on Best Available Techniques in the Chemical Industry

The following data have to be reported for every plant of Chemical Industry with a process waste water volume > 100 m³/d which discharges into water bodies

1) Country
2) Name of the plant, its location and the river into which the discharge occurs
3) Description of type of plant and production technology
4) Waste water volume (m³/d, m³/a)
5) Information on measures taken according to Item 1) of the Recommendation (Technical In-Plant Measures: overall description for direct discharges into water bodies and discharges into the municipal sewer system)
6) Effluent loads

	Annual load (t/year)	Annual mean concentration (mg/l)	Reduction rate (mg/l)
BOD			
COD			
TOC			
tot-P			
tot-N			
AOX			

Heavy metals	Annual load (kg/a)	Annual mean concentration (mg/l)
Hg		
Cd		
Cu		
Ni		
Pb		
Cr-total		
Cr-VI		
Zn		

7) Methods of sampling (grab to 24h-sampling) and analyses.
8) Results of toxicity tests
9) Information about waste water treatment (pre-treatment and end-of-pipe treatment)
10) Action undertaken for reducing discharges and substitution of hazardous substances in the last three years.