SCOPE

This reference document on BAT for industrial cooling systems is a horizontal document that focuses on the cooling systems commonly used within the industrial activities of Annex 1 to the IPPC Directive. The industry sectors with high relevance are the chemicals, food, glass, iron and steel, refineries, pulp and paper and the incinerators. In the power industry, an incomparable amount of information and experience has been gained with respect to cooling. Also, the power industry relatively has the largest direct and indirect impacts on the environment with sub-optimal cooling. In a separate annex, special attention is paid to this sector and any disparities between power stations and other industrial activities have been assessed. Although installations for the production of nuclear power are not part of the scope of Annex I of the IPPC Directive, the applied environmental techniques are considered in this document where they relate to the cooling systems of the conventional section of these installations. Cooling systems of small combustion plants and air conditioning systems for both industrial and domestic use are excluded.

The scope of the term "cooling systems" in this reference document is confined to systems to remove waste heat from any medium, using heat exchange with water and/or air to bring down the temperature of that medium towards ambient levels. This includes only part of refrigeration systems, but excludes the issue of refrigerants such as ammonia and CFCs. Also, direct contact cooling and barometric condensers are not assessed as they are considered to be too process-specific. The following industrial cooling systems or configurations are covered in this document:

- Once-through cooling systems (with or without cooling tower)
- Open recirculating cooling systems (wet cooling towers)
- Closed circuit cooling systems
  - air-cooled cooling systems
  - closed circuit wet cooling systems
- Combined wet/dry (hybrid) cooling systems
  - open hybrid cooling towers
  - closed circuit hybrid tower

In this document, BAT is described for cooling systems that are considered to work as auxiliary systems for the normal operation of an industrial process. It is acknowledged that reliable operation of a cooling system will positively affect the reliability of the industrial process. However, the function of a cooling system in relation to process safety is not within the scope of this BREF.

Within the horizontal "approach", integration means addressing all relevant environmental aspects and the way in which they are interrelated, whilst acknowledging that balancing the various aspects requires expert judgement. Where appropriate, the relevance of the environmental performance of a cooling system within the performance of the entire industrial process is indicated.

The document addresses the following environmental aspects and the methods and techniques for reduction of emissions:
- effects of process and equipment design, and of material and maintenance;
- resource consumption (water, air, energy, chemical substances);
- emissions of chemicals and heat both to water and air,
- emissions of noise and plumes;
- waste generation and emissions to soil and terrestrial habitats;
- risk aspects;
- pollution arising from specific events (starts/stops) or incidents and
- decommissioning of installations.

This document will give a review of available techniques for industrial cooling systems, but will not give solutions on what the best cooling system is and does not intend to disqualify any of the existing systems applied. Nor will it give guidelines on whether a process needs a cooling system at all. This means that the document will not go into the detail of the production processes themselves that require cooling, where overall energy efficiency measures would be addressed. A general "approach" is followed, which leads to a balanced choice of a new system or of measures to optimise an existing cooling system aiming at prevention of environmental emissions related to the operation of cooling systems.