

# THE COOLING WATER SYSTEM FOR THE DELESTO 2 CO-GENERATION PLANT

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## 1. Introduction HBW

Hollandsche Beton- en Waterbouw [HBW], a HBG group company, is a civil engineering contractor, based in The Netherlands and working in Western Europe. HBW is strong in the area of non standard projects, in which the in house design and construction knowledge and capabilities can be combined to achieve clever and economical solutions. The cooling water system for the Delesto 2 co-generation plant is a typical example of such a project.

## 2. Background

AKZO Nobel operates a chemical plant near Delfzijl in the province of Groningen in the far North east of The Netherlands [fig. 1] The plant is located along a channel [Zeehavenkanaal] connecting the harbour of Delfzijl with the Eems. The Eems is the wide estuary of the German River Ems [fig. 2]. The channel runs parallel to the coast line and is in fact a former part of the Eems, now separated by a long dike [Schermdijk]. The dike between the channel and the AKZO Nobel plant is the actual sea defence [Zeedijk]. Characteristic for this area, as for the rest of the North Netherlands coast, are the vast flats [Wadden] in the Eems, outside the Schermdijk, which are dry during low water and wet during high water. This is where the Dutch practice 'wadlopen'.



Figure 1: Location

The AKZO Nobel plant was founded in the 1950's after the discovery of a large underground reservoir of mineral salt in the area and still most activities on the plant are salt-related. Yet gradually other activities have developed, one of those being power generation. This power generation is in hand of the Joint Venture Delesto, formed by AKZO Nobel [50%] and EDON [50%]. EDON is the energy distribution company for the Eastern and Northern Netherlands. Since 1983 a small co-generation power plant is operational at the Delfzijl location. In the co-generation power plant electricity and steam are produced and both are used directly on the AKZO Nobel plant. Part of the electricity is sold to the electricity companies and put in the national network.



Figure 2 Detailed location plan

At present an additional larger co-generation plant is under construction. The capacity of this so called Delesto 2 co-generation plant is 350 MW electricity and 750 tonnes steam per hour. The plant will be operational in 1999.

The cooling water system of this Delesto 2 plant has been designed and built by HBW. The coastal aspects of this cooling water system are the subject of this paper.

### 3. Project introduction

The tender for the cooling water system Delesto 2 took place in the autumn of 1995. AKZO Nobel Engineering acted as the formal client. The tender package included a basic design, by consultant Hasko, however, alternatives were allowed and detailed design was to be in the contractors scope. HBW's price was significantly below those of the competitors, roughly 20 million Dutch Guilders versus 27 million. The price difference was caused by some clever alternatives brought in by HBW; these will be explained further on. After some clarifications and negotiations the contract was awarded to HBW in December 1995.

Design work by WOB/DMC, the engineering department of HBW, started in January 1996. Construction works at the site started in April 1996 and the works were completed in December 1997.

The main components of the cooling water system are indicated in figure 3 and 4 and briefly explained below:

1. water intake with protective barrier etc. in the Zeehavenkanaal;
2. pump station [reinforced concrete] situated at the land-water transition area;
3. pipe and access bridge [reinforced concrete] from the pump station to the dike
4. two cooling water intake lines  $\varnothing$  1500 [concrete pipe with steel plate core] running from the pump station via the bridge and subsequently underground to the power plant;
5. buffer tower connected to the intake lines, which functions as pressure equaliser;
6. one water return line  $\varnothing$  2000 [concrete pipe with steel plate core] which is mainly parallel to the intake lines for the onshore part, then splits off at the crown of the dike, subsequently runs underneath the Zeehavenkanaal and ends in the outfall structure;
7. outfall structure on the flats in the Eems, outside the Schermdijk;
8. earth work and sheet piling at the dike crossing of the pipes.

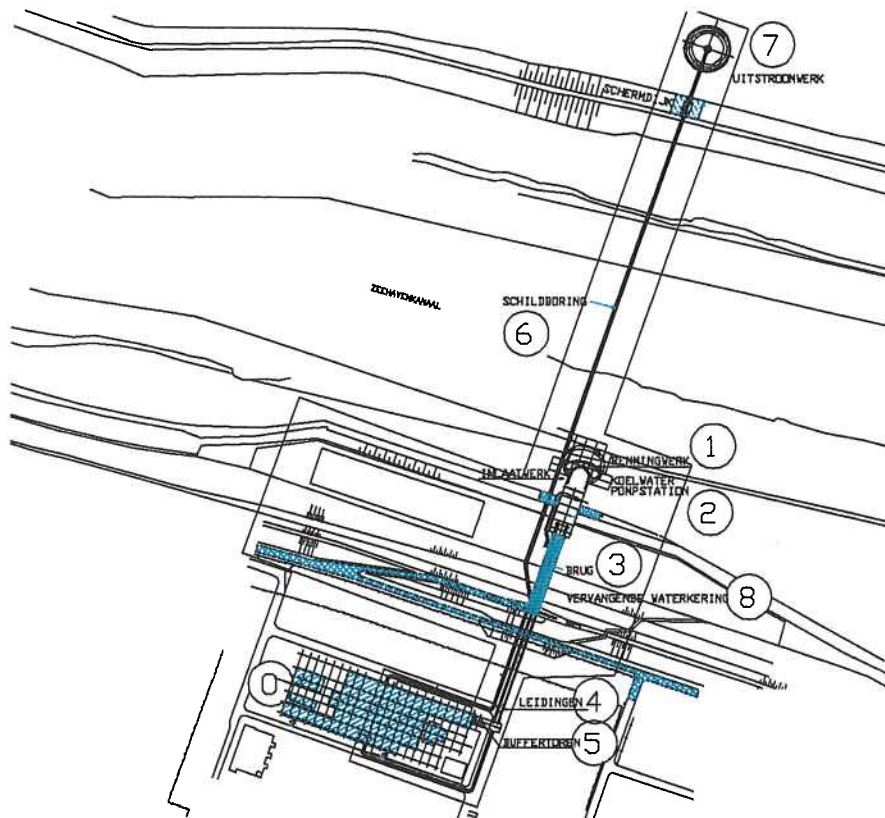


Figure 3 General layout, showing main components

