

# **CONTAMINATION OF THE TWENTE CANAL: ENSCHEDE'S DRINKING WATER SUPPLY UNDER THREAT**

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## **SUMMARY**

On 22 August 2003, a fire broke out in the raw materials store of a tire factory in Enschede, necessitating the use of a large quantity of water to extinguish that fire. This water became heavily contaminated with chemicals used in the factory's production processes. Much of the water then found its way into the nearby Twente Canal, causing serious contamination with various substances, some of which are classed as toxic. This paper discusses the response of the Ministry of Housing, Spatial Planning, and the Environment (VROM) Inspectorate.

## **1 INTRODUCTION**

On 22 August 2003, a fire broke out in the raw materials store of a tire factory in Enschede. Huge quantities of water were used to extinguish the fire, causing serious toxic pollution to the upper section (the 'third compartment') of the Twente Canal. This section of the canal included an abstraction point for the city's drinking water supply. The local water company, Vitens, was forced to temporarily relocate its abstraction activities to a point some five kilometres away (in the second compartment) in order to ensure water safety.

When the water in the second compartment also became polluted, the emergency abstraction was discontinued. Means of transporting water from elsewhere had to be developed very quickly. Because the water quality of the Twente Canal remains inadequate to this day, Enschede's drinking water supply continues to be transported from other areas in the region, with some being 'imported' from across the German border.

Under the provisions of the Water (Supply) Act, the Ministry of Housing, Spatial Planning, and the Environment (VROM) is responsible for the regulation of drinking water supplies in the Netherlands. The VROM Inspectorate carries out the relevant regulatory and enforcement activities on behalf of the minister. In light of its enforcement responsibilities, the VROM Inspectorate (Eastern Region) has been closely involved in the situation affecting the water supply for Enschede and the surrounding area. It must ensure that the continuity of supply is restored to the former (pre-fire) level and maintained thereafter.

Prompted by the fire, the VROM Inspectorate (in its capacity of second-line supervisory authority) also carried out a study of the manner in which the tire company fulfilled its licensing and compliance obligations further to the Environmental Management Act. This study reveals that the raw materials storeroom failed to meet the requirements of the Commission for the Prevention of Disasters due to Dangerous Substances (CPR) 15-2 Directive in a number of essential aspects, including provisions to intercept and retain the water used in extinguishing a fire.

## **2 STUDY OF SITUATION REGARDING ENVIRONMENTAL PERMITS**

Following the VROM Inspectorate's study of the permits held by the company and the supervision exercised by its authorized directors, it was determined that the raw materials storeroom had not been constructed according to the terms imposed by the permit. The building did not comply with the requirements of Directive CPR 15-2, which includes statutory guidelines laid down by the Commission for the Prevention of Disasters following the 1986 fire at the Sandoz chemicals factory in Basel, Switzerland. This incident caused serious contamination of the Rhine.

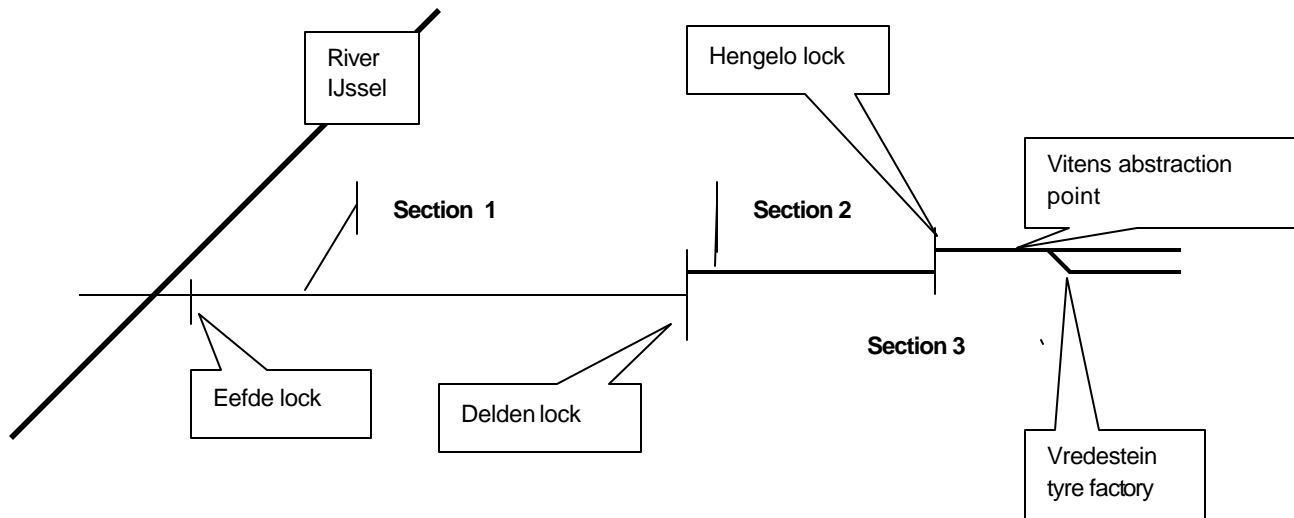
The revised permit issued to the Enschede tire factory on 3 December 2002 explicitly includes all the provisions of Directive CPR 15-2. According to the permit, the raw materials

storeroom was to have been in full compliance with these provisions by 1 January 2004. The study found that the storeroom failed to meet a number of the Directive's essential requirements, including those relating to fire detection, preventative measures, interception of water and incident registration. The company has since built a new storeroom which does indeed meet all the requirements of the CPR Directive.

### 3 POLLUTION OF THE TWENTE CANAL

The Twente Canal connects the River IJssel (at Zutphen) to the harbours of Enschede, via Lochem and Hengelo. It is divided into three sections, or 'compartments,' by means of locks. The first section is that between Zutphen and Delden; the second is between Delden and Hengelo and the third between Hengelo and Enschede (see figure 1). The Twente Canal is classed as a national waterway, whereby responsibility for the quantity and quality of the structure, soil and water rests with the Minister of Transport, Public Works and Water Management.

**Figure 1: The Twente Canal Sections ('Compartments')**



By closing the lock at Hengelo, it was possible to confine the pollution of August 2003 to the third compartment of the canal. Measurements revealed that the chemical substances released into the canal during the fire had spread throughout this third compartment.

In order to prevent the third compartment from overflowing (it is closed at one end and has a water drainage function), the Department of Public Works installed an active carbon filter at the Hengelo lock, through which treated water from the third compartment could be released into the second compartment under strictly controlled conditions. However, it soon proved very difficult, if not impossible, to filter all the substances from the water to the level required for drinking water abstraction. To provide the maximum degree of protection for the Vitens abstraction point, it was decided (in consultation with the various stakeholders) to lay a pipeline that would discharge the filtered water at a location some five kilometres away from the abstraction point. This situation was an ongoing point of attention for the VROM Inspectorate.

In order to resolve the problem permanently, the third compartment had to be completely decontaminated. A two-phase plan was devised for this purpose. The first phase covered the decontamination of the canal bed adjacent to the tire factory (the source). The

second phase involved the decontamination of the rest of the third compartment. With the permission of the Department of Public Works (the competent authority) the tire manufacturer, being responsible for the contamination, conducted the first phase of the decontamination process, which was completed in December 2003. The preparatory study for the second phase revealed that after some two months, the substances released by the fire had created a sedimentary deposit in the form of a thin layer of contaminants across the bed of the entire third compartment. Further investigations concluded that the planned second stage of the decontamination process was not feasible, either technically or financially.

The lock was reopened to shipping in early May 2004. The Department of Public Works has now started work on a restoration plan (based on increasing the throughflow of water in the canal) in order to return water quality to pre-fire levels. To date, however, this plan has failed to produce the desired results. Depending on climatic conditions, it seems unlikely that Vitens will be able to resume activities at its former drinking water abstraction point until at least the middle of 2005.

#### **4 WATER QUALITY AND DRINKING WATER SUPPLIES**

The pollution of the third compartment of the Twente Canal was so serious that Vitens was unable to abstract water at any point in this section. Even as the fire was in progress, water supplies were safeguarded by discontinuing abstraction from the canal and making use of the water reserves kept at the pumping station for use in emergencies such as this. In this way, Vitens could continue to supply drinking water to the residents of Enschede and the surrounding area pending further measures.

However, because the reserve supply was not sufficient to cover the entire period of the canal compartment's decontamination, a temporary pipeline was laid to a point beyond the Hengelo lock, enabling water to be taken from the second, unpolluted compartment. With additional purification of the water abstracted here, the continuity of the water supply was once again assured, at least for the time being. However, this contingency supply was more vulnerable than the regular supply, whereby it was important that it should not be used for longer than absolutely necessary.

When untreated water was discharged into the second compartment (the causes of which have yet to be determined), Vitens was constrained to discontinue its temporary abstraction of water here too. At the urgent request of the VROM Inspectorate, Vitens quickly developed and implemented plans to transport water from other parts of the region, including areas across the German border. With the cooperation of the relevant authorities, most of the necessary infrastructure was completed and brought into use in 2004.

In December 2004, all stakeholders agreed to continue monitoring the water quality (i.e. the decrease in pollutant content) in the third compartment of the Twente Canal. Once the water quality has regained the desired level, the Department of Public Works, being the directly responsible body, will continue monitoring for a further six months. For its part, the VROM Inspectorate (Eastern Region) will continue to ensure that the continuity of the water supply (including use of the original abstraction point in the third compartment) is restored to pre-fire levels.