

SEVERE RAILROAD TRANSPORTATION ACCIDENT WITH VINYL-CHLORIDE

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Scenario:

While passing through of a vinyl-chloride (VC) carrying train at the station of Schönebeck/Elbe on June 1st 1996 eleven tankers derailed, one blew up and five burned out. Due to informations of the fire brigade about 290 tons of VC burned over a period of 38 hours. Fireman, security staff, other workers and even people living near by to the place of the accident were exposed to VC and its pyrolytic products (e.g. hydrochloric acid). Data obtained from such accidents may be used for risk assessment of the chemical involved. This includes the description of an exposure scenario to evaluate the possible dose of the chemical and the documentation of symptoms.

Methods:

Measurements of concentrations in ambient air were performed over the following ten days. From these measurements, the description of an exposure scenario has been carried out. As a biological marker of VC exposure thiodiglycolic acid was measured in urine. In cooperation with the Poison Control Centre (PCC) Erfurt which was contacted on the first day of the accident for general information and advice, the Federal Institute of Health Protection of Consumers and Veterinary Medicine Berlin (BgVV) made retrospective evaluations of health complaints due to reports of poisoning cases by medical doctors as well as by public health institutions.

Results:

Measurements of the concentrations of VC in the air of the surrounding of the accident were as follows: At places directly near the train a range of 0/0/0/20/30 ppm (*min/10%/median/90%/max*) of VC was determined. In a two hundred meter distance from the centre of the fire, air-concentrations were in a range of 0/0/2/8/10 ppm (*min/10%/median/90%/max*). There was no statistical difference between these two concentration ranges (U-test). The BgVV documented symptoms in a total of 325 persons. These were 44 firemen, workers and security personnel exposed directly in the area of the accident and 281 additional persons which came in contact to VC as inhabitants outdoor, indoor and some of them in addition as spectators (inquisitive persons) for a short time near the accident. The most frequent symptoms were complaints of irritations of the upper respiratory tract with pain in the throat, hoarse voice and coughing attacks, pulmonal irritations with pain in the chest, dyspnoea and irritations of the eyes, in one case with an ocular erosion. Additionally there were irritations of the skin with red and itching in the face area, sometimes also with vesiculation and erosions at the limb. Very frequently gastrointestinal afflictions, headache, fear, drowsiness, dizziness and a loss in concentration ability were reported. In 312 patients the acute disorders (most irritations of the skin) were minimal and of short duration (maximum 1-3 days). 28 persons had to be hospitalized, most of them only for one day. Only in 4 cases the symptoms were moderate skin symptoms.

The actual assessment from the documentations of more than 300 patients indicated more symptomatology related to pyrolytic products than to VC exposure, so that the risk of an acute VC-poisoning seemed not to exist. This assumption is supported by the low exposure data for VC and low excretion of thiodiglycolic acid. Toxic concentrations in literature are in a range of > 5000 ppm. As VC is a potential carcinogen the question remains open whether there may be carcinogenic risk.