

Hotlos, H. Analysis of Failure Events and Damage Repair Costs for Water-pipe Networks in the Winter Season. *Ochrona Srodowiska* 2009, Vol. 31, No. 2, pp. 41–48.

Abstract: One of the major underlying causes of water pipe failure in the winter season is negligence (during design and construction of the network) in conforming to the regulations that specify the minimal depth for pipe laying. When the pipeline is laid within a freezing soil layer, this will contribute to the occurrence of failure events due to pipe burst or frozen water, which holds true specifically for pipeline segments of a small diameter and very low flow velocity. In this paper observations are reported on the water-pipe networks that are in service in Poland and in the eastern Lands of Germany. They have revealed a very high number of frost-related failure events, as well as heavy financial losses concomitant with pipe failure, particularly during the harsh winter of 1996. In Poland, six water-pipe networks of choice (Brzeg, Kłodzko, Olesnica, Wrocław, Opole and Świdnica) were analyzed for the number of failure events in distributing pipes and mains in the autumn and winter months (November–February), as well as in the spring and summer months (March–October). Those analyses were based on many years' observations, with emphasis on the ones made in 1996. In the majority of instances, the rate of failure in the time span of November to February was several times as high as in the other months, and was observed in the water-pipe network rather than fittings. The harsh weather conditions are also to be blamed for the rise in the repair costs for particular types of pipe damage and, more importantly, for the very high costs of the repairs that had to be done in the water-pipe network during the winter months. In-service analysis of the Wrocław water-pipe network has shown that the average monthly costs of damage repair in the time span of January to March 1996 were even six times those observed in the other months of that year.

Keywords: Water distribution system, water-pipe network, pipe failure, repair cost.