



Floods and safety of installations containing hazardous substances. Conclusions of the UBA on a research project.

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As a consequence of the floods in the east part of Germany in August 2002 the Umweltbundesamt (German Environmental Protection Agency) set up a research project on the safety of installations and establishments and hazards by nature. The scope of the project included hazards by earthquakes and storms but the main focus was on floods. Subject of the project was the safety of establishments according to the Seveso-Directive of the European Union (96/82/EU) and installations containing substances hazardous to water according to the German Federal Water Act (e.g. mineral oils).

The project included: 1. an analysis of the safety requirements according to relevant legal obligations and technical standards, 2. a survey on flood prone establishments and installations located on the shore of the Rhine or the Elbe and her tributaries, 3. a brief description of techniques for mapping of flood prone areas and flood forecast, 4. a description of available flood protection and safety technologies and 5. a discussion of emergency planning requirements.

According to the Federal Water Act - as amended in 2005 - flood plains and flood-prone zones shall be defined. The Water Acts of the German Länder have to be amended to consider these requirements. The ordinances on the safety of installations containing substances hazardous to water should define clear safety requirements for installations in both types of areas. The German Störfall-Verordnung (ordinance implementing the main part of the Seveso-Directive) requires that operators of establishments consider hazards by nature in their safety concepts. It is left to define which technical and organisational safety measures are required to meet this obligation at

establishments in flood plains and flood prone areas.

The survey in 2003 made clear that the awareness of operators of risks by floods is mainly determined by their own experience. Flood plains and flood prone zones need to be defined, have to be communicated to the operators and have to be regarded in siting of establishments and safety concepts. Especially the current state and reliability of dykes needs to be evaluated, the results have to be considered in flood hazard maps and communication of flood risks.

Riverine and flash floods cause different types and levels of hazards. Mapping of flood hazards is possible for riverine floods but is left to be done for a lot of areas and to be considered in safety concepts for establishments. A lot of technical equipment is available to protect the relevant sites and most of the flood alarm systems allow sufficient time to install mobile technology. Incomparable more difficult is the management of flash floods. Flood hazard mapping and alarm systems have to consider possible and predicted precipitation. Sites or installations need to be protected against forces by flow as well as impacts by flotsam. Alarm systems allow only very short time for response which limits the use of mobile equipment and organisational measures.

Flood control plans and flood hazard maps should consider the existence of establishments as well as other critical infrastructure e.g. hospitals, power plants. Flood alarm systems should consider the information requirements of operators of establishments. Emergency plans of authorities have to consider measures to protect the establishments, the intended activities of the operators according to their own flood emergency plans and the risks caused in case of flooding of the establishments.

The complete research report will be published as: "Schutz von neuen und bestehenden Anlagen und Betriebsbereichen gegen natürliche, umgebungsbedingte Gefahrenquellen, insbesondere Hochwasser" Dipl.Ing. H.J. Warm, Dr. E. Köppke, Prof. Dr. H.H. Bernhart, Prof. Dr. W.B. Krätzig, Dr. H. Beem; Umweltbundesamt Vorhaben 203 48 362