

Natech risk reduction in OECD Member Countries

E. Krausmann¹, R. Fendler², D. Baranzini¹

¹European Commission, Joint Research Centre, Institute for the Protection and Security of the Citizen, Via E. Fermi 2749, 21027 Ispra (VA), Italy

²Federal Environment Agency, Wörlitzer Platz 1, 06844 Dessau, Germany

- OECD Project: **Control of The Impact of Natural Hazards on Chemical Installations** (2008 - 2012)
- Results of a survey on Natech risk reduction in OECD Member Countries

OECD Project: **Control of The Impact of Natural Hazards on Chemical Installations** (2008 - 2012)

Steering Group Members:

Czech Republic, France, Germany, South Korea,
Switzerland, United Kingdom, United States, EC
JRC, UNEP

Findings of the first year of the project (Interim
Report 2009)

1. Effects of Climate Change ☺
2. Mapping of Natural Hazards and Land-Use-Planning ☺
3. Natechs and Emergency Planning ☺
4. International Emergency Assistance ☺
5. Consideration of Natural Hazards in Hazard Identification, Risk Assessment, Design and Construction, Safety Reporting and Inspections
6. Communication of Natural Hazards and Natech Risks

☺ Subjects addressed in the first Interim Report to the 19th WGCA

- CC will influence the frequency and/or intensity of some natural hazards → to be taken into consideration
- IPCC Fourth Assessment Report (2007) gives some information on extreme events and sea level rise, but
 - real CO₂ Emissions 2005/2006 higher than its worst-case scenario
 - melting of the Greenland Ice-Shield will be relevant before 2100
 - more actual and regional information required
- IPCC Report „Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation“
(to be published in 2011) → **Consideration of CC in:**
 - the analysis of risks due to natural hazards for regions, sites and installations
 - design and lay-out criteria, construction, rules, standards

- Different kinds of NHs = different approaches for NH-maps + different authorities in charge
- National and regional maps available but not for all NHs:
 - Further development of NH-maps is required to fit with the information requirements for Natech management
 - (Legislation and guidance on) LUP should consider
 - + risks by NHs
 - + risks by hazardous installations, and
 - + the combination of both (Natechs)
 - OECD should develop guidance on these subjects

- Natechs have to be considered in on-site and off-site EPs
- Natechs pose specific challenges to emergency planning
 - ➔ NH can cause multiple and simultaneous failures
 - ➔ off-site responders may not be available (busy mitigating off-site problems)
 - ➔ NH may hamper response e.g. damage to infrastructure
- Natech scenarios in on- and off-site plans required
- Improvement of NH-forecasting systems is essential

Required activities:

- ➔ Development of guidance for consideration of NH and Natechs in on- & off-site emergency plans
- ➔ Identification of best practise in NH-forecasting and warning systems

- Natechs can be a consequence of a NH causing humanitarian and environmental emergencies that require international response
- Pool of experts, sources of funding, mobilization procedures required:
 - assistance & support by private sector (chemical industry)?
 - clarification of the consideration of NHs in the application of the polluter-pays principle (OECD recommendation C(98)88)

- Further development of the Interim Report (2010 – 2011)
- Co-operation with IPCC and UNFCCC
- Development of OECD-Guidance on relevant subjects
- Preparation and holding of an OECD Workshop (2012?)

SURVEY OBJECTIVES:

- Assess the effectiveness of the current legislative framework for Natech risk reduction in OECD Member Countries
 - Assess Natech awareness and knowledge
 - Identify Natech case histories and lessons learned
 - Identify existing Natech risk management practices
 - Identify needs and/or limitations in implementing Natech risk reduction strategies
- ➡ **Better designed and targeted Natech risk reduction strategies**

For the purposes of the survey, a “Natech” accident is defined as a chemical accident caused by a natural hazard or a natural disaster.

Chemical accidents include accidental oil and chemical spills, gas releases, and fires or explosions involving hazardous substances from fixed establishments (e.g. petrochemical, pharmaceutical, pesticide, storage depot), and oil and gas pipelines.



Earthquake, Turkey, 1999



Hurricane, USA, 2005



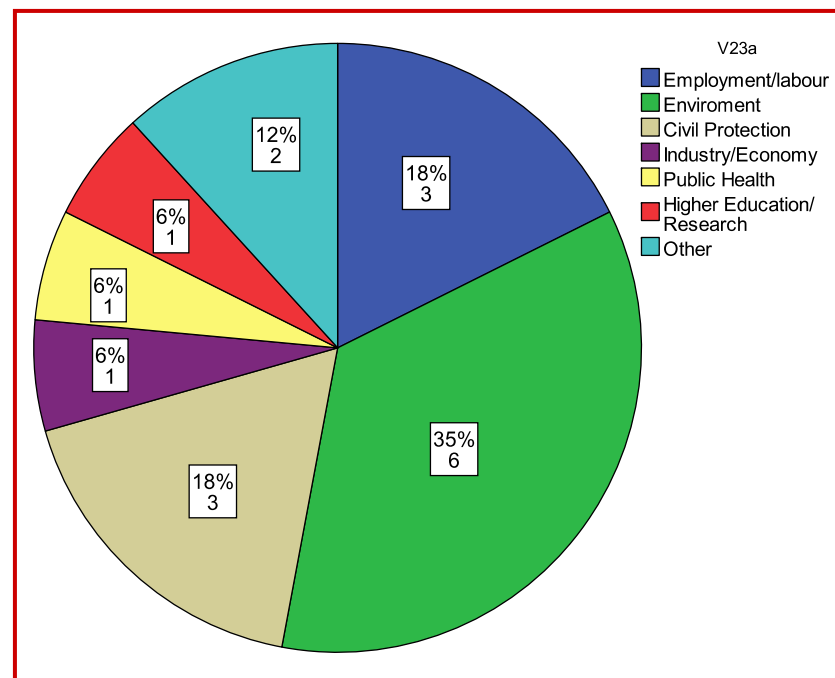
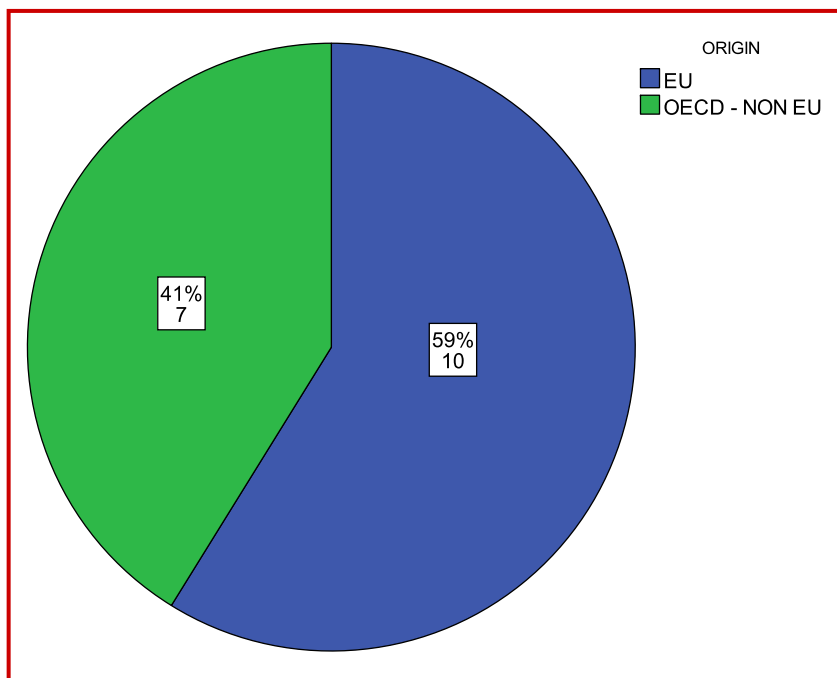
Floods, Czech Republic, 2002



Earthquake, China, 2008

17 participating countries

Australia, Austria, Czech Republic, France, Germany, Iceland, Italy, Luxemburg, The Netherlands, New Zealand, Norway, Poland, South Korea, Sweden, Switzerland, United Kingdom, United States of America



Regulations for the prevention and mitigation of Natechs

- Natural hazards are addressed in existing **regulations for chemical-accident prevention** in the majority of responding countries (76%).
- In 24% of the countries natural hazards are not addressed in chemical-accident prevention regulations despite a possibly high susceptibility to Natech accidents.
- The effectiveness of current regulations in preventing Natechs is unclear. The occurrence of Natechs in some countries indicates that there may be gaps that need to be addressed.
- **There is a perceived need among the respondents for improving current regulations to enable effective Natech risk reduction.**
- In over 70% of the countries **technical codes, standards or guidelines** for the design, construction and operation of buildings and other structures in industry that consider natural hazards exist. However:
 - ➔ Only certain natural hazards are considered, and
 - ➔ Technical codes are designed to protect buildings from natural hazards but may not give appropriate consideration to installations housing hazardous substances.
- Only 10% of the respondents have developed **guidelines specific for Natech risk reduction** (for selected natural hazards).

Natech data collection and case histories

- There are no specific Natech accident databases.
- Natech accidents have to be retrieved from conventional chemical-accident databases whose structure may not be adequate for capturing the dynamics of Natechs.
- Natech accidents have occurred in **35%** of the responding countries in the period 1990-2009 (87 Natechs reported in the survey).
- The most frequent natural events triggering Natechs were: **lightning, low temperatures, and floods** (based on 58 Natechs).
- The main final scenarios reported were **liquid spills** and **air releases**, followed by fires and explosions.
- Some of the reported Natech accidents have resulted in **fatalities** and **injuries**.
- **Most of the reported natural events that have triggered a Natech were considered in the country's laws, codes and standards for chemical-accident prevention.**

Natech awareness and risk reduction

- **Awareness** of Natech risk exists among the respondents.
- There is uncertainty as to the level of **knowledge** on the dynamics of Natech accidents in competent authorities.
- The main potential Natech triggers in the responding countries are believed to be **river and flash floods, storms, heavy rain, storm surge** and **earthquakes**. However, the main natural events having caused Natechs in these countries were floods, lightning and low temperatures.
- **In 40% of the responding countries Natech risk does not appear to be adequately taken into account in industrial risk assessment with the resulting low levels of preparedness.**
- There is a lack of specific **Natech risk maps** in OECD countries.
- **Natech risk-reduction measures** seem to exist in the majority of countries (76%). They are, however, often generic (e.g. Seveso II).
- There are only few Natech-specific **accident scenarios**.
- It is difficult to identify **best practices** specific for Natech risk reduction.

Identifying needs and limitations

- The respondents agree that there are several **gaps in Natech risk reduction**. These gaps have to be addressed to guarantee effective Natech risk management.
- There is a need for **training** of chemical-accident prevention and natural-disaster management officials in Natech risk reduction.
- There is a need for **guidance on Natech risk assessment for industry and at the local level**.
- A **lack of adequate resources** and budget constraints were indicated as the main factors that limit Natech risk reduction.
- The **top Natech risk reduction strategies** according to the survey are:
 - Raising awareness and improving risk communication
 - Natech risk mapping
 - Improving regulations
 - Developing specific guidelines and best practices
 - Developing methodologies for Natech risk assessment
 - Preparing dedicated Natech emergency management plans

The following areas for future work have been identified (in arbitrary order):

- + Improvement of awareness raising and risk communication at all levels of government and in industry;
- + Development of methods and tools for Natech risk assessment;
- + Identification of best practices for Natech risk reduction and sharing of existing practices with other countries;
- + Preparation of dedicated Natech emergency management plans with consider the possible loss of utilities;
- + Preparation of guidelines for risk assessment in industry and specific technical codes that address Natech risk;
- + Implementation and enforcement of specific regulations for Natech reduction;
- + Development of Natech risk maps for effective land-use planning and emergency management;
- + Development of guidance on Natech risk assessment at the community level;

The following areas for future work have been identified (in arbitrary order): cont'd

- + Land-use planning that explicitly addresses Natech risk;
- + Research into the impact of climate change on future Natech risk;
- + Training of competent authorities on Natech risk reduction.

- Natural events have been recognised as a relevant source of risk to a chemical facility with the potential to trigger a major accident.
- A framework for Natech risk reduction exists but a strategic Natech risk-reduction initiative is lacking.
- A number of shortcomings and gaps need to be addressed to achieve effective Natech risk reduction.
- It is proposed that the OECD Guiding Principles on chemical accident prevention, preparedness and response be adapted to more explicitly consider Natech risk.



**THANK YOU
FOR YOUR ATTENTION!**

Contact: elisabeth.krausmann@jrc.ec.europa.eu

<http://www.jrc.ec.europa.eu/>

<http://ipsc.jrc.ec.europa.eu/>