Major Hazard Incidents- Scientific support to chemical safety and security at the JRC

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The Major Accident Hazards Bureau (MAHB) project

The **Major Accident Hazards Bureau (MAHB)** is an office within the **European Commission's Joint Research Centre (EC-JRC)**. We provide scientific and technical support for policy associated with **chemical safety and security**.

We work with European Union (EU) policy entities within the EC, especially the **Directorate General – Environment (DG-ENV),** to implement the **EU Seveso Directive** for the control of major chemical accident hazards.

We work with EU policy leaders in the area of disaster risk reduction and crisis management (DG-ECHO) to support impact analysis (DG-ECHO) related to accident scenarios as well as real time events and capacity building for CBRN risk management in EU neighbour countries and third countries **(DG-DEVCO and DG-NEAR)**

We collaborate with **the OECD Working Group on Chemical Accidents for over 35 years** to support improvement in chemical accident prevention and preparedness globally, as well as other international organisations, especially **UNECE** and **UN Environment**.

We manage EC obligations to collect and analyse EU Member State **data on chemical accidents to support lessons learning** and also manage reporting of information on **EU hazardous (Seveso) sites**

For more information, visit
https://minerva.jrc.ec.europa.eu/en/minerva

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Outline of the presentation

- Chemical incidents – ongoing challenge for the EU and the world
- JRC-MAHB's contribution to preventing and mitigating the impacts of chemical incidents

The most recent chemical disasters shaping our work

Beirut port explosion – 4 August 2020, Improperly stored ammonium nitrate blows up warehouse in the port, kills 218, 7,000 injured

Tianjin, China, 12 August 2015, 173 killed, nearly 800 injured, improper handling of nitrocellulose initiates massive warehouse fire

Sitikunda, Bangladesh, 4 June 2022, Explosion of chemical containers, 47 deaths, 450 injured

Aqabi, Jordan, 27June 2022 – Crane drops chlorine container, 13 deaths, > 250 injured

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Recent EU disasters

Leverkusen, Germany, 27 July 2021, 7 workers killed after tank of chemical waste explodes

Ludwigshafen, Germany, 17 October 2016, 5 workers die after maintenance contractor cuts into wrong pipe

Rouen, France, 26 September 2019, Chemical products warehouse fire causes massive community disruption,

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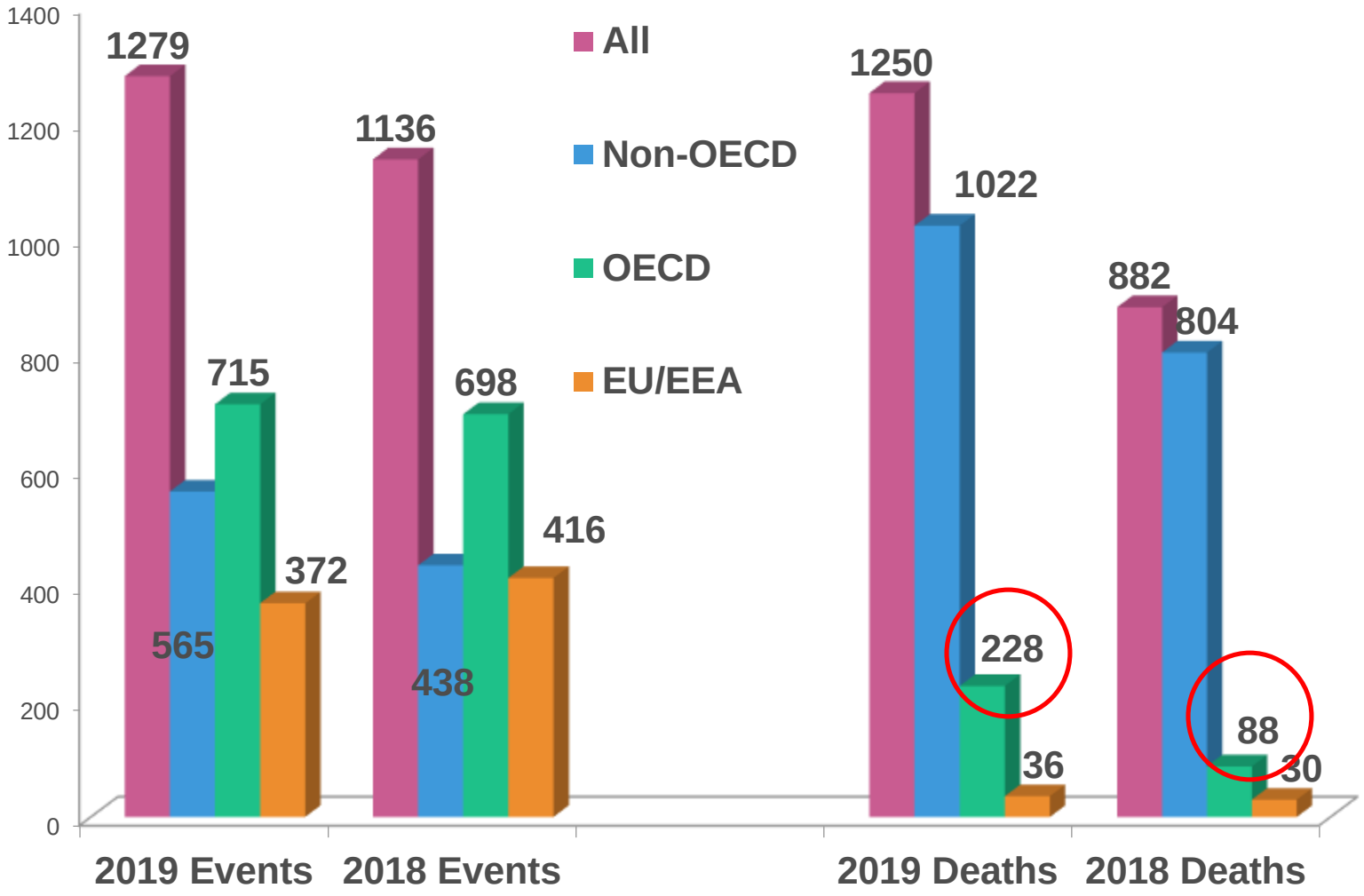
The EU averages > 35 chemical incidents per month (most not serious), according to media reports



The EU has many chemical incidents, but only **a small fraction of its incidents have severe consequences**

74 (20%) of EU/EEA events occurred **on EU Seveso (high hazard) sites.**

The **OECD increase is largely due to one incident**

Conversely, there were **many fatal chemical disasters in non-EU and non-OECD countries.**

Chemical accidents reported in the global media in 2018-2019 (JRC GMI-CHEM database, 2020)

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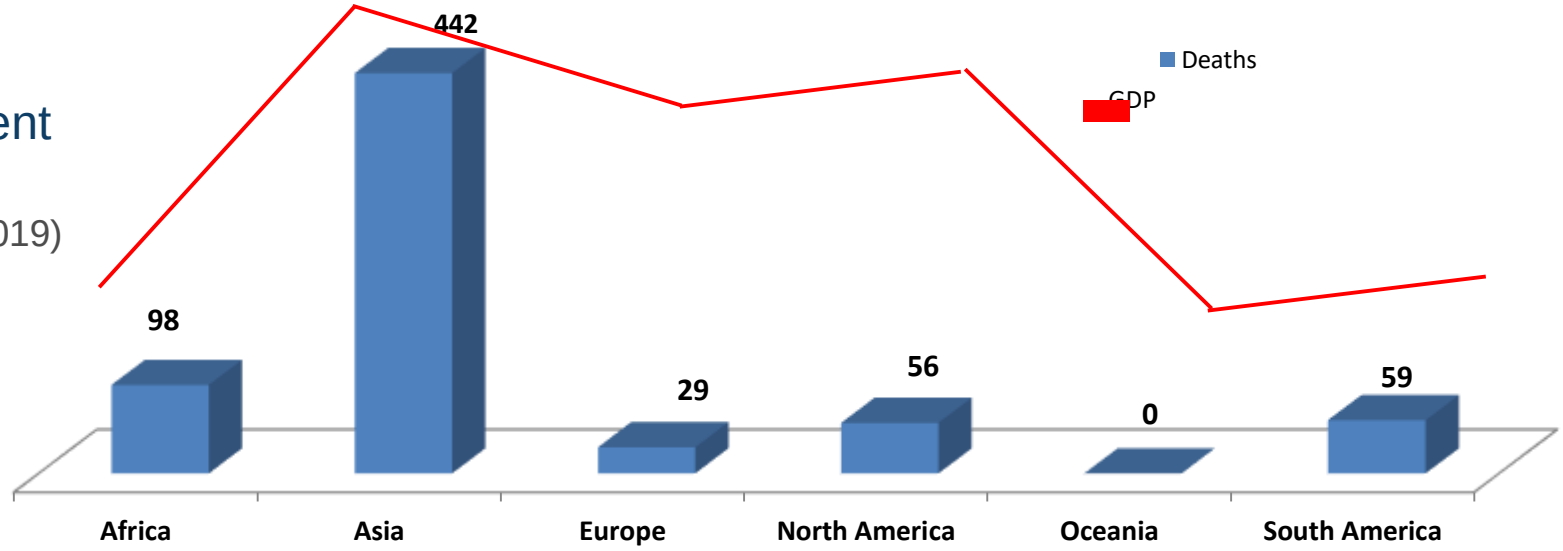
Reducing impacts?

Chemical incident fatalities vs. GDP

Europe sustains a much lower incident rate than many parts of the world

Fatalities vs. GDP
in 2017 By continent

(JRC GMI-CHEM - 2019)



… but it is lower in some years than others. There can be substantial fluctuations in chemical accident impacts over many years.

Are we doing enough to reduce risk of future chemical catastrophes?

And what are we doing about risks faced by our trading partners?

The EU Seveso Directive

- The first comprehensive chemical accident risk management legislation in the world
- Revised several times, most substantially in 1996 (Seveso II), but also after the Baia Mare, Romania (1999), Enschede, Netherlands (2000) and Toulouse, France (2001) disasters
- A performance-based system – It requires safety management system, rigorous system of inspections, accident investigation, accident reporting for sharing lessons learned,
- It Is a global model for chemical accident risk management world wide
  - The OECD Guiding Principles on Chemical Accident Prevention and Preparedness is heavily influenced by the EU Seveso Directive
  - The UNECE Convention on Transboundary Effects of Industrial Accidents is modeled after the
- The JRC-MAHB work is based on the experiences of the EU in implementing the Seveso Directive

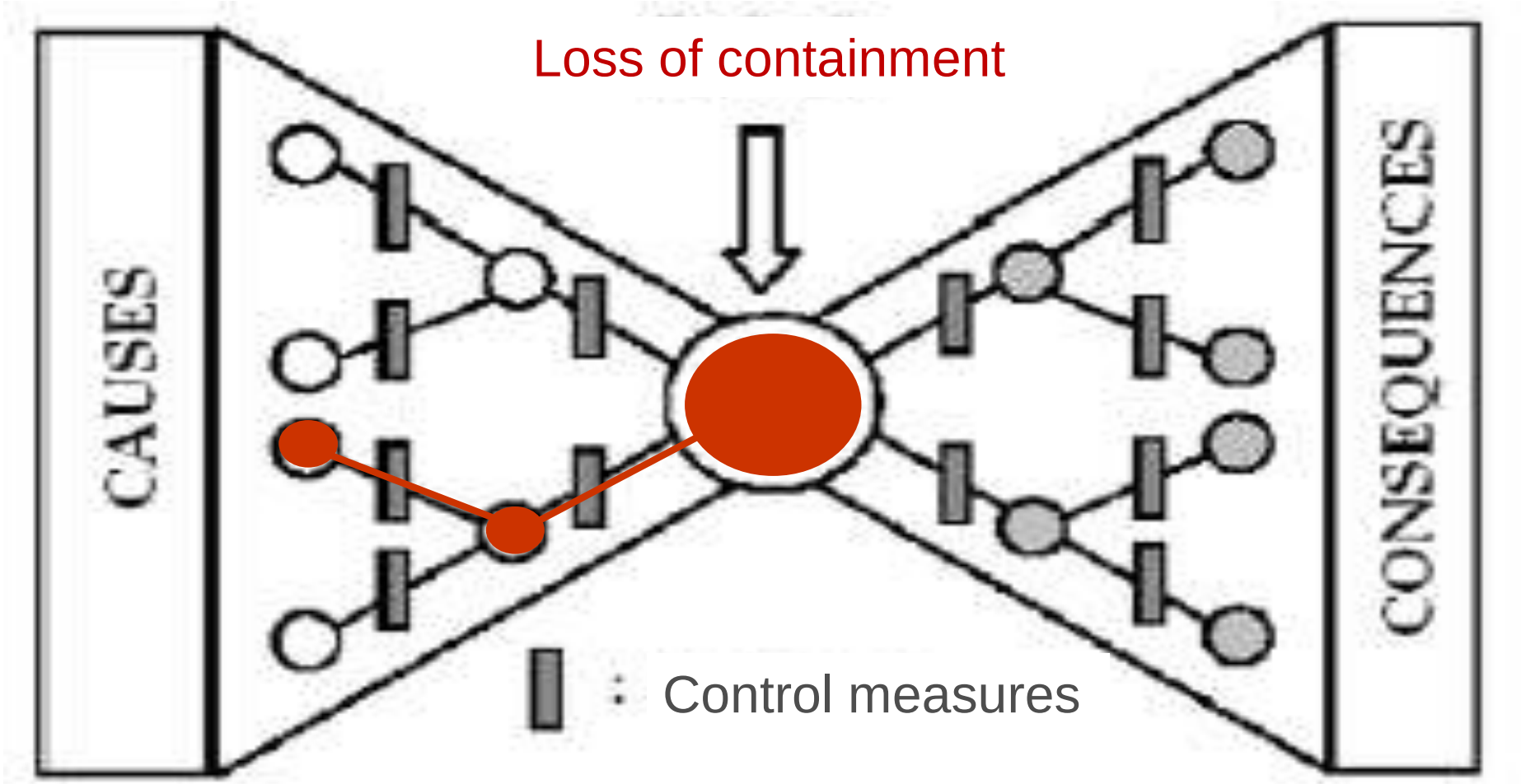
Chemical incidents – uniquely challenging disasters

- Around 30-40 major industrial and commercial sectors use hazardous substances in large enough quantities to be a significant risk
- There are thousands of dangerous substances, a few dozen common toxic substances for humans, many more toxic to the enviornment, and thousands are flammable (with explosive potential under certain conditions
- Operations involving dangerous substances vary widely. There is no “typical” hazardous process.
- Even small changes can elevate risk (in staff, in the operating conditions, in equipment, etc.). Need constant attention!
- Unlike natural disasters, there is no warning for a chemical disaster.

The best way to avoid a chemical disaster is not to have one.

A winning strategy is to invest in prevention and mitigation of impacts

The bow tie illustrates the preferred strategy for preventing chemical (and most technological) disasters



Prevention

Mitigation

What questions does MAHB help answer?

Local or national government: I have a big gas storage plant near a large residential and commercial area. Is it safe enough? (JRC ADAM consequence assessment tool, Accident Scenarios Handbook)

Industry operator: I have a fireworks production plant to keep safe. What strategies should I employ? (Good practice report for fireworks and explosive sites, Lessons learned bulletin)

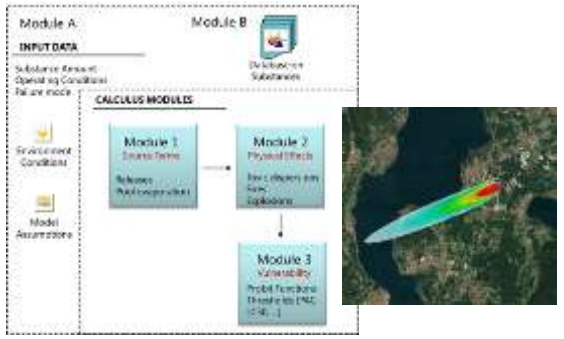
Policymaker: Where are accidents happening? What emerging risks should I worry about? (JRC eMARS accident reports and analyses, JRC Chemical Accident Risks Seminar)

Seveso inspector: I am inspecting the plant's safety management system. How do I know what to look for? (JRC Common inspection criteria)

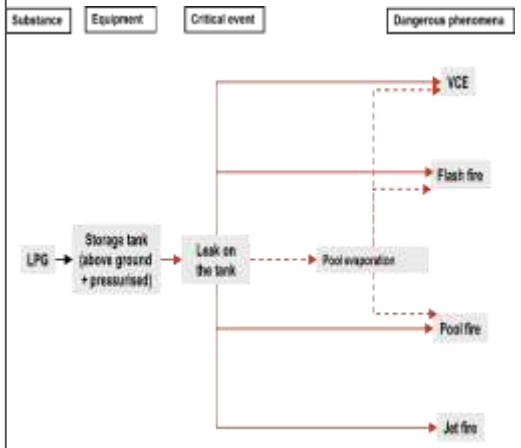
Enlargement/Neighbourhood country: How do I know where my risks are? Who should be involved in chemical accident risk management? Where do I start? (JRC training workshop)

Key contribution areas - MAHB

Consequence and risk analysis



Training workshops - ADAM online risk assessment tool

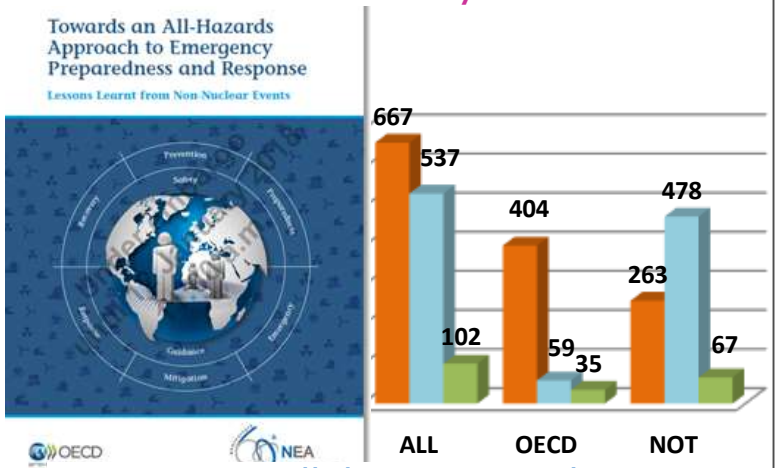


Chemical accident scenarios handbook

Technical tools, training for risk management

4 technical reports and a Seveso inspectors' workshop on LPG/LNG sites

Analysis & exchange with the global community



OECD-JRC collaborations – lessons learnt from emergency response, accidents in the media

Capacity building/ emerging risks

Chemical Accident Risks Seminar

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ADAM Consequence analysis software

MAHB lessons learning and related initiatives 2023

- **Lessons learned bulletins**
  - **Lessons learned from chemical accidents involving power failures (2021)**
  - **Lessons learned from chemical accidents in warehouses (2022)**
  - **Lessons learned from chemical accidents in waste management sites**
- **Lessons learned handbook (final draft 2024) –** in collaboration with the Accident Analysis Benchmarking Exercise (AABE) Group
- **CAPRI –** Chemical Accident Portal – Resources and Information – Pilot-tested 2022 – Official launch autumn 2023
- **Lessons learned and the role of inspectors** – TWG 2 Webinar March 2023
- **Work with OECD Working Party on Chemical Accidents** on
  - seminar on safety of hazardous chemicals handling in ports
  - promoting more advanced approaches to lessons learning
  - raising awareness of chemical safety risks associated with the energy transition (climate change)

MAHB TWG 2 and related good practice exchange 2023

- **Common inspection criteria**
  - **Training of personnel (2021)**
  - **Internal emergency planning (2022)**
  - **Management of contractors (2022)**
  - **Avoiding ignition sources (2023)**
  - **Preparing for toxic dispersion events (2023 or 2024)**
  - **Design and management of secondary containment (2024)**
  - **Incident investigation and analysis (2024)**
  - **Future topics include loading and unloading, cybersafety, hydrogen, ammonia, etc.**

Link to the Seveso Inspection Series

- **MJVs/Upcoming Good Practice Reports**
  - **JRC -Good inspection and risk management practice during Covid-19 (2023)**
  - **JRC - Information to the Public (MJV 2022/Published 2023)**
  - **Portugal - Lower tier sites (MJV 2023/Published 2024)**
  - **Italy - Coordination on external emergency plans (2024)**
  - **Romania – Topic TBA (2025)**

MAHB TWG 2 (EU Seveso inspections group) and related good practice exchange 2023 (continued)

- **Webinars on Seveso inspection practices**
  - **Primary containment systems** – Ageing management and maintenance practices (2022)
  - **Lessons learned and the role of the Seveso inspector** (2023) (up coming publication)
  - EU + OECD **- Hydrogen fuel risks** – exchange between experts and inspectors (September 2023) – Limited participation
  - EU + OECD - **Practices for inspecting/monitoring hydrogen sites**– inspector exchange (2024) – For any Seveso inspectors (not limited)

- **Other upcoming TWG 2 publications**
  - **A human factors framework** to support Seveso inspections (2024 or 2025)
  - Practices for **implementing Article 19** (Prohibition of Use) (2024)
  - Practices in implementing the **Seveso temporary storage exemption** (2024)

- **TWG 2 annual meeting hosts – Austria (2024), 2025 and 2026 (we have volunteers but they need to confirm)**

Various other MAHB contributions in 2022-2023

- Summary for DG ECHO of various chemical incident risks and disasters
  - **War in Ukraine -** briefings to ECHO on identification of most vulnerable sites, advice on preparedness, incident monitoring
  - Briefings to ECHO on **chemical incidents in Sitikunda, Bangladesh and Aqabi, Jordan**
  - Initial monitoring and analysis of the **Oder river transboundary contamination event** (July/August 2022)
    - Follow-up was led by the JRC environmental team
  - Contribution on c**ross-boundary chemical disasters** and **energy transition risks** for upcoming ECHO report on emerging disaster risks
  - Technical support to the **EU CBRN Centres of Excellence Initiative** – workshops, (occasional) advice on Seveso implementation and risk assessment for capacity building project leaders

Thank you

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