UNECE Convention on the Transboundary Effects of Industrial Accidents

UNECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes

UNECE Expert Group on Fire-water Retention

1st MEETING OF THE EXPERT GROUP ON FIRE-WATER RETENTION

17 January 2017
Geneva, Switzerland

Meeting Minutes

1. Opening of the meeting

The meeting was opened by Mr. Gerhard Winkelmann-Oei (Germany), co-Chair of the Joint Expert Group on Water and Industrial Accidents (JEG), and Mr. Nicholas Bonvoisin, Secretary to the UNECE Convention on the Transboundary Effects of Industrial Accidents (Industrial Accidents Convention), who welcomed the participants and expressed their appreciation for the support to the development of the guidance. The experts (see annex I for the list of participants) introduced themselves during a tour-de-table. Mr. Winkelmann-Oei chaired the meeting.

2. Scope and objectives of the guidance

The Chair introduced the mandate, objectives and tasks to be achieved by the expert group, including the time frame and deadlines to be observed. Participants introduced the national regulations in their countries regarding fire-water retention and analysed these and other regulations on fire-water retention in the UNECE region. The following findings were made:

- In some UNECE countries, basic regulations are in place but in a number of countries no specific regulations on fire-water retention exist.
- Even if regulations are in place in a country, such are often general and incomplete (e.g. in Germany, only storage facilities are covered, not production and processing plants).
- The UNECE region is very diverse and a challenge will be to develop guidance applicable for all countries within the region.
- 30 years after the Sandoz accident that happen in Switzerland, a Sandoz-like accident would still be possible in a number of UNECE countries.

The secretariat presented the outcome of a survey sent to Focal Points of the UNECE Water and Industrial Accidents Conventions at the end of 2016, requesting feedback on issues to be addressed in the guidance on fire-water retention. The experts welcomed the outcome of the survey and feedback provided by UNECE countries which reaffirmed the need for the development of such guidance. Members of the expert group commented on the scope and objectives of the guidance and agreed, among others, on the following:

- The scope of the guidance should be in line with annex I to the UNECE Industrial Accidents Convention but could also be applied to other storage, production and processing facilities. The main target audience of the guidance should be industry representatives (operators) and competent authorities as well as governments.
- The added value of the guidance would be to introduce within and beyond the UNECE region minimum standards for fire-water retention through specific recommendations for governments, competent authorities and operators.
- The guidance should also contain a technical annex with specific guidance for operators and examples of lessons learned by countries in order to share experiences. The final guidance should be presented and endorsed by the Meetings of the Parties of the Water and Industrial Accidents Conventions in autumn 2018.

3. Outline and content elements of the guidance on fire-water retention

The Chair made a presentation on the format of previous UNECE safety guidelines and checklists and, based on that, proposed a draft outline for the guidance on fire-water retention. Members of the expert group commented on the draft outline of the guidance, resulting into several changes (see annex II for the updated outline), and agreed on several issues to be included under each chapter (see annex III for the annotated outline with issues for inclusion).

4. Next steps for the preparation of a draft guidance document

The participants agreed to distribute the responsibilities among themselves in a way that one or more members would be responsible for drafting sub-chapters of the guidance (see annex II for the division of responsibilities). The participants also agreed to coordinate their **inputs** before submitting them **to the secretariat by 15 April 2017**. The **secretariat** would compile the inputs and **circulate a first draft of the guidance for comments to the experts by 15 May 2017**. The experts should provide written comments on the first draft before the second meeting of the expert group in June 2017 at which the guidance and written comments will be discussed.

The participants also discussed the need and mechanisms for consulting the draft guidance with others. It was agreed to share the draft guidance for review and comments with international organizations, industry representatives, non-governmental organizations, national focal points and other partners in the fourth quarter of 2017. The secretariat was requested to invite Russian-speaking experts to the next meeting of the expert group, e.g. from the GCE Group in St.°Petersburg, Russian Federation.

5. Next meetings of the expert group on fire-water retention

The participants agreed to hold the second one-day meeting of the expert group on 21 June 2017. Mr. Kovacs, JEG co-Chair from the Water Convention, kindly offered to host the meeting in Budapest. It was also agreed to hold the third meeting of the expert group on 6°(a.m.)°September 2017, back to back with the transboundary field exercise between Germany and Poland (4 September 2017) and the international seminar on fire-water retention (5 September 2017) in Slubice, Poland.

6. Summary and closure of the meeting

The Chair summarized the agreement reached at the meeting. The participants welcomed the readiness of Mr. Winkelmann-Oei to continue acting as Chair for future meetings of the group. The Chair thanked the participants and the secretariat before closing the meeting at 5.30 p.m.

Annex I – List of participants

No.	Country	Name, function and contact details
1.	Czechia	Prof. Pavel Danihelka Professor, Faculty of Safety Engineering, VSB - Technical University of Ostrava Lumirova 13, 7080 30 Ostrava, Czech Republic Phone: +420 597 322 822 / Mobile: +420 603 252 767 / Fax: +420 597 322 983 E-mail: pavel.danihelka@vsb.cz
2.	Czechia	Dr. Pavel Dobes Head of Laboratory for Risk Research and Management (LabRISK) Faculty of Safety Engineering VSB-Technical University of Ostrava Lumírova 13/630 Ostrava Výškovice 70030 Ostrava, Czech Republic Phone: +420 597 322 827 / Mobile: +420736607253 / E-mail: pavel.dobes@vsb.cz
3.	Finland	Ms. Maarit Talvitie Senior Adviser, Finnish Safety and Chemicals Agency E-mail: maarit.talvitie@tukes.fi
4.	Germany (Chair)	Mr. Gerhard Winkelmann-Oei German Federal Environment Agency Worlitzer Platz 1, Umweltbundesamt, 06844 Dessau, Germany Phone: +49-340-21-03-32-98 / Fax: +49-340-21-04-32-98 E-mail: gerhard.winkelmann-oei@uba.de
5.	Germany	Mr. Wolfram Willand Regierungspräsidium Freiburg, Aussenstelle Donaueschingen Irmastrasse 11, 78166 Donaueschingen, Germany Tel.: +49 (0) 771/8966-2759 / Fax.: +49 (0) 771/8966-2798 E-mail:Wolfram.Willand@rpf.bwl.de
6.	Germany	Dr. Cornelia Sedello German Federal Environment Agency Worlitzer Platz 1, Umweltbundesamt, 06844 Dessau, Germany E-mail: cornelia.sedello@uba.de
7.	Hungary	Mr. Lajos Kathaly-Urbán Head of Department for Industrial Safety National University of Public Service Institute of Disaster Management Hungary, Budapest, Hungaria krt. 9-11, H 1101 Budapest, Hungary Mobile: +36/20/389-9346 / E-mail: katai.lajos@uni-nke.hu
8.	Hungary	Mr. Peter Kovacs Head of the Department of River Basin Management and Water Protection, Ministry of Interior, József Attila utca 2-4, 1051 Budapest, Hungary Phone: +36 1441 1376 / Mobile: +36-30-919-3821/ Fax: +36 1 441 1698 E-mail: peter.kovacs@bm.gov.hu
9.	ICPDR	Mr. Adam Kovacs Technical Expert on Pollution Control, International Commission for the Protection of the Danube River, VIC, Wagramerstrasse 5, A-1220 Vienna, Austria adam.kovacs@unvienna.org
10.	Poland	Mr. Lukasz Kuziora Main School of Fire Service Tel.: +48225617752 / Email: lkuziora@sgsp.edu.pl
11.	Sweden	Mr. Claes-Håkan Carlsson Swedish Civil Contingencies Agency, Training, Exercises & Emergency Preparedness Department, SE-651 81 Karlstad, Sweden Phone: +46 771 240 240 / Direct: +46 10 240 50 48 / Mobile: +46 70 670 88 55 E-mail: claes-hakan.carlsson@msb.se
12.	Switzerland	Dr. Jesper Hansen AWEL, Abteilung Abfallwirtschaft & Betriebe Weinbergstrasse 34, 8090 Zürich Phone: +41432593252 / E-mail: jesper.hansen@bd.zh.ch
13.	UNECE	Mr. Nicholas Bonvoisin, Secretary to the Convention, and Ms. Claudia Kamke, Associate Environmental Affairs Officer, Convention on the Transboundary Effects of Industrial Accidents

Annex II – Updated outline of the guidance and responsibilities for drafting the content

Chapter	Person(s) in charge
FOREWORD	Secretariat (at a later stage)
BACKGROUND AND ACKNOWLEDGEMENTS	Secretariat (at a later stage)
ABBREVIATIONS	Secretariat (at a later stage)
DEFINITIONS/TERMINOLOGY	Secretariat (at a later stage)
PART A – INTRODUCTION	Secretariat (at a later stage)
A.1 SCOPE	Gerd / Adam
A.2 BASIC SAFETY PRINCIPLES	Gerd / Adam
PART B – RECOMMENDATIONS	Gerd / Adam
B.1 RECOMMENDATIONS TO GOVERNMENTS	Gerd / Adam
B.2 RECOMMENDATIONS TO COMPETENT AUTHORITIES	Gerd / Adam
B.3 RECOMMENDATIONS TO OPERATORS	Gerd / Adam
PART C – TECHNICAL AND ORGANISATIONAL MEASURES	(see below)
C.1 TECHNICAL MEASURES	(see below)
C.1.1 GENERAL ASPECTS	Lajos
C.1.2 FIRE-PROTECTION CONCEPT	Lajos
C.1.3 FIRE WATER RETENTION CONCEPT	Lajos
C.1.3.1 FIRE WATER RETENTION DIMENSIONING	Wolfram, Jesper, Lukasz
C.1.3.1.1 DESIGN	Wolfram, Jesper, Lukasz
C.1.3.1.1.1 STRUCTURAL FIRE PROTECTION	Wolfram, Jesper, Lukasz
C.1.3.1.1.2 PLANT-SPECIFIC FIRE PROTECTION	Wolfram, Jesper, Lukasz
C.1.3.1.2 ORGANISATIONAL FIRE PROTECTION	Wolfram, Jesper, Lukasz
C.1.3.1.3 DIMENSIONING	Wolfram, Jesper, Lukasz
C.1.3.1.3.1 DIMENSIONING ACCORDING TO EMPIRICAL DATA	Wolfram, Jesper, Lukasz
C.1.3.1.3.2 DIMENSIONING ACCORDING TO THERMAL LOAD (ANALYTICAL CALCULATION)	Wolfram, Jesper, Lukasz
C.1.3.1.3.3 DIMENSIONING ACCORDING TO SCENARIO-BASED CALCULATIONS	Wolfram, Jesper, Lukasz
C.1.3.1.3.4 DIMENSIONING ACCORDING TO THE WATER VOLUME THAT CAN BE PROVIDED	Wolfram, Jesper, Lukasz
C.1.3.2 DESIGN VALUES	Claas-Hakan / Cornelia
C.1.3.3 IMPERMEABILITY	Claas-Hakan / Cornelia
C.1.4 DESIGN OF RETENTION DEVICES	Claas-Hakan / Cornelia
C.1.4.1 CENTRALIZED RETENTION DEVICES	Claas-Hakan / Cornelia
C.1.4.2 DECENTRALIZED RETENTION DEVICES	Claas-Hakan / Cornelia
C.1.4.3 REQUIREMENTS FOR FIRE-FIGHTING WATER BARRIERS	Claas-Hakan / Cornelia
C.2 ORGANISATIONAL MEASURES	
C.2.1 ON SITE ALERT SYSTEM	Pavel Danihelka / Maarit
C.2.2 OFF SITE ALERT SYSTEM	Pavel Danihelka /Maarit
C.2.3 SPECIAL RISKS (I.E. EXPLOSION, TOXICITY)	Pavel Dobes
C.2.4 RULES TO INTERNAL AND EXTERNAL ALARM PROCEDURES	Pavel Danihelka / Pavel Dobes
C.2.5 MONITORING/INSPECTION	Cornelia
C.2.5.1 MONITORING BY THE OPERATOR	Cornelia
C.2.5.2 MONITORING BY THE COMPETENT AUTHORITY	Cornelia
C.2.5.3 EXTERNAL AUDITOR	Bert
C.2.6 DISPOSAL OF FIRE-FIGHTING WATERS	Bert
C.2.7 SAFEGUARDING OF THE FIRE AREA	Bert
PART D – LITERATURE/REFERENCES	All
PART E- ANNEX/Examples	All

Annex III – Annotated outline of the guidance

FOREWORD

BACKGROUND AND ACKNOWLEDGEMENTS

ABBREVIATIONS

DEFINITIONS/TERMINOLOGY

Issues for inclusion into this part, as agreed at the meeting:

- Include a definition on fire-water in the guidance clarifying that the guidance refers to fire-water that was used, not to fire-water used for cooling
- Germany and Sweden could provide a draft definition

PART A – INTRODUCTION

A.1 SCOPE

Issues for inclusion into this part, as agreed at the meeting:

- Scope of the Guidance should be in line with the scope of the UNECE Industrial Accidents Convention (no off-site transportation and no nuclear facilities are covered)
- Guidance should cover storage facilities, production facilities and processing facilities. It could also be applied to facilities that do not underlie the Seveso Directive and annex I of the Industrial Accidents Convention.
- Mention the legislation in place (i.e. international regulations, e.g. Seveso Directive as an example and the Water Framework Directive) and include information about what is missing and what would be the added value of the guidance (general requirements only currently)
- Make the link with water management and transboundary issues (e.g. mention the relation to transboundary early warning systems and how this is relevant to the Water and Industrial Accidents Conventions)
- Mention that the guidance can be used for countries outside the UNECE region too (given that the Water Convention is open for accession of UN Member States outside the UNECE region)
- Name the main target audience here which should be competent authorities (and governments) and the industry (operators)

A.2 BASIC SAFETY PRINCIPLES

Issues for inclusion into this part, as agreed at the meeting:

- Mention the general principle to try to reduce/minimize the production of big quantities of fire water here

PART B – RECOMMENDATIONS

B.1 RECOMMENDATIONS TO GOVERNMENTS

Issues for inclusion into this part, as agreed at the meeting:

- Mention the precautionary principle in this part

- Include that Member States are in charge of setting up technical rules for fire-water retention and that fire-water protection plans should be obligatory
- Include a request to Member States to set up national regulations, based on this guidance which could act as a framework

B.2 RECOMMENDATIONS TO COMPETENT AUTHORITIES

Issues for inclusion into this part, as agreed at the meeting:

- General tasks of competent authorities should be outlined in this chapter

B.3 RECOMMENDATIONS TO OPERATORS

Issues for inclusion into this part, as agreed at the meeting:

- General tasks of operators should be outlined in this chapter

PART C – TECHNICAL AND ORGANISATIONAL MEASURES

Issues for inclusion into this part, as agreed at the meeting:

- This part should comprise specific recommendations to operators

C.1 TECHNICAL MEASURES

C.1.1 GENERAL ASPECTS

Issues for inclusion into this part, as agreed at the meeting:

- Mention the general tactical approach in the fire protection concept as a good tactic for environmental protection
- State that we assume that risk assessment has been done before
- The fire-compartments should be as small as possible (although development seems to go into the opposite direction in some countries, e.g. Germany, in past years)

C.1.2 FIRE-PROTECTION CONCEPT

Issues for inclusion into this part, as agreed at the meeting:

- It was decided not to mention specific fire prevention measures here as each country should have them in place and this seems to be regulated well-enough but it was agreed to include a short general text saying that countries should keep this into account in your planning

C.1.3 FIRE WATER RETENTION CONCEPT

Issues for inclusion into this part, as agreed at the meeting:

- Regarding the general principle to try to reduce/minimize the production of big quantities of fire water, we should be more detailed on that in this part
- Consider letting a fire burn well-managed instead of extinguishing it → this can be done if the firefighters are well informed to avoid a bigger pollution
- Planning should foresee enough firefighting water for extinguishing the fire
- Include precautionary measures, e.g. build walls in a fire-protective manner, not too much other substances should be close to decrease the potential fire load; have detection systems in place (automatic or personnel supervising it)

- Mention that it is better to have a centralized detection device; only if that is not possible there should be a decentralized device

Issues for consideration from Gerd's paper:

- According the Fire Water Retention Concept the required fire protection- and the fire water retention- devices have to be described. For fire protection (fire detection, extinguishing devices, safety categories) and for fire water retention- devices (dimensioning, construction, volume-calculation).
- The Fire Water Retention Concept is the primary proof of the operator to fulfill the requirements of sufficient dimensioning and functionality of his fire water retention devices.
- The Fire Water Retention Concept has to be agreed with the competent authority.

C.1.3.1 FIRE WATER RETENTION DIMENSIONING

Issues for inclusion into this part, as agreed at the meeting:

- Mention that requirements to the proactive constructional fire protection and measures to protect fire spread limit the required volume of fire water retention facilities.

C.1.3.1.1 DESIGN

C.1.3.1.1.1 STRUCTURAL FIRE PROTECTION

Issues for consideration from Gerd's paper:

- Size/area of the fire compartment area
- Separation to other compartments
- Location
- Fire load, thermal load

Issues for inclusion into this part, as agreed at the meeting:

- Mention generally that countries have to define the fire compartments → A case study on how this could be done could be provided as a good practice example (e.g. by Germany)
- In the absence of an internationally accepted methodology for calculating the fire/thermal load, mention the general principles which have to be taken into account and add a case study on calculating the thermal load, e.g. from Germany or Finland (Eurocode)

C.1.3.1.1.2 PLANT-SPECIFIC FIRE PROTECTION

Issues for inclusion into this part, as agreed at the meeting:

- Automatic fire detection system
- Automatic fire-extinguishing system (i.e. Sprinkler System)
- Smoke and heat venting system

C.1.3.1.2 ORGANISATIONAL FIRE PROTECTION

Issues for inclusion into this part, as agreed at the meeting:

- Fire brigade (voluntary or professional plant fire brigade)
- Allocation of thermal load
- Hazardous Substances

C.1.3.1.3 DIMENSIONING

Issues for consideration from Gerd's paper:

For the dimensioning of the fire water retention it is necessary to calculate the volume of needed extinguishing water. In principle there are three approaches for calculation:

- Dimensioning according to empirical data
- Dimensioning in relation to the specific thermal load
- Dimensioning on scenario-based calculations

For the total capacity of fire water retention facilities the volume of potentially leaking products has to be added.

Issues for inclusion into this part, as agreed at the meeting:

- This should be the focus of the guidance
- Mention the three approaches included in Gerd's document (i.e. dimensioning according to empirical data, thermal load and scenarios-based calculation) and add a fourth approach: dimensioning according to volume of water that can be provided (sprinklers, hydrants, from fire-brigades) from the EPA document
- It was agreed that:
    - The calculations for dimensioning based on empirical data (as included in Gerd's paper) were not reliable and that they should not be used
    - This chapter be shortened and that it mention that there were currently no reliable statistics for bigger fires
    - The data be connected to the fire compartment (m^2 of the fire compartment should be equal to m^3 of the fire-water retention as an upper limit) and that liquid materials (e.g. cooling water) has to be added
- As for thermal loads. it was agreed that mobile and immobile (equipment) should be summarized and that the retention volume calculated on total thermal load, divides by 2.6 was ok and can be used, given that this formula was a result of 10 years' time and many statistics

C.1.3.1.3.1 DIMENSIONING ACCORDING TO EMPIRICAL DATA

Issues for consideration from Gerd's paper:

According to the experiences of a number of fires in industries without automatic fire-extinguishing systems, it can be concluded that at fire areas up to 2400 m² the rate of fire waters is 3 l min/m2. 70 % of all fires with fire areas up to 600 m2 were stopped within 90 min. Half of the needed fire- extinguishing water was evaporated.

The dimensioning of fire water retention basins can be calculated for this case according to

Retention-Volume (m3)= Fire Area (m2) * 0,135 (for fire area up to 600 m²)

For fires with an area of larger than 600 m2, the firefighting operations are lasting longer than 90 min and have to be calculated for 120 min. During this longer period it should be possible to implement additional measures for fire water retention.

The dimensioning of fire water retention basins can be calculated for this case according to

Retention-Volume (m3)= Fire Area (m2) * 0,18 (for fire area larger than 600 m²)

These are quite simple fire water retention calculations which do not take into account special risk factors, as high thermal loads (?).

If there is significant proof for special risk factors, as high thermal loads the following calculation should be used:

C.1.3.1.3.2 DIMENSIONING ACCORDING TO THERMAL LOAD (ANALYTICAL CALCULATION)

Issues for consideration from Gerd's paper:

The thermal load is determining the required fire water extinguishing volume.

For the calculation of the total thermal load Q-total, the individual fire compartments have to be taken into account. Here the mobile thermal loads Qm (i.e. products, storage materials, equipment etc) and the immobile thermal loads, Qim (i.e. thermal load of buildings, insulation, damping and cladding) have to be calculated.

Qtotal[GJ] = Qm [GJ] + Qim [GJ]

If there are several fire compartments within a facility the one with the highest thermal load is decisive.

Water has a warmth-binding capacity of 2,6 GJ/m3. According to scientific investigations only half of the firefighting water is reaching the burnt material due to evaporation. Therefore the double volume of the required calculated volume of fire water is needed. From the respective firefighting water half is needed for warmth-binding and is going to evaporate and the other half will be contaminated fire-extinguishing water which has to be retented.

For determining the required volume of Fire Water Retention (R) the calculated total thermal load, Qtot, has to be divided through the warmth-binding capacity.

R [m3]= Qtotal [GJ] / 2,6 [GJ / m3]

C.1.3.1.3.3 DIMENSIONING ACCORDING TO SCENARIO-BASED CALCULATIONS

C.1.3.1.3.4 DIMENSIONING ACCORDING TO THE WATER VOLUME THAT CAN BE PROVIDED

C.1. 3.2DESIGN VALUES

C.1. 3.3IMPERMEABILITY

C.1. 4 DESIGN OF RETENTION DEVICES

C.1.4.1 CENTRALIZED RETENTION DEVICES

C.1.4.2 DECENTRALIZED RETENTION DEVICES

C.1.4.3 REQUIREMENTS FOR FIRE-FIGHTING WATER BARRIERS

C.2 ORGANISATIONAL MEASURES

C.2.1 ON SITE ALERT SYSTEM

- Description of the Equipment, Disposability

- Operational Measures for fire protection
- Action plan, Standard Operating Procedure (SOP), internal ad hoc measures
- Fire brigade response plan

C.2.2 OFF SITE ALERT SYSTEM

- Rules to activate external forces

C.2.3 SPECIAL RISKS (I.E. EXPLOSION, TOXICITY)

C.2.4 RULES TO INTERNAL AND EXTERNAL ALARM PROCEDURES

C.2.5 MONITORING/INSPECTION

Issues for inclusion into this part, as agreed at the meeting:

- Operator has to set up a clear monitoring system – set out what he needs to do
- We should not mention here obligations by competent authorities (as this part is for operators) but we should mention here that these systems should be licenses by competent authorities

C.2.5.1 MONITORING BY THE OPERATOR
C.2.5.2 MONITORING BY THE COMPETENT AUTHORITY
C.2.5.3 EXTERNAL AUDITOR

C.2.6 DISPOSAL OF FIRE-FIGHTING WATERS

Issues for inclusion into this part, as agreed at the meeting:

- This part will not be the focus of the document but we should mention that all firefighting waters should be treated in a proper way before being discharged it into the river

C.2.7 SAFEGUARDING OF THE FIRE AREA

Issues for inclusion into this part, as agreed at the meeting:

- This part will not be the focus of the document but we should mention that fire areas should be safeguarded up to a specific time

PART D – LITERATURE/REFERENCES

Issues for inclusion into this part, as agreed at the meeting:

- Lukasz to provide the secretariat with the EPA document for inclusion
- Claes-Hakan to provide the secretariat with a Swedish document for inclusion

PART E- ANNEX

Issues for inclusion into this part, as agreed at the meeting:

- The annex should contain experiences or lessons learnt from countries which should be presented in a comprehensive way and in summary style