



Technical mission to support Montenegro in the implementation of the UNECE
Convention on Transboundary Effects of Industrial Accidents
Podgorica, 30 November-1 December 2021



UNECE

Benefits of enhanced implementation of the UNECE Industrial Accidents Convention & risk assessment approach on the example of Serbia

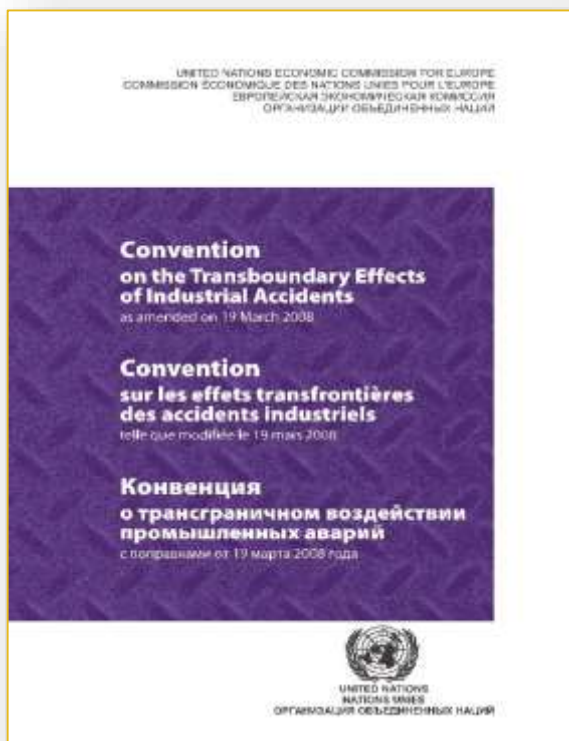
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The Convention on the Transboundary Effects of Industrial Accidents addresses the improvement of industrial safety throughout the UNECE region, in particular through the prevention of industrial accidents with transboundary consequences.

Serbia adopted the Convention in 2009. Law on Ratification of the Convention on the Transboundary Effects of Industrial Accidents.



<http://www.unece.org/environmental-policy/conventions/industrial-accidents/about-us/envteiaabout/more.html>



Responsibility for the implementation of the Convention in the Republic of Serbia are divided between:

- Ministry of Environmental Protection (focal Ministry for the implementation of the Convention),
- Ministry of Interior - Sector for emergency situations and
- Ministry of Agriculture, Forestry and Water management - Republic Water Directorate.

<http://www.unece.org/environmental-policy/conventions/industrial-accidents/about-us/envteiaabout/more.html>



Through activities within the Convention, Serbia has improved its knowledge of the requirements of the Convention and how the Convention is implemented in the country.

<http://www.unece.org/environmental-policy/conventions/industrial-accidents/about-us/envteiaabout/more.html>



THE
ASSISTANCE
PROGRAMME
AND
COOPERATION

Enhanced implementation of the Convention in the Republic of Serbia has been achieved through many activities within under the Assistance Program have helped to improve the implementation of the Convention in Serbia.

Identification and notification of hazardous activities and prevention measures in Serbia

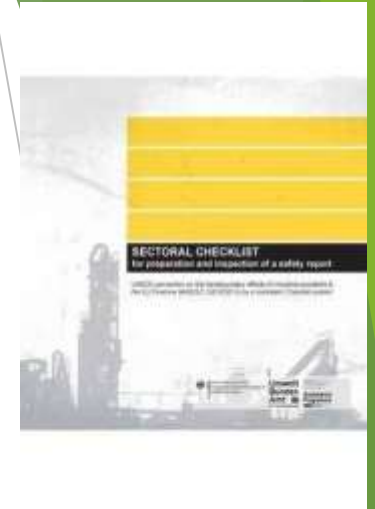
- Law on environmental protection and its bylaws give framework for management of industrial safety, partially aligned with EU Seveso Directive.
- Rulebook on the list of dangerous substances and their quantities, harmonized with Annex I Convention and EU Seveso III Directive.
- Serbia has adopted an amendment to Annex I of the Convention on the Transboundary Effects of Industrial Accidents.
- There are 113 registered Seveso installations, of which 47 are of upper tier.

Identification and notification of hazardous activities and prevention measures in Serbia

- ❑ Working group has been established to identify hazardous activities that may cause transboundary effects under the Convention in the Republic of Serbia, bearing in mind the seriousness and complexity of activities necessary to implement the identification and notification obligation - article 4 of the Convention, criteria, hazard assessment, development of accident propagation models, especially for water propagation effects).
- ❑ Members from MEP, MoI, MAFW and other institutions, experts.
- ❑ Five (5) hazardous activities have been identified within the meaning of the Convention and Annex I, but the list will be validated using a data evaluation mechanism (worst case scenario, risk assessment). The list of hazardous activities remains unofficial.

Identification and notification of hazardous activities and prevention measures in Serbia

1. Serbia defined risk assessment approach (including the roles of authorities) for the evaluation of safety reports.
2. The checklist on safety reports - basis for providing guidance on preparation of safety reports has been developed.
3. The knowledge of the authorities in conducting inspections at hazardous activities based on the conclusions of the safety report evaluation has been strengthened.
4. The knowledge of the inspectors about inspections of hazardous industrial sites, in cooperation with other authorities has been improved.

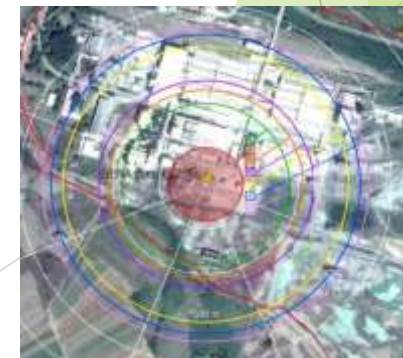
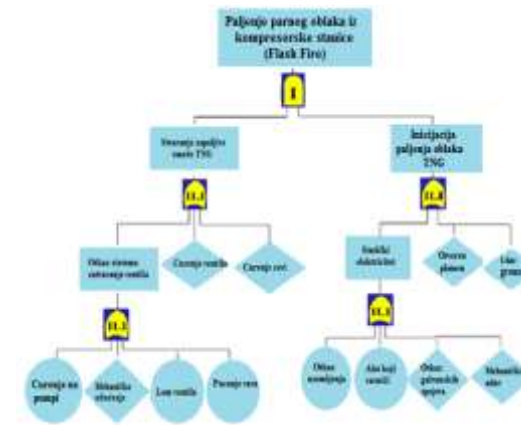
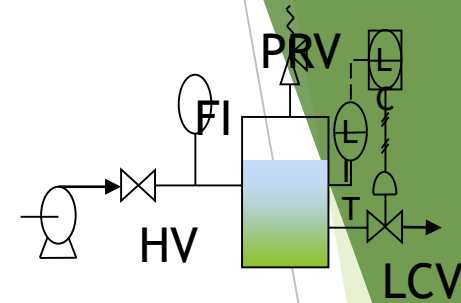


Methodology
of the Safety
Report
development/
Risk
assessment
approach in
Serbia

- ❖ As proscribed by Law on Environmental Protection, all upper tier establishments are required to draft a Safety Report and submit it to CA for evaluation.
- ❖ Threshold values for dangerous substances defining upper tier establishments are transposed from Annex I of EU Seveso III Directive.
- ❖ Data from Safety Report is a base for determining zones for risk assessment and possible transboundary effects.

Methodology of the Safety Report content:

1. Introduce;
2. Major Accident Prevency Policy;
3. Safety Management System;
4. Description of the establishment and its environmental;
5. Hazard Identification;
6. Scenario;
7. Consequences Analysis;
8. Prevention measures.



Scenario

Consequences/
Effects

1. Scenarios should be chosen on the basis of identified critical points and characteristics of dangerous substances, as well as effects that may arise mostly (explosion, fire, toxic release).

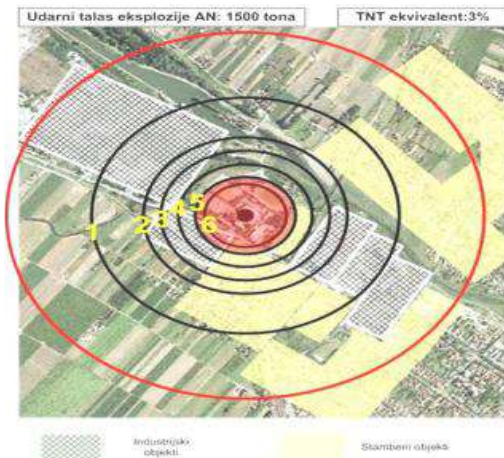
2. The worst case scenario is selected with the greatest consequences for human health and the environment.

3. When drawing up the worst case scenario, all preventive measures are set as “failed”.

4. If at the establishment various types of effects may happen (physical, toxic, environmental), worst case scenario is drawn up for every type of effects.

5. There is no limit set on number of scenarios to draw up, but later in process operator analyses and determines for which ones he must model the effects.

Consequences/ Effects



- Flash fire (vapour propagation zones, domino/escalation zone, thermal zones for 50% death, 1% death, I degree burns and safety zones);
- BLEVE-Boiling Liquid Expanding Vapour Explosion (characteristics of fire ball, thermal zones for 50% death, 1% death, I degree burns, safety zones);
- Pool Fire and Jet fire-(characteristics of flame, domino/escalation zone, thermal zones for 50% death, 1% death, I degree burns, safety zones);
- Detonation (overpressure zones for 50% deaths, 50% lung damage, 50% and 1% eardrum rupture, total, severe, moderate and light destruction of objects);
- VCE -Vapour Cloud Explosion (domino/escalation zone, overpressure zones for total and partial destruction of objects, thermal zones for 50% death, 1% death, I degree burns, safety zones);
- Toxic dispersion (LC50 Lethal concentration,IDLH, 0,1 IDLH).

Effects	Consequences for which values and limits are required in the Rulebook of Serbia	Examples of endpoints for the consequences of the accident effects specified in the Rulebook of Serbia
Explosion/ overpressure	Lethal outcome/ severe lung damage (in approximately 50% cases)	10 bar
	Eardrum rupture (in approximately 50% cases)	1000 mbar
	Eardrum rupture (in approximately 1% cases)	225 mbar
	Complete demolition of facilities	850 mbar
	Moderate damages to facilities	400 mbar
	Light damages to facilities	175 mbar
Fire and explosion/ thermal radiation	Lethal effects (in approximately 50% cases)	11.2 kW/m ² (40'') or 31.6 kW/m ² (10'') (e.g. BLEVE)
	Lethal effects (in approximately 1% cases)	5.6 kW/m ² (40'') or 15.9 kW/m ² (10'') (e.g. BLEVE)
	First degree burns	4.3 kW/m ² (40'') or 12 kW/m ² (10'') (e.g. BLEVE)
	Transfer of fire to other facilities (depending on the type of material)	37,5kW/m ²
Toxicity	LC50 (lethal concentration) (30 minute exposure)	
	IDLH (Immediately Dangerous to Life or Health)	
	0.1 IDLH	



CONSEQUENCE ANALYSIS

The consequence analysis includes modelling the effects of accident, vulnerability analysis and determining the possible level of accident, followed by risk assessment.

According to the defined scenarios, the effects of accidents are modelled and vulnerability zones are determined.

In the vulnerability analysis, it is necessary to identify and report all endangered objects in the vicinity of establishment and within the vulnerable zones.

Risk assessment includes the assessment of the likelihood of the occurrence of the accident, the assessment of possible consequences and the determination of the acceptability of the risk.

Accident probability assessment is performed in one of the following ways:

1. Based on statistic data –historical approach (source of data must be stated);
2. Based on hazard identification –analytical approach;
3. By combining historical and analytical approach.
4. The probability is numerically or descriptively expressed as low, medium and high.
5. The following table may be used if no other data is available:

Criteria for accident probability assessment

High probability ($10^0 - 10^{-1}$ frequency of the occurrence/yr)	Medium probability ($10^{-1} - 10^{-2}$ frequency of the occurrence/yr)	Low probability ($<10^{-2}$ frequency of the occurrence/yr)
<ul style="list-style-type: none"> • leakage of hazardous substances at pipe joints, valves, etc. • spillage in liquids decanting and dispersal of solid substances in manipulation • damages made to unit packaging and spillage of contents • leakage of liquids and dispersal of solid substances in internal transport • leakage of gases under pressure from pipelines and other pressurised systems • created conditions for fire or explosion in Hazard ZONE 2 • initial fire in plants 	<ul style="list-style-type: none"> • liquid substances pipeline breakage • pressurised gas pipeline breakage • spillage of the whole contents from the tank storing liquids • spillage from vehicle and train tanks in the establishment after breakdowns • created conditions for fire or explosion in Hazard ZONE 1 • fire and explosion in a part of the establishment • two and more accidents of high probability in one location at the same time 	<ul style="list-style-type: none"> • crack of transport vessels • crack of storage vessels • fire in the whole establishment • fire in the whole establishment • explosion of the whole establishment • explosion of the whole storage • created conditions for fire or explosion in Hazard ZONE 0 • two and more accidents of medium probability in one location at the same time

- ❖ Possible consequences to human life and health and environment shall be estimated on the basis of data obtained in vulnerability analysis;
- ❖ Vulnerable facilities shall be numerically expressed, while most serious consequences are taken into account when estimations are made;
- ❖ Criteria for potential consequences assessment are provided for in the following table;

Criteria for potential consequences assessment.

Consequence indicators	Consequences				
	Low significance	Significant	Serious	Severe	Catastrophic
Number of casualties with lethal outcome	no	no	1-2	3-5	more than 5
Seriously injured Seriously intoxicated	no	1-2	3-6	7-10	more than 10
Slightly injured Slightly intoxicated	no	1-5	6-15	16-30	more than 30
Dead animals	≤0,5 t	0,5-5 t	5-10 t	10-30 t	more than 30 t
Contaminated soil	≤0,1 ha	0,1-1 ha	1-10 ha	10-30 ha	more than 30 ha
Materialistic damages in thousands RSD	≤100	100 – 1,000	1,000 – 10,000	10,000 – 100,000	higher than 100,000

Accident risk shall be assessed on the basis of accident probability and potential consequences

Accident probability	Consequences				
	low significance	significant	serious	severe	catastrophic
low	negligible risk	low risk	medium risk	high risk	very high risk*
medium	low risk	medium risk	high risk	very high risk*	very high risk*
high	medium risk	high risk	very high risk*	very high risk*	very high risk*

Identification and notification of hazardous activities and prevention measures in Serbia

- ❑ LEP defines that the MEP shall notify the competent authority of the country that may be affected by the consequences of the chemical accident with transboundary effects.
- ❑ Serbia notified Hungary and has used of the *template for the notification of hazardous activities in accordance with article 4 of and Annex III to the UNECE Convention on the Transboundary Effects of Industrial Accidents.*

Identification and notification of hazardous activities and prevention measures in Serbia

- ❑ Amendments to the Law on Planning and Construction has adopted regarding Seveso establishment.
- ❑ In 2016, the Law on Inspection Supervision came into force. Law improved the integrated prevention approach, through better cooperation between competent authorities at all levels and operators of hazardous activities.
- ❑ First draft the Law on the control of major-accident hazards involving dangerous substances (the law will transpose Directive 2012/18/EC/ on the control of major-accident hazards involving dangerous substances - Seveso III Directive) has prepared.

**Emergency
preparedness,
response and
mutual
assistance in
Serbia**

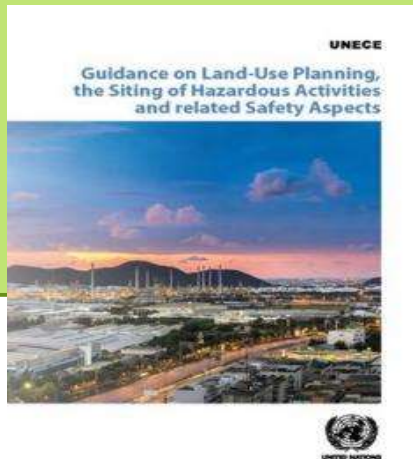
The Republic of Serbia, the Republic Notification Center (112) within the Sector for Emergency Situations, Ministry of Interior has been appointed as a contact point for the use of the IAN system (Industrial Accident Notification System) and as a competent body that will act as a contact point for mutual assistance in case of an industrial accident with cross-border effects.



**Emergency
preparedness,
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assistance in
Serbia**

- Operators of hazardous activities has prepared internal (on-site) contingency plans and submitted to the competent authority.
- New Law on Disaster Risk Reduction and Emergency Management has adopted in 2018.
- The new Law provides for detailed content of the external (off-site) contingency plan.

Decision-making on siting and land-use planning in Serbia



- ❖ The decision-making on siting in the Republic of Serbia takes into account transboundary issues and accordingly, consultation procedures have been initiated in the decision-making process on the Impact Assessment Study for several projects.
- ❖ Law on Ratification of the Multilateral Agreement on Environmental Impact Assessment in a Transboundary Context was adopted in September 2018 (Official Gazette of the Republic of Serbia - International Treaties, No. 12/18).

Serbia has used indicators and criteria facilitate the process of identifying gaps in the implementation of the Convention and to Plan concrete actions to overcome them

The Strategic Approach is designed to enhance the efforts of participating countries in the implementation phase of the Programme and to grant sustainability in the countries of the activities organised.

Aim of the Strategic Approach that each country should apply a step-wise/cyclic mechanism to each of the six working areas and identify their challenges in the implementation of the Convention as well as needs-driven actions to address these challenges.



Results of self-evaluation – **Identifying stage of progress-Serbia**

Indicators for working area 1: identification of hazardous activities

- a) Mechanism for the collection of data/progress stage 5;
- b) Mechanism for the analysis and validation of data/progress stage 4;
- c) Mechanism for the review/revision of data/preogress stage 4.

Results of self-evaluation – **Identifying stage of progress-Serbia**

Indicators for working area 2: notification of hazardous activities

- a) Mechanism for the transboundary consultation on hazardous activities/progress stage 4;
- b) Mechanism for the notification of hazardous activities/progress stage 5.

Results of self-evaluation – Identifying stage of progress-Serbia

Indicators for working area 3: prevention

- a) Mechanism giving the responsibility for industrial safety to hazardous activity operators /progress stage 5;
- b) Mechanism introducing the control regime of the Competent Authorities/ progress stage 5.

Results of self-evaluation – Identifying stage of progress-Serbia

Indicators for working area 4: preparedness

- a) Mechanism giving the responsibility for emergency preparedness to hazardous activity operators/progress stage 5;
- b) Mechanism giving the responsibility for emergency preparedness to the CA/progress stage 4;
- c) Mechanism ensuring transboundary compatible emergency plans/progress stage 2.

Results of self-evaluation
- Identifying stage of progress-Serbia

Indicators for working area 5: response and mutual assistance

- a) Mechanism giving the responsibility to competent authority to promptly recognise industrial accidents or an immediate threat thereof/progress stage 4;
- b) Mechanism to ensure the use of IAN system /progress stage 4;
- c) Mechanism to ensure the use of notification mechanisms at the national level/ progress stage 4;
- d) Mechanism giving responsibility to competent authority to request and to provide assistance/progress stage 4.

Results of self-evaluation – Identifying stage of progress-Serbia

Indicators for working area 6: information to the public and public participation

- a) Mechanism to inform the public /progress stage 4;
- b) Mechanism to ensure opportunities for public participation in relevant procedures whenever possible and appropriate/progress stage 4.

Serbia has used indicators and criteria facilitate the process of identifying gaps in the implementation of the Convention and to Plan concrete actions to overcome them



- Applying the indicators and criteria allowed us to identify challenges and shortcomings we face in the implementation of the Convention.
- Insufficient coordination among and between national and local authorities.
- Insufficient cooperation and exchange of information between these authorities, the industry and the public.
- Further support to fully comply with the requirements of the Convention and thus improve industrial safety is needed.

- Serbia is committed to improving the system of prevention of industrial accidents, especially accidents with possible transboundary effects through improving the implementation of the Convention on Transboundary Effects of Industrial Accidents.
- Especially, Serbia need to improve the effectiveness and efficiency of cooperation, and to establish sustainable coordination mechanisms among government authorities and between the public authorities and industry.
- The Ministry of Environmental Protection in cooperation with UNECE Industrial Accidents Convention secretariat had prepared a project concept which proposes establishing of National Policy Dialogue for Industrial Safety in Serbia.



Thank you for your attention!

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Ministry of Environmental Protection

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