

UN/OECD online seminar in follow-up to the 2020 Beirut port explosion:

Lessons learned, experiences and good practices in managing risks of ammonium nitrate storage, handling and transport in port areas, preventing accidents and mitigating their consequences



14 December 2021 (3 hours)
with interpretation in Arabic, English, French, Russian and Spanish

Co-organized by the United Nations,
namely the United Nations Economic Commission for Europe, the International Labour Organization, the International Maritime Organization, the United Nations Environment Programme/Office for the Coordination of Humanitarian Affairs Joint Environment Unit and United Nations Office for Disaster Risk Reduction (Regional Office for Arab States),
and the Organisation for Economic Co-operation and Development



Concept note

Introduction

This concept note presents information on the UN/OECD online seminar in follow-up to the 2020 Beirut port explosion. This and other accidents involving ammonium nitrate (AN) and AN-based fertilizers have had devastating effects on human beings, including high numbers of deaths and injuries, and billions of dollars of damage to infrastructure, economies and the environment.

Mandate

At the eleventh meeting of the United Nations Economic Commission for Europe (UNECE) Conference of the Parties to the Convention on the Transboundary Effects of Industrial Accidents (Geneva and online, 7-9 December 2020), the European Union (EU) proposed the facilitation of an exchange of views on lessons learned from the Beirut port explosion ([ECE/CP.TEIA/42](#), para 87). The secretariat then suggested that such a seminar be organized in cooperation with other United Nations partner organizations and the Organisation for Economic Co-operation and Development (OECD). This proposal was later approved by the Convention's Bureau during its joint meeting with the Working Group on Implementation (WGI) (Geneva and online, 24 February 2021).

At that meeting, based on a secretariat note, the Bureau and the WGI reflected on existing guidelines and tools for AN and decided to proceed with the organization of a seminar preceded by a survey. It was agreed that the seminar be global in reach, co-organized under UNECE's lead in cooperation with partner organizations, and focus on storage (including intermediate storage) of AN and AN-based fertilizers within the context of accident prevention and preparedness. In addition, the Bureau and WGI endorsed the Bureau's establishment of a small Advisory Group to support the preparation of the seminar.

UNECE contacted relevant partner organizations. Following their expression of interest in co-organizing and conducting the seminar, an Organizing Committee was set up for this purpose, with participation of the following international organizations:

- UNECE (namely the secretariats to the Industrial Accidents Convention (lead) and to the Sub-Committees of Experts on the Transport of Dangerous Goods (TDG) and on the Globally Harmonized System of Classification and Labelling of Chemicals (GHS))
- International Labour Organization (ILO)
- International Maritime Organization (IMO)
- United Nations Environment Programme/Office for the Coordination of Humanitarian Affairs Joint Environment Unit (UNEP/OCHA JEU)
- United Nations Office for Disaster Risk Reduction (UNDRR) Regional Office for Arab States and
- OECD.

The European Commission Joint Research Centre (EU JRC) contributes through the Advisory Group. Other United Nations regional economic commissions and the United Nations Institute for Disarmament Research (UNIDIR) have been invited to attend and contribute to the seminar and engage their respective constituents.

The UNECE secretariat, in close cooperation with the co-organizing partner organizations, prepared this concept note. The Advisory Group also provided expert inputs that shaped this concept note and the seminar's survey. More information on the seminar and its documentation are available on the [webpage](#).

1. Background on the Beirut port explosion and other accidents involving ammonium nitrate

In 2014, the Lebanese government confiscated an estimated 2,750 tons of AN from an abandoned ship off its coast and stored it, among other substances, in a warehouse in the Beirut port for six years. Initial analysis¹ shows that a number of causes led to the eventual disaster, when on 4 August 2020 the AN caught fire and exploded.² The explosion caused severe material damage to critical infrastructure, including to the port and healthcare facilities, and to commercial and residential areas within reach of the blast. It led to approximately 300 deaths, 6,500 injuries and the displacement of an estimated 300,000 people. The international community, including UNEP/OCHA JEU³, mobilized in support of national authorities to provide humanitarian aid and assistance. The COVID-19 pandemic significantly influenced international and national response measures.

Despite the knowledge available on the hazardous characteristics of AN and AN-based fertilizers and measures to be taken to neutralize them, the Beirut port explosion was not the only accident involving AN. Other examples include the Toulouse factory explosion in France (2001), the Mihăilești explosion in Romania (2004), a fertilizer plant explosion in Texas, United States (2013)⁴, the Tianjin explosion in China (2015) and the Bata explosions in Equatorial Guinea (2021). These accidents had in common that they failed to respect the fundamental risk management principles applicable to all hazardous substances. They are reminders of the importance of ratifying and complying with international laws and regulations addressing all aspects of chemicals' management during their life cycle.⁵ Proper implementation and enforcement of laws, policies and good practices at national level are key to preventing, preparing for and responding to industrial accidents involving AN and AN-based fertilizers (and other hazardous substances) and to minimizing their occurrences and effects should they occur.

2. Overview

2.1 Scope

The seminar will address the effective risk management of AN and AN-based fertilizers in port areas, including: temporary (or intermediate) storage, handling and transport (especially when in proximity to high-density areas) and related accident prevention, preparedness and response topics, including transboundary elements. It will cover lessons learned from the Beirut port explosion and other accidents involving AN and other hazardous substances. In this respect, the outcomes may also serve to highlight the essential legal frameworks and control measures for addressing the risks associated with the handling, storage and transport of hazardous substances in port areas.

¹ See <https://forensic-architecture.org/investigation/beirut-port-explosion>; *Chronology of events relating to the Beirut explosion of 4 August 2020 from 2013 – November 2020*, available at <http://www.legalactionworldwide.org/wp-content/uploads/2020/11/REPORT.pdf>.

² More information available in UNECE's press release issued on 6 August 2020 <https://unece.org/environment/press/we-must-not-wait-next-ammonium-nitrate-blast-solutions-exist-improve-safety>.

³ See <https://gho.unocha.org/delivering-better/disaster-response-during-pandemic-beirut-port-explosions>.

⁴ See <https://www.csb.gov/west-fertilizer-explosion-and-fire/>.

⁵ The sound management of chemicals includes aspects of their manufacturing, classification, labelling, transport, storage, handling and disposal, among others.

2.2 Objectives

The main objectives of the seminar are as follows:

- i. Identify and share lessons learned from the Beirut port explosion and other accidents for risk management of hazardous substances in port areas, focusing on AN and AN-based fertilizers: Reviewing these will raise awareness of the intrinsic hazards and risks of storing, handling and transporting hazardous substances (in particular AN and AN-based fertilizers) in port areas and in areas close to high density populations.
- ii. Take stock of international laws, policies and other instruments and tools (e.g. guidance materials, guidelines, standards and approaches) addressing AN and AN-based fertilizers that may be relevant for the prevention of, preparedness for and response to such accidents. This will give an overview of the instruments available to enhance safety and provide guidance to prevent similar disasters in the future.
- iii. Exchange lessons learned, experiences and good practices on:
 - a. effective risk management in the storage, handling, and transport of AN and AN-based fertilizers and related accident prevention, preparedness and response (which may apply to all hazardous substances present in port areas), including transboundary elements;
 - b. the needs associated with prevention, preparedness and response associated with typical accident scenarios.

This will help identifying gaps and challenges in implementation and provide examples of practices by governments (competent authorities and other national authorities) and industry to address them.

- iv. Foster cooperation at the international/national levels: Bringing together communities addressing storage, including port storage, handling and transport of hazardous substances (including AN and AN-based fertilizers), occupational safety and health, industrial safety (accident prevention, preparedness and response) and disaster risk reduction will enable knowledge-sharing, improve mutual understandings, generate awareness of existing instruments, tools and approaches and improve implementation and eventually safety.

2.3 Target audience

The target audience includes the following stakeholders involved in managing risks related to storage and handling of AN and AN-based fertilizers, and related accident prevention, preparedness and response:

- Policy/decision-makers (i.e. competent authorities overseeing, among other areas: hazard classification and labelling; port area management and safety; occupational safety and health; accident prevention, preparedness and response/crisis management; disaster risk management; and land-use planning and siting)
- Transport and port authorities
- Industry representatives and employers' organizations
- Operators, workers and workers' organizations
- Inspectors (i.e. customs, labor and municipal)
- Civil society
- Academia and
- International organizations, including those participating in the organization of the event, as well as other international and regional partner organizations.

3. Content

The content of the seminar will address the themes i. to iii below. They will be further informed by an online survey that will be conducted across the constituencies of the partner organizations in advance of the seminar. The survey will help taking stock of experiences, lessons learned and good practices in the storage and handling of AN and AN-based fertilizers as well as related accident prevention, preparedness and response, including their transboundary elements.

i. **Lessons learned from the Beirut port explosion and other AN-related accidents**

Theme (i) will consist of a review of the Beirut port explosion and lessons learned from it and other AN-related explosions. It will include information known on AN (among other hazardous substances stored) and the management of the storage sites, as well as the general effects of the accidents, including on populations, economies and the environment. This theme will aim to build on conclusions of previous seminars, such as the EU JRC seminar held in follow-up to the Toulouse accident in 2002 in Ispra, Italy and information available on analysis of previous accidents.⁶

ii. **Legal and policy instruments and guidance on their implementation**

Theme (ii) will provide participants with an overview of existing international legal and policy instruments, as well as guidance materials, guidelines, standards and approaches, that regulate the effective risk management of AN and AN-based fertilizers. It will specifically look at those instruments for storage sites in proximity to port areas and high-density areas, and highlight related accident prevention, preparedness and response applicable to all hazardous substances, including in a transboundary context. This will include instruments developed for various communities under the aegis of the partner organizations.

iii. **Lessons learned, experiences and good practices**

Theme (iii) will showcase lessons learned, experiences and good practices in the national implementation of some of the instruments covered under theme (ii) and beyond. It will include discussions on risk management of storing, handling and transporting AN and AN-based fertilizers and related prevention, preparedness and response. The discussions would cover aspects such as: testing, classification, labelling, distancing from other substances, inspections; temporary and port area storage, exchange of information/coordination amongst competent authorities, land-use planning and siting, risk assessments, contingency planning, emergency response mechanisms, training and exercises, and public information and participation. Transboundary elements will also be covered (e.g. information-sharing on risk assessments, harmonized and joint contingency plans, notification systems and information to and participation of the public in neighbouring countries). This theme will also seek to highlight implementation areas and challenges.

iv. **Conclusions**

The final part of the seminar will draw conclusions on existing experiences and good practices, as well as on implementation gaps and challenges, and ways to strengthen risk management of storing, handling and transporting AN and AN-based fertilizers particularly in port areas and related accident prevention, preparedness and response,

⁶ See <https://minerva.jrc.ec.europa.eu/EN/content/minerva/79837f29-3146-480c-be69-af86e1639a75/srtseviiammoniumnitratesafetypdf>. Available in the EU Lessons Learned Bulletin at https://minerva.jrc.ec.europa.eu/en/shorturl/minerva/5_mahb_bulletin_no5_final_fortheweb.

including in a transboundary context. Although specific to AN and AN-based fertilizers, the conclusions will aim to provide information that is relevant to other hazardous substances that have potential to cause similar accidents. The seminar conclusions will also provide a basis for possible future action (e.g. follow-up activities) to be carried out under the aegis of the partner organizations and their constituencies, or in continued cooperation among them and possibly others.

4. Co-organizing international organizations and instruments

The international organizations listed on page 1 of the concept note came together in a unique partnership as the seminar's Organizing Committee. They all deal with aspects related to the safe management of hazardous substances, including AN and AN-based fertilizers, in different ways. They develop, revise and foster the implementation of legal and policy instruments and/or have prepared guidance materials, guidelines, standards and approaches on: the safe transport, storage and handling of AN and AN-based fertilizers; industrial/chemical accident prevention, preparedness and response; and other related matters. An Advisory Group provides expert advice to the Organizing Committee in the development and conduct of the seminar.⁷ Information on the partner organizations and their instruments relevant to the seminar's topic follows:

United Nations Economic Commission for Europe (UNECE)

The [UNECE Convention on the Transboundary Effects of Industrial Accidents \(Industrial Accidents Convention\)](#) supports countries in preventing, preparing for and responding to industrial accidents, with a focus on transboundary cooperation and the mitigation of transboundary effects. To help countries identify and evaluate the risks of hazardous activities, the Convention addresses industrial accidents as “event[s] resulting from an uncontrolled development in the course of any activity involving hazardous substances either: (i) in an installation, for example during manufacture, use, storage, handling, or disposal; or (ii) during transportation on-site of an installation”. The Convention applies to hazardous substances listed in its [Annex I](#), including, among others, AN and AN-based fertilizers (see Annex I, in the full text of the Convention, and its footnotes for details on the AN characteristics and grades covered). Currently, the Convention counts 41 Parties within the UNECE region. The beneficiary countries of the [Convention's Assistance and Cooperation Programme](#), in Eastern and South-Eastern Europe, the Caucasus and Central Asia, including several non-Parties, have

⁷ The Advisory group is comprised of experts nominated through the Bureaux to the Industrial Accidents Convention and OECD Working Party on Chemical Accidents and communicated through the Sub-Committees of Experts on TDG and GHS. They are from the following countries: **Austria** (Chair of the Advisory Group, Vice-Chair of the Industrial Accidents Convention Bureau); **Canada** (Explosives Safety and Security Branch, Natural Resources Canada); **France** (Ineris); **Germany** (Bundesamt für Materialforschung, Landesanstalt für Umwelt Baden-Württemberg); **Latvia** (Civil Protection Department of the State Fire and Rescue Service); **Netherlands** (Chair of the Explosive Working Group of the Sub-Committee of Experts on the Transport of Dangerous Goods); **Norway** (Chair of the Industrial Accidents Convention, Norwegian Directorate for Civil Protection); **Sweden** (Swedish Civil Contingency Agency); **Switzerland** (Vice-Chair of the Industrial Accidents Convention Bureau, Swiss Federal Office for the Environment); **United Kingdom** (Chair of the OECD Working Party on Chemical Accidents, UK Health and Safety Executive); **United States** (Environmental Protection Agency). The **European Union** is also represented through the Joint Research Centre Major Accident Hazards Bureau. In addition, the following industry associations, which have consultative status with ECOSOC or the Sub-Committee of Experts on the TDG, contribute to the Advisory Group: **Australasian Explosives Industry Safety Group, Inc**; **Fertilizers Europe**; **Institute of Makers of Explosives**; **Responsible Packaging Management Association of Southern Africa**.

also committed to the Convention's implementation. The Convention hosts the Industrial Accident Notification (IAN) System, which countries are encouraged to use for early-warning, accident notification or mutual requests for assistance for accidents under the Convention's scope, with potential transboundary implications.

To help countries implement the Convention and strengthen industrial safety, the [UNECE secretariat to the Convention](#), which is hosted by the Environment Division, has developed and promoted numerous tools, [guidelines](#) and good practices, which are available and applicable for countries within and beyond the UNECE region. UNECE also initiated, jointly with OECD, the [Inter-Agency Coordination Group on Industrial/Chemical Accidents](#).

The [UNECE Sustainable Transport Division](#), under the umbrella of its Inland Transport Committee, facilitates the international movement of persons and goods by inland transport modes. It aims at improving competitiveness, safety, energy efficiency and security in the transport sector, while also focusing on reducing the adverse effects of transport activities on the environment and contributing effectively to sustainable development. The Division is responsible for 59 legal instruments (several of them of global scope and application) dealing with the establishment of coherent international infrastructure networks for the various modes of inland transport; the adoption of uniform transport regulations ensuring a high level of efficiency, safety, security and environmental protection in transport (including transport of dangerous goods); and the harmonization and simplification of border crossing procedures.

In addition, the Division provides secretariat services to the ECOSOC Committee of Experts on the Transport of Dangerous Goods (TDG) and on the Globally Harmonized System of Classification of Chemicals (GHS) and its two sub-committees. The Committee's recommendations address the worldwide harmonization of classification and labelling criteria of hazardous chemicals for all sectors (transport, storage, workplace, consumer chemicals), as well as worldwide harmonization of transport provisions for the safe transport of dangerous goods by all modes. The outcome of the work of the intergovernmental bodies serviced by the Sustainable Transport Division dealing with chemicals management can be summarized as follows:

- The [UN Recommendations on the Transport of Dangerous Goods, Model Regulations](#) contain a harmonized set of provisions for the safe transport of dangerous goods (including AN and AN-based fertilizers) that provide a regulatory framework allowing for the uniform development of national and international regulations for all modes of transport (e.g. IMO [International Maritime Dangerous Goods Code \(IMDG\)](#) for maritime transport; International Civil Aviation Organization (ICAO) [Technical Instructions for the Safe Transport of Dangerous Goods by Air, for air transport](#); [Agreement concerning the International Carriage of Dangerous Goods by Road \(ADR\)](#); and, [Regulation concerning the International Carriage of Dangerous Goods by Rail \(RID\)](#)). They cover classification and listing of dangerous goods; general packing requirements; marking, labelling and placarding of packaging and transport units; consignment procedures; training and security provisions; requirements for construction and testing of means of containment; and provisions concerning transport operations applicable to all modes of transport (e.g. those relating to loading and segregation). The Model Regulations are applied worldwide.
- The [Globally Harmonized System of Classification and Labelling of Chemicals \(GHS\)](#) addresses the classification of chemicals by types of hazard and proposes harmonized hazard communication elements, including labels and safety data sheets. It aims to ensure that information on these hazards is available to enhance human and environmental safety during the handling, transport and use of chemicals. The GHS provides a basis for the harmonization of rules and regulations on chemicals at

national, regional and worldwide levels. The classification of physical hazards in GHS is consistent with the classification for transport purposes in the Model Regulations and is used to define storage conditions. GHS provisions are implemented worldwide.⁸

- The [UN Manual of Tests and Criteria](#) contains criteria, test methods and procedures to be used for the classification of dangerous goods (including AN and AN-based fertilizers), according to the provisions of the Model Regulations and the GHS. It describes the test methods and procedures considered to be the most useful for providing classifiers with the necessary information to arrive at a proper classification. It also supplements national or international regulations that are derived from the Model Regulations or GHS.
- The [Agreement concerning the International Carriage of Dangerous Goods by Road \(ADR\)](#) is open for accession to all UN Member States and currently has 52 Contracting Parties. Its structure and contents are consistent with that of the Model Regulations and, in addition, address specific provisions applicable to the transport of dangerous goods (including AN and AN-based fertilizers) by road (including conditions of carriage, loading, unloading and handling, as well as requirements for vehicle crews, equipment, operation and documentation and construction and approval of vehicles).
- The [European Agreement concerning the International Carriage of Dangerous Goods by inland waterways \(ADN\)](#) has 18 Contracting Parties. Its structure and contents are consistent with that of the Model Regulations and, in addition, address specific provisions applicable to the transport of dangerous goods (including AN and AN-based fertilizers) by inland waterways (including conditions of carriage, loading, unloading and handling, as well as requirements for vehicle crews, equipment, operation and documentation and construction and approval of vehicles).

[International Labour Organization \(ILO\)](#): The ILO is a specialized UN agency responsible for a range of issues related to the world of work, including occupational safety and health, chemicals management and the prevention of major industrial accidents. The ILO has adopted a number of legally binding International Labour Standards relating to chemicals, major industrial accidents and occupational safety and health, which have been ratified by a number of member states. International Labour Standards are developed through tripartite dialogue between employers' organizations, workers' organizations and governments. The [Chemicals Convention, 1990](#) (No. 170 with 22 Parties) and [Chemicals Recommendation, 1990](#) (No. 177) provide an international framework for the safe use, including storage and handling, of chemicals at work. The [Prevention of Major Industrial Accidents Convention, 1993](#) (No. 174 with 18 Parties) obliges Parties to formulate, implement and review a coherent national policy concerning the protection of workers, the public and the environment against the risk of major accidents. The ILO hosted the 2020 Inter-Agency Coordination Group on Industrial/Chemical Accidents meeting, which took place shortly after the Beirut port explosion. In response to the explosion, the ILO has developed a project at the international and national levels in Lebanon to strengthen legal frameworks for chemicals management, prevention of major industrial accidents and promoting occupational safety and health.

[International Maritime Organization \(IMO\)](#): IMO is the UN's specialized agency responsible for the safety and security of shipping and the prevention of marine and atmospheric pollution by ships. With 174 Member States, it acts as the secretariat to 50 Conventions, Protocols and numerous codes and has prepared guidance and recommendations; some of which cover the handling and transport of dangerous goods (including AN): International Convention for the

⁸ Information about the status of implementation is available at <https://unece.org/ghs-implementation-0>.

Safety of Life at Sea (SOLAS); International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 (MARPOL); and International Maritime Dangerous Goods (IMDG) Code. In particular from the IMO legal instruments, the Recommendations on the Safe Transport of Dangerous Cargoes and Related activities in Port Areas (MSC.1/Circ.1216, 26 February 2007) apply to dangerous cargo in port areas as part of a *transport chain*, in which case land-use planning and other specifics pertaining to the temporary storage and regular checks of dangerous goods are taken into account.

UNEP/OCHA Joint Environment Unit (JEU): The JEU responds to the environmental dimensions of emergencies; whether from natural hazards, technological accidents or a combination of both, providing technical expertise to affected countries. It conducts rapid environmental assessments and analysis and provides tools and guidance on environmental emergencies, including on chemical accidents. One such tool is the [Flash Environmental Assessment Tool \(FEAT\)](#) to rapidly assess chemical risks, including from substances listed in Annex I of the Industrial Accidents Convention. The seminar will provide a platform for the JEU to share lessons learned during the Beirut mission following the 2020 explosion, and to involve its networks, in particular in relation to preparedness and response.

United Nations Office for Disaster Risk Reduction (UNDRR): UNDRR supports countries in implementing the [Sendai Framework](#) along its four priority areas. The framework calls for societies to engage in managing the risks of natural and man-made hazards and related environmental, technological and biological hazards and risks. UNDRR provided the framework for the development of the [Words into Action Guidelines: Implementation Guide for Man-made and Technological Hazards](#), prepared under the leadership of UNEP/OCHA JEU, with contributions from UNECE, OECD and other organizations that are part of the Inter-Agency Coordination Group on Industrial/Chemical Accidents. UNDRR cooperates with UNECE and other organizations through the network of UN DRR focal points, guided by the [UN Plan for Action for Strengthening Resilience](#).

Organisation for Economic Co-operation and Development (OECD): The [OECD Guiding Principles for Chemical Accident Prevention, Preparedness and Response](#) aims to prevent accidents that result in harm to health, the environment or property, and to mitigate their consequences through respective preparedness and response measures. The Working Party on Chemical Accidents leads the OECD's work on these topics and, building on its several ongoing partnerships with the UNECE secretariat, has expressed its interest to be involved in the organization of this seminar. At its thirtieth meeting (October 2020), the Working Party already discussed existing guidance on ammonium nitrate storage among its members.

The organization of the seminar is possible thanks to financial contributions from the French Ministry for Ecological Transition and the German Federal Ministry of the Environment, Nature Conservation and Nuclear Safety to the trust fund of the UNECE Industrial Accidents Convention, in the framework of its 2021-2022 workplan. UNDRR and the OECD are providing the Arabic and French translations of the concept note and survey, respectively, while UNECE will provide the English, Spanish and Russian translations and interpretation services during the seminar.

