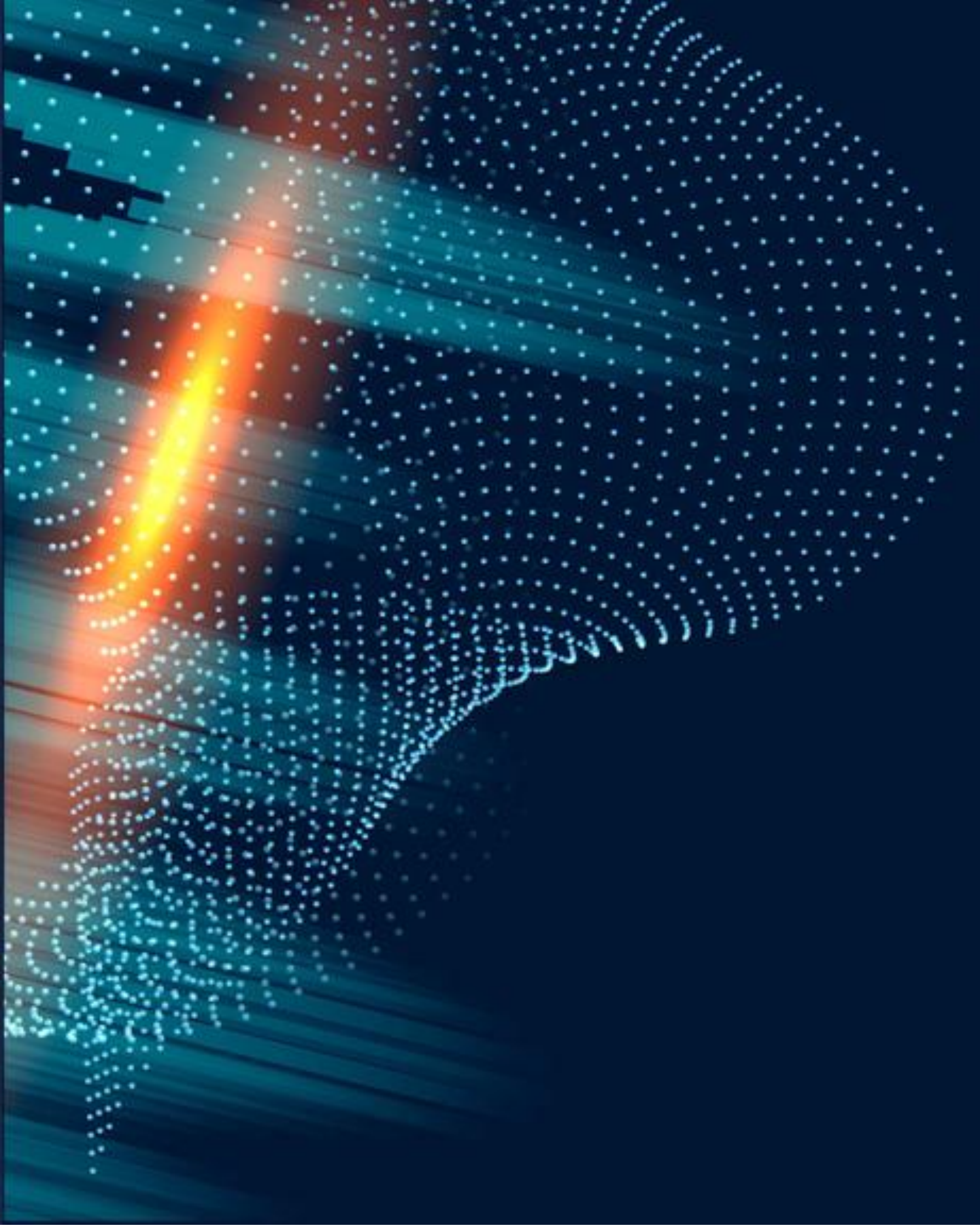


Safety & Risks in the Transportation of Dangerous Goods





Introduction

This presentation focuses on *mitigating risks* in transportation of **hazardous materials**. We will explore strategies for ensuring vehicle and driver certifications, accident prevention, and the use of advanced transport technologies.

Regulatory Compliance

Ensuring **vehicle and driver certifications** is crucial for compliance with transportation regulations. This involves regular training, licensing, and certification renewal to guarantee the safe transport of hazardous materials.



Safety Measures Required During Transportation

1. Explosive Materials

Risks: Explosive materials pose a high risk of accidents and detonations during transport, potentially leading to catastrophic outcomes.

Safety Measures: To mitigate these risks, stringent packing, handling, and transportation procedures must be strictly followed. Additionally, drivers should receive specialized training to handle emergencies and understand the proper protocols for transporting explosive materials.

2. Chemical Substances

Risks: Transporting chemical substances carries risks of leaks and environmental contamination, which can harm human and animal health.

Safety Measures: It is critical that chemical substances are transported in tightly sealed containers that meet prescribed safety standards. Regular checks and maintenance of containment systems help prevent leaks and spills, and drivers must be equipped with knowledge and tools to manage any accidental exposures.

3. Radioactive Materials

Risks: Radioactive materials are highly hazardous to human health and the environment due to their radiological properties.

Safety Measures: The transport of radioactive materials must adhere to strict procedures and standards to prevent contamination and exposure. Drivers must undergo rigorous training on the handling of radioactive materials, including the use of protective equipment and emergency response techniques.

Safety Measures Required During Transportation

4. Fuels and Gases

Risks: Fuels and gases are highly flammable and pose risks of fires and explosions if improperly handled.

Safety Measures: Vehicles transporting fuels and gases must meet high technical standards and safety criteria to prevent accidents. Drivers need thorough training in handling these materials, recognizing the signs of leaks, and executing emergency shut-off procedures to mitigate risks during transport.

5. Vehicle Standards and Inspections

Risks: Inadequate maintenance or failure to meet vehicle standards can lead to mechanical failures that precipitate accidents while transporting dangerous goods.

Safety Measures: Vehicles used in the transport of dangerous goods must undergo regular inspections to ensure they are in optimal condition and meet all safety requirements. These inspections should be conducted according to specific regulations outlined in the transport laws for dangerous goods.

Accident Prevention

Implementing robust **accident prevention** measures is essential to minimize the risks associated with transporting hazardous materials. This includes rigorous safety protocols, emergency response plans, and driver training.



Guidelines on specific prevention measures

- Identification of the type of dangerous material and the consequences that the dangerous material can cause.
- Indication of specific measures to be taken during the transport of dangerous material, as well as measures to prevent and mitigate harmful consequences that may arise from an accident (fire, damage to packaging, spillage, and leakage of dangerous material).
- Procedures for a person who has come into contact with dangerous material.
- Name, address, and telephone number of the company (carrier, sender) that must be notified in the event of an accident or incident that occurred during the transportation of dangerous material.

Vehicle Conformity Certificate I

The Certificate of Vehicle Conformity for the transport of dangerous goods is a confirmation from the competent authority, contracting party, that an individual vehicle intended for the transport of dangerous goods meets the relevant technical requirements for FL, OX, and AT vehicles as prescribed by the ADR

Vehicle Conformity Certificate II

The Certificate of Vehicle Conformity is issued by a professional institution authorized to issue this certificate.

The dimensions of the Certificate must be 210 x 297 mm (A4 format). Both the front and back sides can be used.

The certificate must be white with a pink stripe drawn diagonally, as shown in the following image.

A special form of the Certificate is issued for vacuum waste tankers, which must include the inscription "vacuum waste tanker". An attestation of the vehicle's technical characteristics is an integral part of this Certificate.

Driver Training and Certification

The Certificate of Professional Competence for drivers transporting dangerous goods is issued after passing an exam at the end of a basic course and/or attending a specialized course related to tank transport.

If, according to other regulations valid in the ADR Agreement signatory countries, the driver has completed equivalent training for a different regime or purpose that covers the topics required for the specialized tank transport training, the specialized course may be partially or fully waived. This also applies to the transport of explosive or radioactive materials, provided that the candidate has passed the final exam.

All certificates are issued by competent institutions of an ADR signatory country or any organization recognized by those authorities and must be acknowledged by the competent authorities of other contracting parties for the entire validity period of the certificate, which is five years.



Other documents accompanying the transportation process

Those documents include the previously mentioned documents (Driver's Certificate of Professional Competency, Certificate of Vehicle Conformity, Safety Measures Instructions, Dangerous Goods Transport Document - consignment note). Additionally, the vehicle crew must also possess:

- Identification means,
- Authorization from competent authorities, and
- Cargo insurance policy.

Role of TDG Participants

Participants in the transportation of dangerous goods must implement adequate preparation measures according to the nature and extent of foreseeable hazards to prevent damage and injuries and minimize their consequences. In all cases, ADR requirements relevant to their activities must be met.



Role of TDG Shipper

Shipper:

The shipper of dangerous goods is required to only hand over shipments that comply with ADR requirements. This includes:

- Ensuring that the dangerous goods are listed and permitted for transport under ADR;
- Providing the carrier with relevant information, data, and necessary transport and accompanying documents (permits, approvals, notifications, certificates, etc.);
- Using approved and appropriate packaging, large packaging, large containers for unpackaged materials (IVS), and tanks (removable tank-vehicles, gas cylinder battery vehicles, MEGCs, transportable tanks, and tank containers), marked according to ADR;
- Meeting requirements related to the method of dispatch and transport restrictions;
- Securing and marking empty uncleaned tanks and tank vehicles, including those not cleared of residual gas, as well as empty uncleaned vehicles and large and small containers for unpackaged materials, ensuring they have the correct safety markings

Role of TDG Carrier

Carrier:

The carrier must:

- Verify whether the transportation of dangerous goods is permitted under ADR regulations;
- Ensure that the required documents are present in the transportation unit;
- Visually confirm that the vehicle and cargo are free from visible defects, that all necessary goods are present, etc.;
- Check that the next inspection date for tank-vehicles used for transporting gas cylinders in battery vehicles, removable tanks, shiftable tanks, container tanks, and MEGCs has not expired;
- Ensure that the vehicles are not overloaded;
- Confirm that safety signs and labels required for the vehicles are securely attached;
- Make sure that the vehicle is equipped with the items prescribed by the written instructions for the vehicle."

Role of TDG Recipient

Recipient:

The recipient is obligated to not unduly delay the acceptance of dangerous materials and must verify after unloading that the requirements defined by the ADR relevant to that type of material are met.

Regarding general traffic safety measures:

- in cases prescribed by the ADR, the recipient must carry out cleaning and decontamination of the vehicle and containers;
- the recipient must ensure that the hazard label is removed from the container after unloading, cleaning, and decontamination."

Role of TDG Safety Loader

Loader:

The responsibilities of the person loading dangerous goods are as follows:

- To hand over the dangerous goods to the carrier only if the goods are permitted for transport according to ADR requirements,
- To check if the packaging is damaged,
- Not to hand over for transport any shipment whose packaging is damaged, especially if it is not resistant to leakage of dangerous materials, and if there is leakage or a possibility of leakage, until the damage is rectified. This obligation also applies to empty uncleaned containers,
- To follow special requirements related to loading and handling when loading dangerous goods into a vehicle, or a large or small container,
- After loading the dangerous goods into a container, to proceed according to the requirements for proper marking of the packaging and the vehicles transporting dangerous goods, as per Chapter 5.3 of the ADR,
- To adhere to the prohibition of mixing loads while considering the dangerous goods already in the vehicle and the requirements related to the separation from foodstuffs, other consumer goods, or animal feed,

The loader may rely on the information and data available from other participants in cases

Role of TDG Packer

Packer:

The packer's responsibilities include:

- Ensuring compliance with packaging requirements, co-packing conditions, and
- Adhering to ADR requirements concerning the use of orange plates and hazard labels when preparing packages for transport.

Role of TDG Tank Operator

Loader:

The loader of dangerous goods has the following obligations:

- Ensure that the tank and its equipment technically meet the required conditions before filling.
- Ensure the next testing date for tank vehicles, battery vehicles, demountable tanks, portable tanks, tank containers, and MEGCs has not expired.
- Fill tanks with dangerous material that is permitted to be transported in those tanks.
- Adhere to the requirements related to dangerous materials in adjacent compartments of the tank.
- Comply with the maximum filling level or maximum allowable mass per liter capacity for the materials being filled.
- Check for leak resistance after filling the tank - ensuring seals and closures are secure.
- Ensure that no residue of the filled dangerous material adheres to the external surface of the tank.
- Ensure that orange plates and prescribed hazard labels are properly attached to the tank, vehicle, and large and small containers for bulk transport according to requirements.
- Transport characteristics of dangerous materials dictate that non-compliance with transport regulations is subject to penalties (improperly filled CMR C3,200, incorrect UN number C3,200, use of packaging without or with an inappropriate packaging code C2,400, driver lacking a certificate C2,400...). Knowledge of ADR (when cargo will be exempt from ADR, when cargo requires transportation as ADR, how to correctly implement it, etc.) is essential to prevent accidents involving dangerous materials and to avoid high fines, requiring constant monitoring of changes related to the transport of dangerous materials and adaptation to new rules.

Role of TDG Driver I

Driver:

Duties and obligations of the driver of a motor vehicle transporting dangerous goods:

- Familiarizing with the characteristics of the transported dangerous goods;
- Performing a visual inspection of the vehicle and ensuring the presence and functionality of equipment;
- Checking galvanic connections and devices before loading (unloading);
- Driving the vehicle to the loading point and complying with loading and unloading regulations;
- Checking the filling of the tank chambers and sealing them;
- Retrieving transport documents and safety instructions from their company (must familiarize themselves before transport), signing off on the cargo declaration;
- If during transport it is discovered that the cargo does not meet transport conditions or is undeclared, the driver must halt further transport and notify the sender, their company (carrier), and the police;
- If towing a trailer or semi-trailer, checking the connection and signaling devices, automatic braking;
- Adjusting speed according to road and weather conditions, and traffic signs, with vehicle speed not to exceed 80% of the maximum permissible speed according to the road type;

Role of TDG Driver II

- Movements, turns, overtaking, marking, braking, and stopping must be smooth to avoid sudden jolts, considering fluid pressures on tank walls and additional vehicle loads;
- The driver must not leave the vehicle unless a co-driver is present or the vehicle is parked in a designated area until the hazardous cargo is handed over;
- In the event of a vehicle malfunction during transport, the driver must secure the vehicle and notify the sender and the nearest station; a towing service may only tow to the nearest repair or transshipment point using a solid connection at a speed not exceeding 40 km/h;
- In case of an accident, securing the accident site properly and notifying the nearest police station and the sender of the dangerous goods; if alone in the vehicle (without a co-driver), this responsibility is passed to the person present or the first person arriving at the scene;
- In case of liquid spillage, attempting to stop the leak and contain the spill area using personal protective equipment and vehicle equipment;
- In case of a vehicle fire, reacting immediately using portable powder fire extinguishers;
- The vehicle must only travel on roads designated for vehicles transporting dangerous goods;
- No smoking in the cabin or on the vehicle, and no flammable or explosive materials should be kept;
- Only the driver, co-driver, and an escort are allowed in the vehicle;
- A vehicle with empty and uncleaned containers must be transported with the same markings and equipment as when transporting full containers;
- In the event of an accident, following the instructions on special safety measures and providing first aid to those

Role of TDG Safety Advisor

"Transport of Dangerous Goods Safety Advisor:

- Every company involved in road transport of dangerous materials or related operations (packing, loading, filling, or unloading of dangerous materials) must appoint one or more safety advisors (hereafter referred to as 'advisor') for the transport of dangerous goods. They are responsible for assisting in the prevention of risks during these activities concerning people, property, and the environment. The primary task of the advisor, under the responsibility of the company's management, is to facilitate these activities safely and in compliance with the applicable regulations using all suitable means and measures within the company's activities. The advisor's duties, depending on the company's activities, primarily include:
- monitoring compliance with the regulations for the transportation of dangerous materials;
- advising their company during operations related to the transportation of dangerous materials;
- preparing an annual report for the management of their company or possibly for the local public administration about the company's activities related to the transport of dangerous materials. Such annual reports must be preserved and made available to national authorities upon request."

Accidents prevention during transportation of DG

Preventing accidents during the transportation of dangerous goods is crucial, as the requirement for safe driving is significantly higher than for other types of transportation, primarily due to the potential consequences of a traffic accident.

Due to unskilled handling of the vehicle, mistakes, inattention, or improper driving during transport, many undesirable situations can occur, such as: spillage of liquids, fire and explosion, poisoning and property damage, environmental pollution, danger to human lives."

Risk Assessment

Participants in the transport of dangerous goods take all necessary measures to prevent accidents or minimize their consequences, given the potential hazards involved.

Transporters, shippers, recipients, and transport organizers collaborate with each other and with authorized officials of competent authorities to implement appropriate safety and preventive measures.

In case of danger or an accident, participants must immediately notify the nearest police station and provide necessary information for appropriate action. In the event of an accident, in accordance with international agreements, the transporter, safety advisor, or transport organizer is required to prepare an accident report as soon as possible and submit it to the competent authority.

Fire Protection and Safety

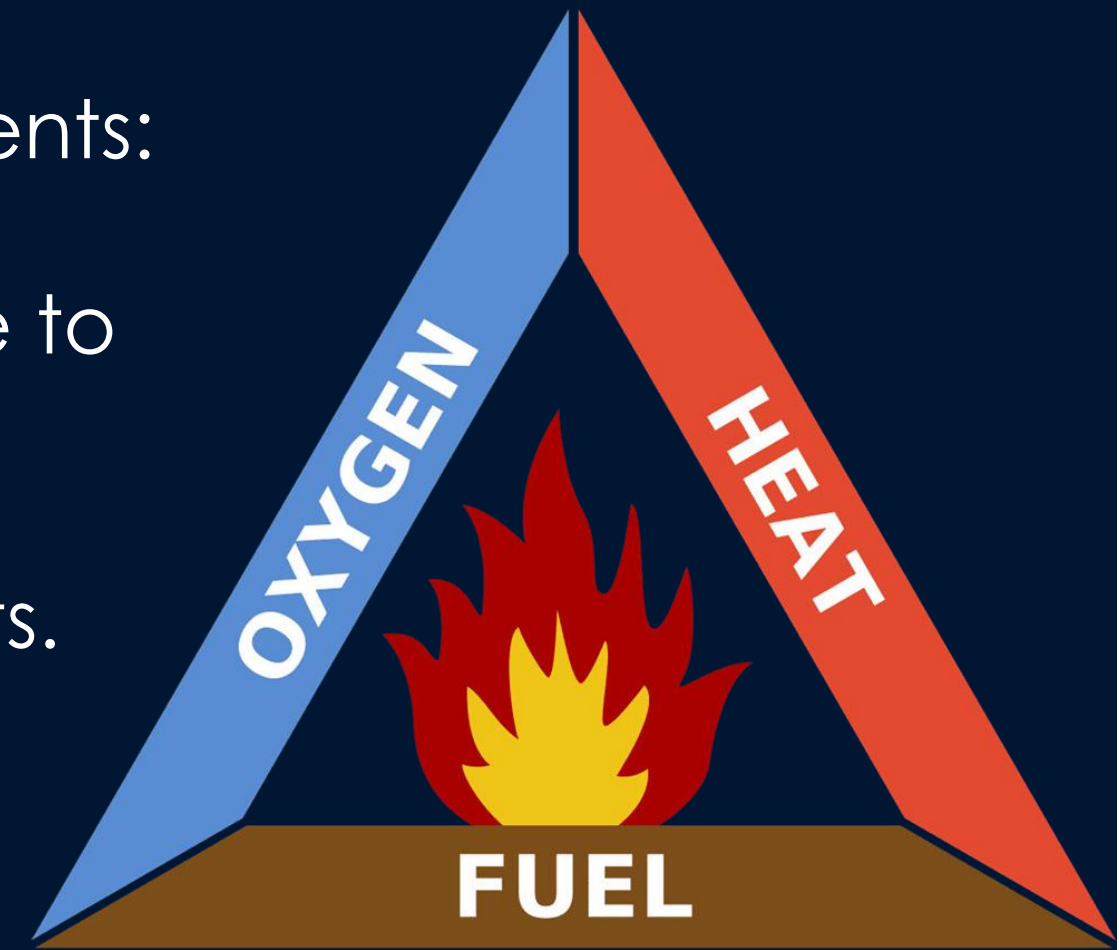
Flammable materials, which under normal conditions can ignite and then continue to burn independently until completely consumed.

Difficult-to-ignite materials, which catch fire or smolder in the presence of a flame, but cease burning once the flame is removed.

Non-flammable materials, which under normal conditions cannot ignite.

The conditions necessary for fire to occur involve three basic elements: an ignition source, oxygen, and combustible material. These three elements together form the "FIRE TRIANGLE," depicted in the image to the right.

The basic principle of firefighting is to remove any of these elements.



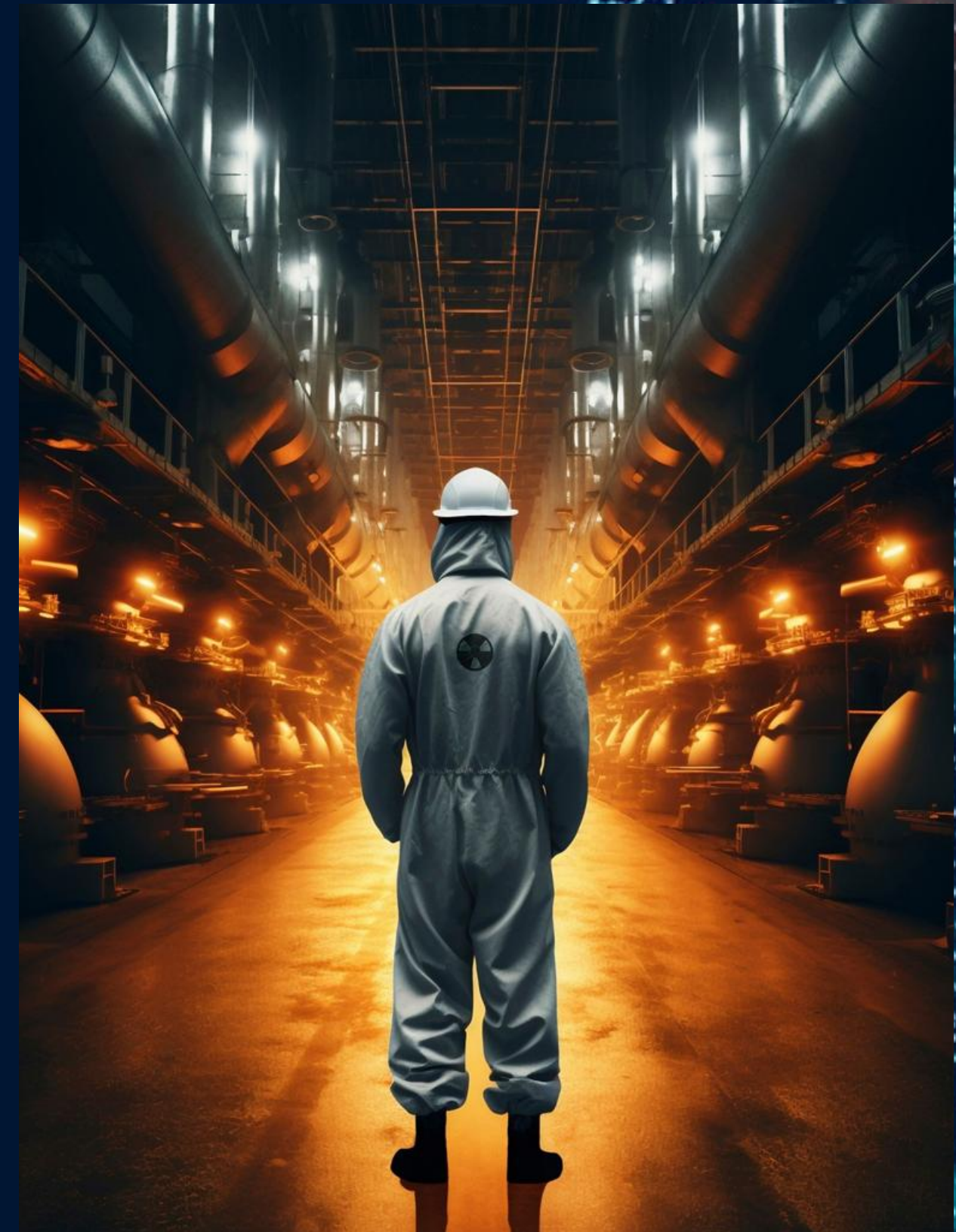
Classification of Combustible Materials

1. Class A: Flammable solids (wood, paper, fabrics, waste, plastic). Class A fires are most commonly extinguished with water, sand, powder, etc.
2. Class B: Flammable liquids (gasoline, oil, lubricants, acetone).
Extinguishing agents include powder, carbon dioxide, sand, halons, or foam.
3. Class C: Flammable gases. Extinguished using powder, halons, or carbon dioxide.
4. Class D: Metals such as potassium (K), sodium (Na), aluminum (Al), magnesium (Mg). Only dry agents (powder or sand) are used for extinguishing.
5. Class E: Electrical equipment and devices under electrical tension.
Extinguished with powder, halons, and aerosol systems.

Best Practices in Hazardous Material Transportation

Adopting and promoting **best practices** in the transportation of hazardous materials can significantly enhance safety and minimize risks.

This includes industry standards, continuous improvement, and knowledge sharing.



Conclusion

In conclusion, prioritizing **vehicle and driver certifications**, implementing **robust prevention measures**, and leveraging **advanced transport technologies** are essential for mitigating risks in the transportation of hazardous materials.

Thanks!

