## Scenario 10-C: Accident at a starch plant

|  |  |
| --- | --- |
| **Scenario 10-C: Accident at a starch plant** | |
| **Complexity of the scenario: moderate** | |
| **Possible application of the scenario: Topics 4.1, 5.1, 5.2, 5.6, 6.1 and 6.3** | |
| **Scenario description:** | |
| At a starch plant, an employee connected a tank wagon containing a hypochlorite solution to the wrong transfer pipeline by mistake.  Approximately 600 litres of hypochlorite solution were transferred from the wagon to a storage containing hydrochloric acid. The reaction of the two chemicals produced chlorine gas, which was released to the air inside the plant through a ventilation pipe.    Employees noticed the accident due to a noise from the reaction occurring in the tank about 90 seconds after the accident occurred. There was a strong smell of bleach. Without immediately realizing what was happening, they switched off the pumps and trigged the emergency response. One of the employees called the emergency services.  Soon after the release, many employees started to experience coughing, wheezing, burning sensation in the nose, throat, and eyes, difficulty breathing, sore throat, chest tightness, skin irritation, nausea and vomiting.  250 employees were evacuated for 5 hours.  39 persons were taken to the hospital. 35 of them were discharged in home care the same day, 2 had to stay in hospital over night and 2 died.  No offsite emergency measures were required as the accident was limited to the plant.  **Things to consider:** When liquid chlorine is released, it quickly turns into a gas that stays close to the ground and spreads rapidly. Chlorine gas can be recognized by its pungent, irritating odor, which is like the odor of bleach. The strong smell may provide adequate warning to people that they are exposed. Chlorine gas appears to be yellow-green in color. Chlorine itself is not flammable, but it can react explosively or form explosive compounds with other chemicals such as turpentine and ammonia, therefore, first responders must pay attention to these signs.  If chlorine gas is released into the air, people may be exposed through skin contact or eye contact. They also may be exposed by breathing air that contains chlorine. Exposure to chlorine typically leads to symptoms of ocular, nasal, and respiratory irritation. Signs and symptoms of poisoning might include eye redness and lacrimation, nose and throat irritation, cough, suffocation or choking sensation, and dyspnea. For cutaneous exposures, burning, blistering, and frostbite-like injury to the skin are possible. The extent of poisoning caused by chlorine depends on the amount of chlorine a person is exposed to, how the person was exposed, and the length of time of the exposure (In this case, at least 90 seconds). When chlorine gas comes into contact with moist tissues such as the eyes, throat, and lungs, an acid is produced that can damage these tissues. Long-term complications may occur after breathing in high concentrations of chlorine. Complications are more likely to be seen in people who develop severe health problems such as fluid in the lungs (pulmonary edema) following the initial exposure.  Symptoms usually appear during or immediately after exposure to dangerous concentration of chlorine.  Sources:  Based on a 13 December 2017 accident in the EU.  [https://emars.jrc.ec.europa.eu/en/emars/accident/view/ca68fa4e-4f6a-11e8-a5bf-005056ad0167](about:blank)  [https://www.health.ny.gov/environmental/emergency/chemical\_terrorism/chlorine\_general.htm](about:blank)  [https://emergency.cdc.gov/agent/chlorine/basics/facts.asp](about:blank)  Ronald De Groot, Gerard A. Van Zoelen, Marianne E. C. Leenders, Antoinette J. H. P. Van Riel, Irma De Vries & Dylan W. De Lange (2021), *Is secondary chemical exposure of hospital personnel of clinical importance?,* Clinical Toxicology, 59:4, 269-278, DOI: 10.1080/15563650.2020.1860216 | |
| **Application: First alarm (Topic 4.1)**  **Target audience: DO, FB, (M)P, AS** | **Learning objective:** To recognize signs of a potential CBRN release and (initiate first) respond(ers).  **Aim:** The dispatch officer interacts with the caller to identify the likelihood of a possible CBRN release and to know which information should be shared with the chain of command. Use of METHANE and Four W’s protocols. |
| Example: |  |
| **Application: Arrival on scene (Topic 5.1)**  **Target audience: FB, (M)P, AS** | **Learning objective:** To recognize how to carry out an on-site risk assessment, zoning of the area, and isolation and registration of victims.  **Aim:** The first responders arrive on scene, perform a risk assessment, talk with the caller, perform a reconnaissance of the incident scene and discuss actions. They apply METHANE, establish zoning, isolate people and pet animals, initiate evacuation, register persons. |
| **Example:** |  |
| **Application: Forensic awareness (topic 5.2)**  **Target audience: FB, (M)P, AS, EMS, GP** | **Learning objective:** To recognize how to carry out your work without forensic disruption of the scene.  **Aim**: The responders discuss the possible forensic value of the materials found on the scene and preserve the evidence. |
| **Example:** |  |
| **Application: medical treatment and triage (topic 5.6)**  **Target audience: FB, (M)P, AS, EMS, GP** | **Learning objective:** To recognize how to apply appropriate medical care towards patients involved in a CBRN incident.  **Aim:** The responders assess the medical conditions of the victims, perform triage on the victims and recommend possible treatment. |
| **Example:** |  |
| **Application: Alarm Protocol (topic 6.1)**  **Target audience: DO** | **Learning objective:** To differentiate a possible CBRN incident (from normal incident) and to carry out appropriate procedures & protocols.  **Aim:** The dispatch officer interacts with the caller and relays necessary information to the responders moving towards the scene. |
| **Example:** |  |
| **Application: Task Specific – Triage of victims (topic 6.3)**  **Target audience:** **AS, EMS, GP** | **Learning objective:** To familiarize with and carry out triage and provide medical care in relation to CBRN scenarios**.**  **Aim:** The responders assess the medical conditions of the victims and perform medical triage on the victims based on provided symptoms. |
| **Example:** |  |