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80. HOW TO ACHIEVE BETTER PROTECTION FROM CHEMICAL TERRORISM EFFECTS BY PREVENTIVE ACTIONS

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INTRODUCTION

Next to progress and development, chemical industry also brings about the burden of constant risks for human lives and material assets in its surroundings. Although accidents are not uncommon in time of peace, they are several times more probable to occur in times of wars, particularly as a result of air or missiles attacks on chemical facilities. Petrokemija d.d. Kutina is one of the chemical companies with such technology, conditions and media that could be extremely dangerous in case of uncontrolled release, due to the prevailing high temperatures, pressures and toxicity. During the Homeland War against the great-Serbia aggression on Croatia (1991 – 1995), the company was several times exposed to missile and air attacks with substantial material damage, but fortunately without human losses. Among other things, it is also the result of adequate preparations and implementation of preventive measures, tasks and procedures for such emergency situations among the company employees as well as among local residents. The purpose and the objective of this paper is to share the experience in organization and implementation of preventive activities, essential in reducing the consequences of war actions.

EDUCATION

Training of employees and local residents on implementation of the protection and rescuing measures in cases of uncontrolled release of hazardous materials into the environment, caused by war actions, terrorism or technological accidents is the best way of protection. That is why it is essential for local authorities to implement a system of continuous education and training of residents in the vicinity of such large industrial facilities, producing or processing hazardous materials.

The education and training of the Petrokemija d.d. employees is an integral part of the sophisticated protection and rescue system and is carried out continuously the whole year round.

Since the existing technological processes take place at high temperature and pressure, the released hazardous material would spread at very high speed. That is why special attention is devoted to education and training of employees and local residents in implementing protection and rescue measures for cases of air-borne hazardous materials.

The education of local residents should include the following:

- properties of hazardous materials
- impact of hazardous materials on people and environment
- characteristic reactions of people to certain concentrations and possible consequences
- protection measures by zones of distance from accident source
 - remaining in closed spaces
 - use of shelters
 - evacuation
- protection means
 - for protection forces (gas masks)
 - at hand (wet cloth)

- first aid

forms of education

- lectures
- brochures
- information leaflets
- local radio and TV
- special audio and video recordings for schools and kindergartens

education of employees according to jobs:

- at plants (accident source)
- at plants technologically directly connected with accident source plant
- at other plants
- administrative staff

education of professional protection and rescue forces

- technical facilities and equipment for bringing down poisonous clouds
- tactics of bringing down poisonous clouds
- protection equipment for work in high-concentration conditions
- tactics of rescue forces operation in high-concentration conditions
- procedures for means of transportation
- first aid
- at outskirts of the affected zone
- in health centers in closer and wider surroundings, technically and professionally trained for this kind of danger
- ways of removing hazardous materials from people and land (decontamination)

PROVIDING WITH EQUIPMENT AND TRAINING

Equipping and training of protection and rescue forces in modeling conditions of possible events caused by war actions, terrorism or chemical accidents is an important factor in the protection and rescue system.

The protection and rescue system of Petrokemija d.d. Kutina implies interaction between process staff and protection and rescue forces (firemen, security staff and other).

Operational protection and rescue plans are tested during the year in exercises carried out by process staff, firemen and security staff organized by modeling real-life situations. The protection and rescue forces (firemen and security staff) must be trained well in order to act quickly and efficiently to prevent spreading of danger and to limit it in the least possible space.

The management and the relevant departments of the company should take constant care of providing process plants with reliable equipment and measuring instruments and equipping the staff with safe and good-quality personal protection equipment, as follows:

- intervening process staff should be equipped with protective clothing breathing apparatus
- other staff should receive gas masks
- instruments for detection of hazardous materials
- water hydrant net of appropriate capacity, in accordance with the possible extent of danger
- means for neutralization at locations determined beforehand
- communication systems

Equipping professional firemen with:

- protective clothing and breathing apparatus
- equipment for bringing down poisonous cloud
- means for pouring hazardous liquids and prevention of spreading spills
- multi-purpose foams
- special vehicles for operation in high concentrations of hazardous materials

TECHNICAL DEVICES AND EQUIPMENT

The upgrading of technical devices and equipment makes possible safer and better protection of employees and local residents through:

- installing the system for alarming employees and local residents in direction of danger (by telephone and speaking sirens)
- providing shelters with appropriate filters and additional air reserves for longer stay
- installing monitoring system (stationary and mobile) for monitoring and measuring the concentrations of hazardous materials in air and water
- installing automatic systems for bringing down and prevention of spreading hazardous materials
- possibility of communicating of protection and rescue forces in protective clothing and breathing apparatus
- development of good-quality foams for covering the spill and preventing its evaporation
- good quality doors and windows that due to lower air exchange in housing space makes it air air-tight.

REAL-TIME PREDICTING

The development of software for real-time predicting of events in the present area enables:

- estimation of approaching speed of danger taking into consideration the configuration of the surroundings (plants, buildings, hills, etc.)
- estimation of range of danger in depth and width in direction of its movement and the height of hazardous material concentration at different distances from the source.
- timely and good decisions in undertaking protection and rescue measures (whether to stay in air-tight space or evacuate in defined directions)
- knowledge of existing facilities for technical protection and protection and rescue forces in preventing of spreading the danger into the surroundings and their optimum number
- practical training of process staff, protection and rescue forces for every possible real situation

RELEASE OF SO₂

Scenario:

Chem. substance: SO₂

Aggregate state: gas

Kind of release: continuous

Amount of release: 2700 kg/min

Duration: 30 min

METEOROLOGY

TIME:

AIR TEMPERATURE:

WIND SPEED:

WIND DIRECTION:

STABILITY CATEGORY:

SUN RADIATION:

HUMIDITY: