Fire in an ultimate waste underground storage facility

September 10, 2002

Wittelsheim – [Haut-Rhin] France

Underground storage
Ultimate wastes
Salt mine
Fire
Dioxines
Phytosanitary products
Asbestos wastes

THE INSTALLATIONS IN QUESTION

A retrievable underground storage facility for industrial wastes, located in the Alsace region of France, in the commune of Wittelsheim (Haut Rhin), near the city of Mulhouse, was authorised to operate for a 30-year period by a prefectoral order dated February 3, 1997.

The storage area is located at a depth of 600 m in ad hoc galleries (blocks) dug for this purpose by the site's mine operator in the geological salt formation.

With a maximum authorised capacity of 320,000 tons of waste for an annual capacity of 50,000 tons, this storage facility accepts ultimate wastes (incineration wastes, quenching salts, and arsenical, chrome and mercury wastes, laboratory wastes, and waste containing asbestos…) and wastes specifically intended for underground storage owing to their physical properties that do not allow them to be stored in buried waste disposal centres, even once they are stabilised. Approximately half of the waste stored at the site belongs to this category. All are packed in drums, big-bags or metal containers.

All of these wastes must be perfectly identified and come from recognized producers. Non-ultimate wastes, radioactive, toxic biological, volatiles, flammable, explosive, gaseous, liquid, thermal or volumetrically unstable products, that react with water or salt or indefinable products are not authorised to be stored in these installations.

This type of storage facility is the only one of its kind in France.

THE ACCIDENT, ITS BEHAVIOUR, EFFECTS AND CONSEQUENCES

The accident:

At 4.15 am, during the night of September 9 – 10, 2002, a fire was detected in the mine's galleries by miners on duty in the adjacent sites. As the walls between the mine digging site and the storage facility are not hermetic, the operators were alerted by an abnormal odour.

The fire was located in storage block No. 15 which held 1,800 tons of waste: drums of arsenic tainted soil, big-bags of household and industrial waste treatment residues (REFIOM/REFIDI), big-bags of asbestos removal wastes and big-bags of asbestos-containing residues collected after a fire in a phytosanitary product warehouse.

After an unsuccessful attempt at extinguishing the fire with water (given the depth of the storage facility, water supplies were low) and fire extinguishers, the emergency response teams set up barriers designed to smother the fire by reducing the amount of air circulating in the block.

Upon the request of the Prefect, a rescue team from the neighbouring mine, specialising in underground operations, also provided assistance but were still unsuccessful.

All of the firefighting operations conducted at the site of the accident had to be performed by operators wearing self-contained protection equipment knowing that the temperature at the bottom of the mine is normally in the order of 32°C (these factors limit the time of each intervention to 30 min. at the most and make it necessary to have a rescue team on the surface ready to intervene if required).

On September 20, reconnaissance was conducted and concluded that the fire had been extinguished, without disregarding the possibility of possible combustion points, conformed by continuous measurements conducted in the block using an automatic sampling apparatus. As these hot spots continued, nitrogen was injected 23 to 25 October to "inert' the atmosphere inside the block and to thus extinguish the last hot spots.

During the following reconnaissance operations, a few hot spots were still noted. On November 7, a new extinguishing operation was undertaken by injecting nitrogen into the core of the few remaining hot spots.

On November 12, the fire was considered to be completely extinguished.

The consequences:

The consequences of the accident are directly linked to the generation of smoke caused by the fire.

Significant concentrations of sulphur dioxide were measured at the outlet to the atmosphere, at the level of the upcast. The installation of barriers rapidly deceased the amount of smoke released from these upcasts. The micro-pollutant analyses, conducted on samples taken at several locations and particularly in the environment (soils and vegetables), did not highlight any notable impact. The main values exceeding the authorised standards concerned two carcinogenic pollutants, benzene and benzopyrene. Subsequent analyses of these 2 pollutants, conducted on the smoke trapped in block 15, seem to imply emissions short duration. Significant amounts of dioxin and furan were recorded on the walls of the galleries near block 15, at a depth of 600 m, although no contamination was recorded at the surface.

The incident did not result in health hazard for the residents living near the installation. At the time of the accident, the population was not requested to remain at home although 3 schools were closed as a precautionary measure.

However, several miners exposed to the smoke during the firefighting operations complained of dermatosis and throat irritation.

These evaluations were confirmed by the committee of experts appointed by the local CLIS ("Commission Locale d'Information et de Surveillance", local commission for information and surveillance) which concluded that there was "no specific risk for the residents, the population and the surface personnel" and indicated that "several rescue personnel showed clinical signs of slight carbon monoxide intoxication, skin irritations and digestive problems requiring medical attention".

Initially, the fire resulted in the suspension of the storage facility's activity: as a result, 27 employees of the storage facility and 350 miners applied for technical unemployment. The storage facility eventually closed down definitively. The future of the 40,000 tons of waste stored in the bottom of the mine has not yet been determined. Furthermore, the termination of the potash extraction activity, which should have occurred in April 2003, was brought forward 6 months.

European scale of industrial accidents

By applying the rating rules of the 18 parameters of the scale made official in February 1994 by the Committee of Competent Authorities of the Member States which oversees the application of the 'SEVESO' directive, the accident can be characterised by the following 4 indices, based on the information available.

The parameters that comprise these indices and the corresponding rating method are indicated in the appendix hereto and are available at the following address: http://www.aria.ecologie.gouv.fr

Although the quantities released are not known with certainty, this accident resulted in the release of several "Seveso" substances (benzene, PAH (polycyclic aromatic hydrocarbons), dioxins…), the "dangerous materials released" index is thus at least equal to 1 (parameter Q1).

As the associated mine was unable to resume operations (350 miners applied for technical unemployment), the "human and social consequences index" is 5 (parameter H6). The other indices of the European accident scale could not be determined owing to a lack of sufficiently precise data.

ORIGIN, CAUSES AND CIRCUMSTANCES OF THE ACCIDENT

The exact causes of the fire are not known. Several hypotheses were submitted, however:

- ✓ The presence of wastes that remain hot such as the REFIOM or REFIDI,
- ✓ The presence of prohibited wastes, flammable wastes in particular,
- ✓ The presence of incompatible products and/or products liable to change owing to the temperature in the mine.

As such, there is a presumption about "asbestos-containing" wastes coming from the fire of a phytosanitary product warehouse, with this waste being delivered in big-bags (these big-bags had not been opened when they arrived because of asbestos risk).

Various expert analyses are underway to determine the causes and circumstances of the fire:

- ✓ Judicial inquiry,
- ✓ Inquiry requested by the Administrative Court,
- ✓ Administrative inquiry,
- ✓ Inquiry conducted at the request of the CLIS which nominates a committee of experts,
- ✓ Inquiry conducted at the request of the CHSCT (the committee for hygiene, safety and working conditions).

The conclusions are not known for the moment. The CLIS experts have only retained the hypothesis of "self-ignition following biological downgrading, chemical decomposition or a chemical reaction between products, phytosanitary products in particular."

ACTION TAKEN

At the time of the accident, the Prefect set up a crisis centre directed by the Thann Sub-Prefect and which met often (2 times per day during the period following the start of the accident, then at more widely-spaced intervals).

On September 12, an emergency prefectoral order was drawn up requiring that the operator conduct the analyses required to evaluate the impact of the fire. These analyses formed the subject of numerous additional letters and their follow-up was ensured by the DRIRE, which was mobilised from the start of the fire and, subsequently, to provide its technical point of view to the Prefect in determining the operations to be conducted with regards to civil defence.

Furthermore, a formal prefectoral notice dated September 19 was issued requesting that all waste stored on the surface be removed (the prefectoral authorisation order only authorises wastes to be stored above ground for 2 days).

Concerning the future of stored wastes, an expert report concluded in **October 2003**, that there is no industrial-scale waste reclamation installation able to receive the type of wastes stored". They can only be stored, either on site, or at a different ultimate waste treatment centre.

In **December 2004**, the operator was indicted for "deliberate palpable breach of an obligation of safety and prudence" required by the Prefectoral Order of February 1997 which authorised it to operate.