Perforation of a gaseous fuel distribution pipe

22 December 2007

Noisy-le-Sec (Seine-Saint-Denis) France

Piping / distribution
Natural gas
Leak
Explosion
Contracted works
Victims
Property damage
Declaration / "DICT"

THE FACILITIES INVOLVED

The site:

In the town of Noisy-le-Sec (Seine-Saint-Denis Department north of Paris), municipal gas supply is distributed by means of a public pipe network. The particular installation involved in this accident is the network supplying a group of buildings in the city centre within a so-called “private” district (i.e. non-subsidised housing).

Source: DRIRE Environment Agency (Paris Region)

THE ACCIDENT, ITS CHRONOLOGY, EFFECTS AND CONSEQUENCES

The accident:

On December 22, 2007 within a private residence composed of several housing blocks, a public works contractor was drilling boreholes in order to evaluate site subsoil by means of extracting core samples from deeper strata.

While drilling the first metre of one of the final sampling boreholes, located 3 metres in front of the entrance to a main stairwell, the two foremen supervising the works detected a gas smell and then noticed a gas jet escaping.

They immediately shut off the boring machine to alert emergency services (fire-fighters, police); the time was 8:48 am. Gas company technicians received an initial call at 9:00 am, but for an erroneous address in the neighbouring city of Bobigny; the second call to the gas response unit, five minutes later, provided the correct address.

The gas supply pipe was punctured by the drilling, which created a 63-mm diameter hole, and then projected upward into a 100-mm casing from a previous pipe installation on the same site.

Once on the scene, police and fire-fighters evacuated the entire building, beginning with the central portion. At 9:30 am, the gas technicians arrived onsite.

By around 9:35 or 9:40 am, police and fire-fighters had evacuated all individuals potentially exposed to risk.

The first explosion happened right about 9:45, in other words just 5 or 10 minutes following the building's full evacuation. A number of fire-fighters and police officers were injured, while the on-call technician was able to find cover in time.

A second explosion occurred at approximately 9:53 am, and this time the gas technician was hurt by the shockwave.

By 10:52 am, the residential zone was considered completely secured, from the standpoint of gas explosion risk, by the rescue team.

Agents from the local DRIRE Office, notified of the accident at around 11:00 am, reached the scene by 1:00 pm, although access at the time to the damaged zone was reserved exclusively for police and fire-fighting personnel. Even those agents assigned to monitor the gas distribution pipe system were denied access to the explosion site.

Consequences of the accident:

It must be emphasised that the building collapsed just 5 or 10 minutes after being completely evacuated.

Fire-fighters were heavily challenged to extinguish the fire that broke out following the two explosions. Of the entire housing block, both the central and right parts were totally levelled and burned. All building residents had to be relocated to alternative housing.

The window panes of buildings lying just opposite as well as those of a neighbouring school (empty at the time) were shattered.

Source: DRIRE Agency, Paris Region

The European scale of industrial accidents

By applying the rating rules applicable to the 18 parameters of the scale officially adopted in February 1994 by the Member States' Competent Authority Committee for implementing the '*SEVESO*' directive on handling hazardous substances, and in light of the information available, this accident can be characterised by the four following indices:

Given the inability to estimate the quantity of gas released both before and after the explosions, the "hazardous materials released" index was recorded, by default, as 1 due to the two explosions produced (parameter Q2).

The eight individuals injured among fire-fighters, police officers and gas service employees explain why a level 2 was ascribed to the "human and social consequences" indicator.

The parameters composing these indices and their corresponding rating protocol are available from the following Website: http://www.aria.developpement-durable.gouv.fr

THE ORIGIN, CAUSES AND CIRCUMSTANCES SURROUNDING THE ACCIDENT

Once the pipe had been punctured, some of the gas escaped in the form of a gas jet, while the remaining amount of gas perhaps migrated and wound up accumulating in the basement of the nearby building. The ignition source of the gas pocket or cloud could not be identified.

On the same day, during the investigation conducted by both the police and DRIRE agents, the onsite work crew was unable to provide drawings that could potentially correspond to the DICT (notice of intent to begin works). The search undertaken by the gas company's technical department to track the DICT notice also proved fruitless.

The public works contractor was therefore drilling boreholes without any detailed drawings of the gas distribution network, information that would have been provided in the DICT. The contractor indicated to the authorities that for the prior boreholes on this site, they had proceeded by means of manual boring, but for the last one such preliminary boring had not been performed by the crew, undoubtedly in order to save time. Let's recall that this drilling campaign was being conducted on Saturday, December 22.

A legal investigation is currently underway.

SUBSEQUENT TECHNICAL ACTIONS

The valve supplying the accident zone was closed, which caused gas supply to be shut off to 172 residential customers.

Until the end of the evening of the 22nd, fire-fighters were still spraying the rubble. The wide safety perimeter was maintained for over 24 hours. Due to the legal investigation and while waiting for large amounts of debris to be removed, a smaller perimeter was set up.

Over the next few days, DRIRE agents contacted managers of the public works contractor, who were able to confirm the nonexistence of a DICT notice. A correspondence dated December 27, 2007 summarising the situation along with data collected was sent by DRIRE to the contractor.

The families evacuated from the building were relocated by the City of Noisy-le-Sec in temporary housing units reserved for new arrivals for an indefinite period.

LESSONS LEARNT

The Noisy-le-Sec accident lies within a sequence of serious accidents that arose between the end of 2007 and beginning of 2008 on national gas company infrastructure. Over this same period, other accidents occurred in the cities of Bondy, Niort and Lyon, accounting for a total (including Noisy-le-Sec) of 100 victims, including 2 deaths. This heavy human toll is the most visible outcome of a much higher number of serious gas leaks (6,000 a year in France), as a result of works performed adjacent to structures.

In this context, France's Ministry of Sustainable Development has undertaken, in conjunction with other involved Ministries (mainly Interior and Labour), a major reform of Decree No. 91-1147, adopted October 14, 1991 relative to the safety of building works conducted in the vicinity of all types of utility networks, especially gas distribution and hazardous materials transport networks. This reform, whose content and implementation protocol are still under review and discussion, should be ready for application in 2010. These efforts are aimed at introducing the following improvements:

1. Creation of a single national unit, to replace a mission currently backed by the municipalities: Positioned at the interface between third-party contractors and utility network operators, such a single unit would be assigned to keep a record of contact details for all network operators working in France, plus drawings of the zones where their networks actually run. Based on information recorded and continuously updated, this unit will provide via an Internet platform to all authorised contractors (who must furnish the unit with footprint drawings of any planned worksite) an exhaustive and fully reliable list of network operators responsible for servicing the particular zone or its immediate vicinity. Contractors would thus be able to directly contact network operators potentially affected by the planned works and could then determine in concert with each of them the set of appropriate measures for executing works under the safest conditions.

2. Advanced training for utility network actors, and credentialing requirement: Statistical records reveal that accidents are not due solely to frequent lapses in notifying works projects, but also to unsuitable jobsite practices, particularly regarding the use of aggressive or poorly-managed techniques and a widespread misunderstanding of potential hazards. Both initial training and continuing education need to be defined, in association with the corresponding set of credentials. As an example, qualifications specific to driving public works vehicles (i.e. "CACES", French for Special Vehicle Driving Licence) will be completed by a specific module devoted to the safety measures anticipated for zones closest to utility networks. Similarly, contractors performing localisation measurements to improve network mapping or practicing emergency intervention will be required to complete special training and a certification procedure.

3. Development of an expanded observatory: Such an observatory is intended to compensate for the current lack of dialogue between actors and to introduce a tool for managing feedback on anomalies, incidents and accidents in order to institute a progress-oriented approach that involves all stakeholders. This expanded unit will rely heavily on the existing regional observatories, encompassing construction firms and network operators, and will extend to: local authorities, administrative agencies responsible for monitoring gas distribution pipelines, and contractors unfamiliar with the practice of filing work notices (agricultural sector, nurseries, landscape architects, sign setters, drillers, etc.). These

observatories will also conduct campaigns to disseminate information and build awareness of applying regulations and employing best practices.

4. Other planned regulatory measures: Besides introducing a number of measures relative to the single, consolidated unit and training / credentialing (points 1 and 2 above), this regulatory reform will also focus on:

- heightened responsibility of project owners, especially through mandating that they conduct additional investigations whenever network localisation proves too imprecise,
- modernisation of both the works permitting and notification forms (DT, DICT),
- continuous reliability enhancement of network mapping thanks to geolocalisation measurements carried out during improvement work on existing networks and at the time of inspecting new networks,
- an optimal definition and dissemination of appropriate building techniques for the zone closest to the network layout,
- the potential to stop work in progress in the presence of a proven serious hazard relative to a network,
- preparation prior to commencing work of an accelerated intervention strategy in the event of network damage,
- penalties applicable in the case of rule violations.