

Decision Support Systems for Management of Former Gas Plant Sites

The need to manage old manufactured gas plants (MGP) in a harmonized way was highlighted in the nineties. At that time the question of "Polluted Sites and Soils" emerged in France, following the discovery on a site, owned by Gaz de France, of tar tanks still containing by-products from the production process of manufactured gas. Based on the distillation of coal, this process purified gas from furnaces, which was then stored in gasometers before being injected into the network.

The gas plants have been in operation from 1798 until the late sixties, the date from which natural gas was used, resulting in the gradual closure of all factories, the last of which ceased operations in 1971. But if the surface installations were dismantled, by-products from the distillation of coal and gas purification were themselves not always eliminated in their entirety (confined in tanks, absorbed by soil,...).

In order to coordinate actions throughout the national territory, Gaz de France has identified and prioritized the 467 sites of old gas plants it manages, and has developed with the Ministry of Ecology and Sustainable Development, a Memorandum of Understanding. This MOU pertains to the control and monitoring of the rehabilitation of these ancient lands and was signed on April 25, 1996, for a period of 10 years.

The decision support system used by the protocol has been to rank sites according to their sensitivity towards the environment, including the use of the site, the vulnerability of groundwater and surface water, the presence and type of population on the site, etc. The application of this method, near the SRA (Simplify Risk Assessment), led to the establishment of 5 classes of decreasing priority of 1 to 5. However, in all cases, the protocol provides for a minimum a historical study, and location, emptying and filling of any tar tanks.

As another aspect of its policy on former industrial sites, Gaz de France systematically carries out an initial diagnosis prior to any sales transaction, cession or redevelopment of these sites (such actions equivalent to declare sites in Class 1 of Protocol) and a thorough diagnosis to quantify the volume of polluted soil and other waste to be treated, depending on planned future uses of the site.

Also in 2001, in order to homogenize throughout the territory the rehabilitation of sites, and to accompany the implementation of the protocol, Gaz de France conducted a study called "semi-generic" which was also a second decision support tool. This study was in accordance with the National Methodology for polluted sites and soils, which provides treatment of sites according to their future use and their impact on the environment. The study, conducted from experience, is in fact a DRA (detailed risk assessment) to specific sites of old gas plants identified within the MOU. It defines rehabilitation objectives for which the level of risk is acceptable given the intended use.

Five chemical substances produced during the manufacture of gas from coal and belonging to three separate families were taken into account as tracers for the study:

- Benzo (a) pyrene, fluoranthene and naphthalene belonging to PAHs (polycyclic aromatic hydrocarbons);
- Benzene, as part of the family of BTEX (benzene, toluene, ethylbenzene, xylenes), present in the tar recovered after washing and chemical cleaning of gas;
- Ferric ferrocyanide from the materials used to purify the gas;

This semi-generic study was based on five criteria: health safety, organoleptic factors, the possible release of chemicals to groundwater, management of excavated land in case of sale of a site with unrestricted use, and techno-economic status. This multi-criteria analysis has thus the effect of adding safety margins to proposed rehabilitation objectives.

Thereafter, the Circular from the Ministry dated 12 April 2001 asked the Inspections of Classified Installations to rely on results of this study to decide about rehabilitation work on sites within the MOU.

The results of the implementation of the protocol and the use of these two decision support system are illustrated by the following features:

- all sites (467) have been investigated,
- 332 hectares of land have been rehabilitated for reuse in projects of urban planning,
- investigations and works led to the draining and filling of tanks from 270 sites and elimination of over 715 000 tons of waste,
- It was carried out checks and monitoring of groundwater for 268 sites. 93 sites are still subject to such action.

The year 2006 marks the end of the Protocol, and an output document was co-signed by the Minister of Ecology and Sustainable Development and Chairman of Gaz de France considering:

- compliance deadlines and commitments,
- the fact that it is not appropriate to initiate a new protocol approach,
- return to the common law, which means that Gaz de France will carry on with the environmental management of its former gas plant sites only in its capacity as landowner,

However, the Semi-Generic Study is always being used, as a decision support system, to determine the remediation objectives ensuring health compatibility with the planned use.

This new "health harmonized approach" is being updated to reflect changes in national policy on contaminated land and also in Toxicological Reference Value.

Robert Pentel, Head of Environment Department, Real Estate Management Division, GDF SUEZ
robert.pentel@gdfsuez.com

+33(1)47 54 73 59