

Assessment of the long term behaviour of hazardous waste stabilised with hydraulic binders

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In 1992 a regulation was written in France for hazardous waste landfilling to modify limit levels of acceptance criteria. As far as hazardous waste are not complying these criteria based on short compliance leaching tests, they have to be treated before landfilling. Two deadlines were given for application of this new regulation : April 1995 for most of the waste (including municipal and industrial solid waste incineration fly ashes, waste from chemical and metallurgical industries,...) and April 1998 for the other waste (industrial liquid waste treatment sludges, ...).

Stabilisation and solidification processes have been developed by INERTEC, a SITA group subsidiary, to meet these new requirements : they are based on hydraulic binders and other chemical reagents in order to solidify the waste and to reduce pollutant leachability down to fixed limit levels. These processes have been used at industrial scale since 1995.

The management of hazardous waste is widely covered in new European regulation which set the concept of sustainable development. The sustainable development can be achieved by promoting recycling and energy recovery on one hand and by controlling environmental impact with an adapted management of treatment on the other hand. A new waste management methodology is also now under development in several European countries as the new EC Directive (1999) is introducing waste pre-treatment before landfilling and defining limit values to be reached after short leaching compliance tests : this new regulation is aiming at reducing environmental hazards.

In order to comply with the concept of sustainable development, the long term behaviour of these stabilised waste should be assessed.

The long term behaviour of such stabilised waste has been studied within the Research and Development Department of SITA and INERTEC subsidiary at three different scales : laboratory, on-site tests and pilot landfill.

Following ENV 12920 European Standard, several testing conditions at lab and pilot scale have been studied, completed by numerical modelling, in order to be able to predict leaching behaviour on a long term scale :

- Definition of storage conditions : stabilised waste mainly exposed to water, as potential pollutant conveyor,
- Stabilized waste characterisation : pollutant content, physical and mechanical properties of different stabilised waste,
- Leaching behaviour in different conditions :
 - at lab scale (pH influence, leaching with different water ratio up to limit conditions close to zero on monolithic and/or crushed sample at different time and ageing scale),
 - at pilot scale (exposure to rain water, solubility controlled conditions, water renewal). A pilot landfill in operation, the CERED located in Vernon (France), is monitored accurately for leachate quality, structure behaviour of stabilised waste blocks, groundwater and run off water quality since 1996, in order to provide real scale data.
- Modelisation/interpretation step : in order to be able to define a source term that could be transferred to environment for impact assessment (step in progress now).

The conclusion of all these experiments will be presented to point out the efficiency and limit of these stabilisation processes. In the same time, the analysis of the results could lead to a best understanding of the mechanisms of pollutant release for these kind of matrix.