

GROUNDWATER PROTECTION AROUND LANDFILLS: FROM EU REGULATION TO SITE-SPECIFIC ACTION PLANS

E. BIETLOT*, V.LEBRUN**, C.COLLART*

* *Institut Scientifique de Service Public (ISSeP), Liège (Belgium)*

** *Service Public de Wallonie, DGARNE - Groundwater Direction, Namur (Belgium)*

Directive 1999/31/EC^[1], Annex III, section 4, gives recommendations about control and monitoring procedures to be followed by every landfill operator in the EU to ensure groundwater protection. As mentioned in Articles 12 and 13 of this Directive, "significant adverse environmental effects" should lead to "corrective measures". Regarding groundwater, "trigger levels", representative of a "significant change in water quality", must be set "taking account of the specific hydrogeological formations in the location of the landfill and groundwater quality". Transposition of EU Directive onto regional legislation has been implemented in two steps:

- In 2003, the sectoral conditions formalized the groundwater monitoring system, consisting in analyzing a set of defined parameters in a relevant selection of wells and on a bi-annual basis^[2]. However, this law did not set any trigger levels as provided by the Directive.
- In 2010, the groundwater protection chapter of the text have been deeply modified^[3] namely to define the set of parameters to be periodically controlled and to introduce first-order threshold levels, called "vigilance values"^[4]. The selection of parameters to be controlled and the choice of vigilance values have been driven by a wide-scale environmental monitoring program established by the Walloon ministry in 1999^[5]. Vigilance values take also into account the natural geochemical background computed from the regional groundwater database built according to 2000/60/CE Water Framework Directive^[6]. The setting of threshold values is important insofar it allows the competent authorities (Environmental Policy) to dispose of a repressive tool: the exceeding of a vigilance value, accompanied by an exceeding of 3 times the upstream concentration, triggers a sustained control. In case of confirmation of an endogeneic and persistent contamination of groundwater, the operator is obliged to proceed with the implementation of an intervention and protection plan for groundwater. In the case of old ("historical") pollution, it is assumed that corrective measures should be taken if and only if it is still "active" (non stabilized situation), causing a HHE risk. In case of "new" contamination, the landfill operator has to undertake a detailed risk assessment, at a local scale, with the objective of setting trigger values beyond which corrective measures must be taken.

After a seven-years follow-up, several changes have come about through the protection plans which led to modifications of particular conditions of landfill permits. These site-specific plans take into account local hydrogeological particularities and historical specificities of each landfill site. Relying on big sets of analytical results acquired during the last decade, adapted monitoring networks are implemented, including compliance and exposition points definition. For each of these particular points, the protection plan provides the selection of relevant parameters to be analysed and a sampling frequency. By use of reverse hydrogeological modelling, based on quality criteria to be maintained at every target points, trigger values can be set on a selection of key parameters.

A particularly comprehensive and well-constructed plan has recently been implemented on the Tenneville Landfill in the province of Belgian Luxembourg^[7]. The Tenneville site has been first operated as a treatment unit of MSW between 1979 and 2006 after which it was rehabilitated (old dumpsite). Then, a new landfill area has

been built in 2006 according to the 2003 landfill regulation. This landfill site is monitored in the framework of a MSW landfill monitoring network established by the Walloon Government and managed by ISSeP since 1998^[8]. ISSeP periodically organizes monitoring campaigns on landfill emissions (leachate, biogas) and their impact on receptors. Based on the ISSeP controls and owners compulsory monitoring campaigns, ISSeP concluded in 2012 in an endogenous and persistent groundwater contamination resulting in exceedances of vigilance values in some wells downstream of the former dumping area. This triggered the implementation of the groundwater intervention and protecting plan. According to the 2010 legislation, this study has been carried out by an expert within the meaning of the Walloon Soil Decree^[9]. Additional field investigations (new wells and sampling campaigns) were carried out in order to delineate contamination plumes in groundwater, but also to provide additional useful information for the risk assessment. Retromodelling led the expert to propose particular vigilance values and trigger values in groundwater, for a relevant selection of monitoring wells and parameters. While the concentrations are below these thresholds, the risks associated to each identified receptor remain acceptable. If not, the owner will have to actively intervene according to the defined corrective measures that have been validated within the intervention and protection plan. Figure 1 shows the decision-making flowchart established under this protection plan on the basis of the new monitoring program. A detailed explanation on the realization of the intervention and protection plan elaborated for the Tenneville site will be given in the full paper.

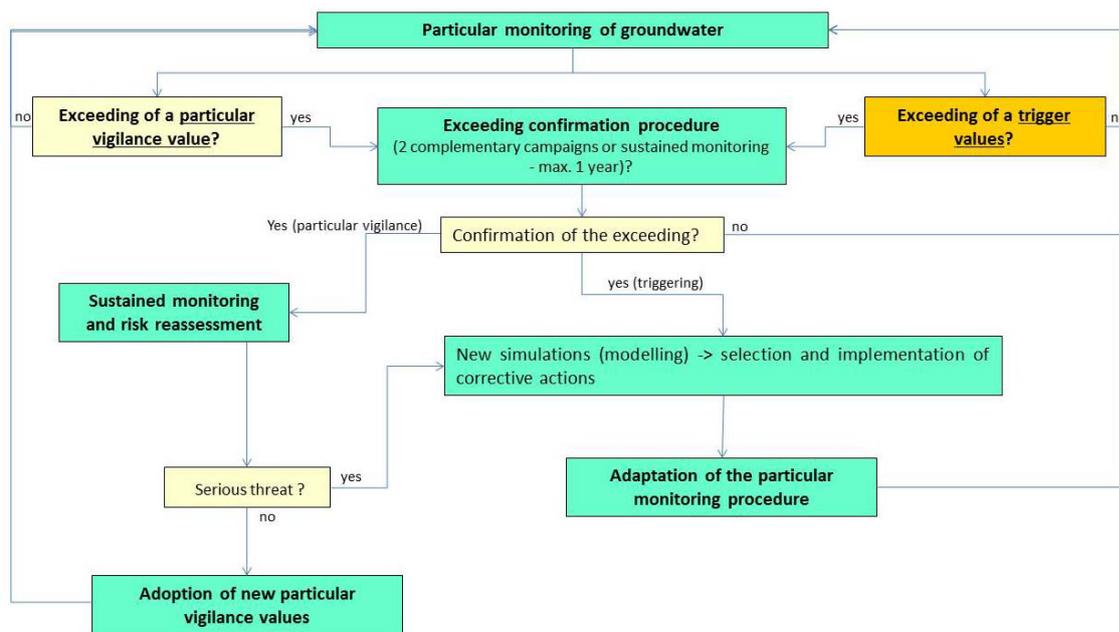


Figure 1 : Intervervention and Protection Plan in Tenneville : Decision-making flowchart.

References

- [1] European Commission (1999): Council Directive 1999/31/EC on the landfill of waste, Official Journal of European Commission (O.J.E.C.), L 182 of 16.07.1999, 26 pp.
- [2] Région Wallonne (2003): AGW du 27 février 2003 portant conditions sectorielles d'exploitation des centres d'enfouissement technique, Moniteur Belge 13/03/2003, p 12169-12188.
- [3] Région Wallonne (2010): Arrêté du Gouvernement wallon du 7 octobre 2010 modifiant l'Arrêté du Gouvernement wallon du 27 février 2003 portant conditions sectorielles d'exploitation des centres d'enfouissement technique, Moniteur Belge 23/11/2010, p 72224-72264.
- [4] Lebrun V.; Delloye F.; Bietlot E.; le Bussy O.; Collart C. (2011). Landfill of waste in Wallonia: transposition of 1999/31/EC groundwater protection plan and trigger levels based on long term monitoring results. Proceeding Sardinia 2011, S. Margherita di Pula, Sardinia, Italy.
- [5] Bietlot E., Lebrun V., Collart C. (2011). Environmental monitoring on municipal solid waste landfills in Wallonia: overview on 10 years of field measurements. Proceedings Sardinia 11, S. Margherita di Pula, Sardinia, Italy.
- [6] European Commission (2000): Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy, Official Journal of European Commission (O.J.E.C.), L 327 of 12.22.2000, 72 pp.
- [7] Jodocy V (2016): Centre d'enfouissement technique de Tenneville, Elaboration d'un plan interne d'intervention et de protection des eaux souterraines (PIIPES), Expertise of SGS for the landfill operator (AIVE), 240 PP.
- [8] Service Public de Wallonie: Website of the monitoring network of MSW landfills in Wallonia (in French) ; <http://environnement.wallonie.be/data/dechets/cet/>
- [9] Service Public de Wallonie (2008): Décret relatif à la gestion des sols, 5 Décembre 2008, Moniteur Belge 18/02/2009 - add. 06/03/2009, p 14852-14868.