

# **009 Landfill Final Treatment: "Fast and Cheap Remedial Design"**

September 1999

## **Summary**

In the fall of 1992 the Environmental Protection Agency met with the citizens of Brunswick, Georgia and stated these facts from the Remedial Investigation:

- toxaphene is a health concern at the 009 landfill,
- toxaphene migration through surface runoff and groundwater can occur,
- toxaphene was offsite on school property and in the neighborhood.

The EPA then proceeded to describe the results of the Feasibility Study:

- removal and incineration were impractical,
- toxaphene was too dangerous to excavate,
- in situ stabilization and capping were the best alternatives.

There would be studies to determine the depth of toxaphene migration in soils contacting groundwater, and studies would determine the best conditions for immobilization and capping.

A backup plan was also included. In case the experimental in situ plan was not feasible, the toxaphene would be extracted chemically and only clean dirt left behind.

An extensive onsite and offsite study was performed. Offsite areas were cleaned up and consolidated onsite. A study was conducted and the results suggested in situ should work. At that point though, the thorough cleanup promised the community was derailed and a plan put in place that was much less than promised. As result, there are no assurances that this site is completely stable for the decades originally promised.

## **Overview**

Toxaphene is highly toxic to every species tested from microbes, to water bugs, to insects, to fish, to dogs, to humans. These toxic effects range from poison, to mutation, to tumors. There is no doubt of this, and the effects are felt even when toxaphene is diluted nearly a billion times.

Because of this, the EPA originally called for all toxaphene to be handled underground to prevent

any exposure in the air. This did not occur, the site was excavated even though it was dangerous to do so. According to a study performed in 1995 by Hercules with EPA oversight, the treatment at the 009 landfill was to continue past the sludge to immobilize toxaphene already migrating into the groundwater beneath the site. Treatment documents indicate that this did not happen. According to EPA/Hercules, treatment encompassed all of the major sludge bands, however this appears doubtful as well.

Treatment efficiency can only be achieved if rainwater and groundwater cannot enter the treated cells. This is dependent on two things, monolithic solidification and a rain repellent cap.

## **Solidification**

There is doubt that monolithic solidification was used at the 009 site. In the original remediation plan, the site would be solidified using augers, pumped cement, and overlapping treatment techniques producing a single monolith by fusing treated cylinders. Based on the pictures, diagrams, visual description and records there is no overlapping of treatment cells to produce a monolith. An initial pit was excavated and the contents placed above ground. This hole was then filled with dirt from another freshly excavated area while concrete was mixed using a stirring device. This process was repeated using the freshly excavated hole. In order to be a true monolith, the equipment should fuse adjacent treated cells. There is no indication this occurred. Therefore, there will be cracks or gaps between each treatment cell that water may percolate through and continue to contaminate area soils. Further, individual blocks may settle independently, placing additional stress on the cap.

Technically the method used is a form of ex situ processing. There are methods of ex situ processing of excavated wastes that are enclosed and generate no aerosols. However, the method used actually created the most dust and toxaphene release possible for any treatment method considered. This was exactly the opposite treatment conditions promised by EPA/Hercules. EPA acknowledges repeatedly that this method of above ground mixing is not safe. The reason cited for the change: this method is less expensive and faster.

Depth of treatment is insufficient and much less than promised. There are three treatment dimensions: north to south length, east to west width, and the depth of treatment. The length and width treatments appear to be sufficient; however, the depth of treatment likely missed much of the eroded toxaphene. In March of 1995 EPA published reports showing the expected treatment depths. These charts were based on extensive studies and used the Record of Decision criteria of 76 parts per million as the cleanup target. EPA/Hercules ignored these charts when performing the cleanup, instead using an unscientific method of visual identification of sludge. A set of charts titled "Record Drawing of Completed Landfill Cross Sections" dated September 1999, were provided. Comparing the 1999 actual treatment with the 1995 actual toxaphene levels indicates that EPA/Hercules may have missed large amounts of toxaphene sludge during treatment. Both charts have a reference datum for "MSL" or Mean Sea Level. References to the ground level and depth of toxaphene are given as distances above MSL. For example, in cell 4, the 1995 chart of toxaphene levels shows four sludge bands at 22, 18, 12, and 9 feet above Mean Sea Level. However, the 1999 treatment chart shows that treatment stopped at 12 feet MSL, at the bottom of the third lowest band, thereby missing one entire sludge band (the 9 foot MSL band) shown on the 1995 chart ("raw" data collected during actual construction also show that toxaphene sludge was missed). Since EPA/Hercules did not perform the ROD-required soil testing, these charts and spreadsheets are all we have to use. Based on these, it appears that EPA/Hercules failed to treat

all of the sludge. Comparing other cells also reveals high levels of untreated toxaphene still present and in contact with groundwater.

## **Capping**

The original specification was for a solid thick clay cap. This type of cap is well known to provide waterproof tops for landfills. Instead a loose mixture of waste and cement was used. During a preclosure inspection the EPA told the Glynn Environmental Coalition the cap met "RCRA standards." RCRA- the Resource Conservation and Recovery Act- provides a variety of specifications for landfill linings and tops. The GEC was promised information for which RCRA standard was met by the cap. To date the information has not been provided. When the change was made an Explanation of Significant Differences (ESD) was issued stating field tests would prove the 3% cement cover was equivalent to the clay cap before it was used. However, the limited data given suggests the cement cap could be an order of magnitude less efficient than the original clay cap provided for by the ROD.

## **Drainage Ditch**

Finally, the Record of Decision clearly calls for treatment of the ditch adjacent to the site to prevent water influx from the bed of the ditch to the landfill cell. This has not occurred. The treatment runs very close to the eastern edge of the drainage ditch. During high water levels, water should migrate from the ditch to the treated cells. A culvert was to inhibit this weathering action. Plans were drawn up, but never implemented. These ROD criteria have not been fulfilled.

## **Conclusions**

A true "monolith" would be a single concrete sheet completely replacing the old sludge cells. If one stripped away the covering dirt this site would look from above like a patchwork-quilt of little cement globs, sitting on top of sludge and toxaphene contaminated soil.

At one other EPA site an in situ treatment is failing (Shattuck Chemical; Denver Colorado). In situ has been widely implemented in the last few years, but this is still an experimental treatment and not much is known about long-term stability. However, the Shattuck site is failing after only two years, apparently because it was under engineered for the local weather conditions.

There is an element of uncertainty in heavy construction over wide areas. No site can be perfectly level or the concrete perfectly mixed. But at 009 there were so many changes with so little thought or testing that the final treatment is inexact to the point where it is impossible to determine if the treatment is under engineered or not.

The final report card on this treatment gives EPA/Hercules an overall "D" grade. The offsite cleanup was fairly thorough, but only due to a civil lawsuit by the neighborhood and constant diligence by the School Board. Some offsite areas were poorly tested, particularly the transport route. So a "B" grade for offsite work is fair.

For onsite treatment it appears the EPA failed to provide a product that meets RCRA standards for the bottom and top, failed to prohibit water infiltration, failed to meet ROD goals for the drainage ditch, and, most importantly, failed to immobilize all of the sludge. It appears likely this

treatment could fail and allow significant water infiltration in less than a generation. All of these call for an "F" final grade for onsite treatment. So an overall "D" or "D-" seems fair.

Just as other communities are finding, this site is likely to continue to be a problem after EPA has "completed" its work. An outside review on the techniques and monitoring is surely called for at this poorly treated waste pile. The monitoring plan presently in place, in particular, requires outside review.

Written by R. Kevin Pegg, Ph.D.; edited by Dr. Mary S. Saunders. Copies of the report are available from the GEC, at the Glynn County library, or at [www.enviro-issues.net](http://www.enviro-issues.net) on the Internet.

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