

## **Severe Erosion Problems at West Valley Site**

The report found that erosion is a powerful and fast moving force at the West Valley site. West Valley sits on a geologically young landscape which is undergoing a relatively rapid rate of erosion. Within the next few hundred years, erosion is estimated to create damaging gullies. **This region could expect to have hundreds of new gullies form with erosion removing the plateau surface in the next few thousand years.** Wastes that would be left at the site are extremely long-lived and radioactive for thousands to millions of years. It is easy to imagine that if erosion is uncontrolled, gullies will penetrate a buried waste area.

### **Predicted Erosion Breaches Buried Waste Areas**

*Unless erosion and other institutional controls are rigorously maintained, we predict that the disposal areas could be breached in less than 1000 years and as quickly as 150 years from now without any controls in place.* This breach would be a catastrophic failure, leaking high concentrations of radioactive waste into the watershed and then quickly into Lake Erie. Since severe erosion problems are estimated to occur at the site within hundreds of years, clearly, the long-term disposal of buried waste at the site is not an environmentally sound approach. Currently, there is a large plume of contaminated groundwater moving towards Buttermilk Creek. However, even more worrisome for the downstream population and the priceless resource of the Great Lakes is the potential for streams near the site to undercut or expose buried wastes. The following is a summary of the erosion problems that were investigated in the report.

### **Estimated 500 Gullies in 10,000 Years**

There are approximately an estimated 64 gullies and streams per square mile in this region. Over the roughly 15,000 year period that this landscape has evolved, we estimate that the density of gullies doubles every 3,000 years. This region could expect to have over 500 new gullies, or stream splits, form in the next 10,000 years. It is easy to imagine that if erosion is uncontrolled, at least one of these gullies will penetrate a buried waste area. In fact, it will take far fewer than 500 gullies and far less time for the entire plateau surface to erode.

### **20 % of Plateau Surface Estimated to Erode in 10,000 Years**

Using a bench-scale (30 x 50 ft) experiment as a model for the evolution of the site landscape, we estimated that within 10,000 years, 20% of the plateau surfaces that are un-gullied today will have eroded away across the lower Buttermilk watershed. There are various reasons why this is a conservative rate. First, Buttermilk Creek tributary gullies drop more rapidly and over more waterfalls than in the bench-scale model which lead to faster erosion rates in reality. Deforestation and impervious surface runoff increase erosion rates, and we expect climate change to result in more severe storm events, when the most severe erosion occurs.

### **Erosion Will Create Damaging Gullies Within a Few Hundred Years**

A 1993 document concluded from 35 years of repetitive air photos that the head cut on Franks Creek advanced an average of 7.5 feet per year and on Erdman Brook advanced 10.5 feet per year. From these rates, we would expect that within several hundred years, this erosion will have opened new areas on the adjacent plateaus to damaging gullies. *At the rate of plateau-edge removal anticipated for Franks Creek, we*

*might anticipate a breach of the northeast edge of the state-licensed disposal area in less than 400 years due to side-cutting alone.* In addition, there are concerns about landslides and a Buttermilk side-slope retreat.

### **Worse Case Scenarios Result in Contaminated Public Water Supplies**

*Landslides, gullies, and stream cuts all put the West Valley site at high risk of erosional failure.* There is a significant probability that at some point in the future while the radioactive waste still poses a threat, controls will fail, or an unforeseen major storm and flooding will result in a serious failure. Erosion controls typically have short life spans of 10 to 25 years. Many of the erosion controls proposed have short design lives, raising the question: Can we count on a system design so sound and repairs made so frequently that the dangerous contaminated waste at the site is never released?

*There is a tremendous risk of erosion penetrating the buried wastes at the West Valley site.* A major concern with the Onsite Buried Waste cleanup option is the potential for waste to be released and impact water supplies. We looked at two worse case scenarios resulting in the leaching of contaminants into public water supplies.

**Scenario 1:** Expanding desiccation allows escape or exchange of trench water leachate into Erdman Brook or Franks Creek. Then contaminated liquid and sediment migrate to Buttermilk and Cattaraugus Creek stream bed and point bars, and are also taken up by the food chain. Lastly, a 10 or 100 year storm event flushes the system, including gullies and desiccation cracks. The timeframe could be less than a century.

**Scenario 2:** After centuries, trenches containing contaminated leachate are exposed by a landslide. This sudden exposure of the end of a trench will allow a release of fluid waste contents, in addition to the processes described in Scenario 1. Because of the need to have conditions that promote landslides, this scenario may occur in centuries.

*Preventing erosion and landslides at West Valley will be difficult, if not impossible, over the long term.* Over a period of years to decades, erosion controls can be ineffective under design conditions—and if the system maintenance is neglected, or if a rare extreme flood occurs, mechanisms can become ineffective quickly. For example, levees along rivers are not designed to allow floodwaters into towns, and yet this is a regular occurrence throughout the Midwest. *The probability that institutional controls, memory, and budgets will remain effectively in place throughout the next millennium is highly unlikely, and therefore we should be concerned about any plan to try to maintain critical control features if buried wastes remain at West Valley.*

(Excerpts from Section 6 of ***The Real Costs of Cleaning Up Nuclear Waste***)