Damage to the Liner

The Problem

High winds started on Friday, February 26, 1996, forcing a halt to all construction activities on the landfill. At the time we were in the process of installing geo-composite material and Barrier Protection Layer (BPL) on the geomembrane previously installed on the top of the landfill.

Since the wind exceeded 40mph at the base of the landfill no one was allowed to travel to the top where the wind was usually 10-15MPH higher and the potential for injury greater.

The high wind condition continued for the weekend and subsided by Monday March 1st On Monday afternoon the crew ventured back on the landfill to investigate the extent of the damage the weekend storm has caused to the liner. At the top of the landfill it was revealed that approximately 13:5 acres of lining on the top was damaged.

Of the damaged areas approximately 10 acres were completely missing as it had blown off the top and was at the base or in the surrounding water or park. The nature of the damage to the liner that was left on the top was stretching in areas and shrinking in others.

Damage

Based on the condition of the damaged areas two theories emerged as the main cause of the damage: wind or fire.

The idea of a fire would seem to be remote at best, as conditions on the top of the landfill at that time would not be conducive to a fire. On the one hand, the conditions of high winds with little or no gas accumulation would make a fire unlikely. On the other hand, there could have been accumulation of landfill gas below the liner in the gas collection layer. This landfill gas could have been directed upward and accumulated below the liner on the landfill “plateau”. However the shrinking and fusing of large portions of the line gave credence to the theory.

The second and more plausible theory is that of extensive wind damage. It is possible that the high winds at the top of the landfill reached over 70mph and caused excessive stretching of the liner. As the liner broke and flapped in the wind it stretched and then fused as it lost its elasticity.

Neither theory was extensively researched and the focus soon returned to repairing the damaged areas and the closure of the landfill.

The contractor made a claim to his insurance company and the insurance company of the liner installation subcontractors. A settlement was reached by all parties and the liner replacement started.

Replacing the Damaged Liner

Extensive testing on the liner that remained was conducted to set the limits of the damaged areas. Portions of the liner were removed and tested on site and samples were sent to the lab for conformation. All the liner that exhibited any result that did not meet the requirement of the contract was removed and new liner was installed.

Appendix B-6 and B-7 shows the QC testing results

New liner was installed in the spring and the liner was completed by the summer of 1996.

Section 6.5 Landscaping

In the fall of 1995 the contractor started to stock pile topsoil at the base of the landfill in anticipation of spreading the soil during the winter and start the final planting in the spring of 1996.

The contracts called for spreading 6"of topsoil over 2 feet of barrier protection layer and landscaping the soil with a design seed mix of prairie grass and other wild grasses. The seed mix was specially designed for the landfill and was purchased and stored at a seed depot.

Topsoil

The contractor investigated and submitted various sources that were going to be used proposed to provide the quantity and quality of topsoil to be used on the landfill. However due to the large volume and the quality required, the required material could not be obtained naturally and would have to be manufactured from soil and compost.

Soil delivery:
The contract required the topsoil testing @ 1 sample per source. As the possible sources increased and quality of the material decreased additional soil testing was required. A change order was issued to the contractor for additional testing at the source and at the site.

After soil testing at the various processing sites two subcontractors were eventually approved to deliver material to the site for use as topsoil. The two approved subcontractors delivered approximately 20,000 cubic yards of topsoil that was stockpiled at the base of the landfill. The material was tested at the source and at the landfill and the data in the resulting test report was in compliance with the contract and was submitted to the New York City DEP.

Soil Spreading and planting
Spreading of the topsoil started on the east side of the landfill in February of 1996. Starting on the lower level of the landfill 6" of topsoil was spread by bulldozers. After approximately 30 acres were covered with topsoil the area was hydro-seeded with the design seed mix and a rye grass seed mix.

Landscaping
The hydro-seeding operation consists of mixing the specified prairie seed with a rye grass and sheep fescue seeds, water and green coagulant indicator. The rye grass and fescue was used as a quick germinating grass that would provide shade for the prairie seed during the initial germination period. During April and May of 1996 the lower area of the landfill was hydro-seeded with the mix and the area covered with straw mulch for shade and moisture retention.

Initial Growth
In June and July of 1996 the specified prairie grass or the rye grass did not germinate as expected. It was initially believed that this was due to the hot summer days in June and July and the seeds would germinate as the heat subsides. The soil and the seeded areas were inspected by personnel from the New York City Parks Department, the landscaper and Cornell Cooperation extension to ascertain the reason why the grass was not germinating as anticipated. The results from the testing and inspection showed no adverse conditions that would prevent the specified seed mix from growing.

By September 1996 the grass did not show any improvement and additional testing and consultations with Cornell and Parks Department, revealed that the pH was above the acceptable limit for the specified prairie grass mix.

Investigation
The DEP and DEC commissioned Rutgers University as an outside source to investigate the problem with the lack of growth in the area previous landscaped. The focus of the investigation was on soil source, seed stock and planting technique.

Additional investigation was conducted by the NYC IG, NYS DEC and the court appointed Special Referee Office to see if any malfeasance was involved.

Soil: After additional testing on landfill, at the source and in the stockpile, it was determined that the soil was of low quality and had a high pH which would prevent the grass from growing.
The investigators reviewed the test results from the contractors approved lab and found inaccuracies with the data and poor QA/AC for the lab. The lab was dismissed and a new lab was contracted to do all further soil testing.

Soil Source: One of the approved sources for the topsoil to the site manufactured the topsoil from a blend of compost and dirt and stockpiled the material next to a recycling area. The investigation revealed that the recycled material along with other unspecified material was added to the topsoil blend as a bulking agent. These material consisting of wood, crushed concrete, glass and other crushed material.

Seed Stock: Testing of the seed that was purchased and stored for use on the landfill revealed germination rates below normal. The germination rates for the stock material were less than the specified rate. New seeds would therefore be required.

Planting Technique: The planting schedule and technique of the subcontractor were reviewed and found to be substandard and a new sub-contractor was hired to complete the project.

The investigation by the NYC DEP IG and the Federal Special Referee revealed that there was no malfeasance by City or State employees and the problem was contractual

between Brecco the contractor and their sub-contractors for the soil, seed and landscaping.

New Landscaping

The result of the investigation resulted in new techniques for planting and a new protocol for soil testing and delivery to the site.

The recommendation of the investigation was:

(1) The existing soil at the site both topsoil and the soil for the barrier protection layer was to be treated with sulfur to reduce the pH

(2) The entire landfill (including the areas previous topsoiled) was to be covered with 6 inches of new topsoil.

(3) New seeds were to be used

(4) A new and more experienced landscaper was to be hired.

With a new testing protocol featuring additional soil testing and more frequent site visits, new topsoil was manufactured and delivered to the site.

Sulfur was added to the existing soil and mixed to lower the pH of the existing soil. After mixing and testing the pH of the soil was lowered and the new topsoil was spread over the existing soil.

During the spring and fall of 1999 the landfill was landscaped using new soil, new seed and a new landscaper.

The new soil was hydroseeded and straw mulch was used to cover the seeds for protection from the sun and also as a moisture retention barrier.

Growth on the landfill was established by the summer of 2000 and deemed to be successful by the spring of 2001.