

Daily Cover Challenges and Solutions at Puente Hills Landfill

Mark Cadwallader, M.S., CTS, Conroe, Texas, USA

Abstract

Time constraints in working with daily cover have been among the main concerns at Puente Hills. The landfill serving Los Angeles County California was one of the world's largest, and has until recently received up to a maximum allowable daily limit of 13,200 tons (12,000 tonnes) of municipal solid waste a day. With that waste intake and being a "canyon fill", large and steep waste slopes of a total area of approximately 60,000 ft² (5,500 m²) with intermediate deck of approximately 40,000 ft² (3,750 m²) have often needed coverage by the end of each working day. Not only is quick coverage of a large area important at Puente Hills, but the daily cover for many of the waste slopes has been required to provide a prolonged period of coverage - of up to 4 weeks or more - because of large fill layers, long operational cycle and the unpredictable relocation of waste disposal area during the winter rainy season. The Districts evaluated many Alternative Daily Cover (ADC) materials against the cover challenge at Puente Hills Landfill and concluded that the EPI Environmental Products' Extended Enviro™ Cover (EEC), a somewhat longer lasting non-reusable plastic film, with the company's Model 800 self-propelled Deployer best suited their needs. The landfill's experience and refinement of their daily cover requirements over the last decade is described in this case study.

Introduction

Located in Whittier California, USA and owned by the Sanitation Districts of Los Angeles County (The Districts), Puente Hills Landfill is a major part of the long-term integrated waste management system of Los Angeles County. The landfill has been in existence since 1957 and occupies an area of approximately 1,365 acres (522 hectares), in which 410 acres (166 hectares) have been used as solid waste fill area. Puente Hills Landfill until recently was receiving an average of 13,200 tons per day (10,900 tonnes) from around 1,500 trucks of municipal solid waste a day between the hours of 6 a.m. and 5 p.m. for six days a week. It has regularly provided one-third of the disposal capacity for Los Angeles County, serving a total population of about 5.3 million people in 78 cities and unincorporated territories in the county.

The Districts have long set out to create a technologically advanced landfill at Puente Hills and have incorporated many environmentally safe, innovative and state-of-the-art systems including landfill gas recovery, covering and compacting refuse, ground water protection, dust and litter control, visual appearance and screening of unacceptable wastes and water conservation. The Districts have the largest landfill gas recovery and electrical generation facility in the world, supplying electricity for the equivalent of 100,000 homes. Indeed, the landfill has earned a reputation as one of the most advanced disposal facilities in the world.

The Districts' experience with daily cover has been innovative and noteworthy as well. Though having considerable access to dirt brought in by their customers and processing green waste for daily cover,

Puente Hills found it advantageous to use other ADC's in their management and control of waste disposal.



Figure 1 - Puente Hills Landfill, one of the world's largest landfills, is using Extended Enviro™ Cover in its operation

Alternative Daily Cover Challenges

At Puente Hills peak truck traffic and operation occurs in the morning, with massive numbers of waste disposal trucks discharging their waste. After peak operation, most of the active working face area is covered and only a small portion of the area is open for the remaining disposal operation until site closure at 5 pm. As a result, large waste slopes of a total area of approximately 60,000 ft² (5,500 m²) and intermediate deck of a total area of approximately 40,000 ft² (3,750 m²) need to get covered daily in a short amount of time.

Puente Hills is fortunate to receive a considerable quantity of dirt suitable for daily cover and is not constrained in its scheduled operating life by air space limitations. However, permits require use of ADC's.

At Puente Hills what mattered for daily cover operation during inclement weather was time and efficiency in the application of the daily cover product. The manipulation of earthen cover and/or processed green waste, particularly in rainy conditions, could be slow and problematic and here is where their testing and comparison of ADC's led them to the non-reusable film coverage approach, using a self-propelled track-mounted film and film-ballast "deployer".

The Districts evaluated many alternative daily cover materials against the prolonged cover requirement. Spray-on slurries had a very limited life expectancy of only a couple of days in addition to visual concerns. Re-usable tarps were too expensive to be used for a prolonged period in the progressive fill program at Puente Hills, where the current “working face” rotated through several locations over a wide area. Furthermore, the removal of tarps at the start of each operating day would create an unacceptable workload to the Districts when a large number of waste disposal trucks were lining up at the gate for waste disposal in the morning.

Green waste is processed on site at Puente Hills and utilized as an alternative daily cover. Scrapers are typically used to import the processed green waste from the green waste receiving area to the day’s active working face. During inclement weather, however, green waste tonnage typically decreases, thereby reducing the availability of this alternative daily cover source and site conditions make it difficult for scrapers to transport the green waste to the active working face.



Figure 2 - The EPI Model 800 Deployer at Puente Hills, a track mounted self-propelled film and ballast deploying device with excellent capability for efficient movement and coverage.

Jason Ching, site engineer for Puente Hills, has been working with technology developments there for many years. He said regarding the Enviro™ Cover film and deployer system, “We like its use in inclement weather conditions because it provides our operation an effective and cost-efficient means of covering the active working face.”

Indeed, the needs for cost reduction and expedited coverage have supplemented the traditional air space savings and water-shedding benefits of the Enviro™ Cover technology at Puente Hills. Instead of needing to use multiple earth movers - including scrapers, dozers and cover soil compactors - with

related personnel, diesel fuel and maintenance costs, the landfill can cut operational expenses and still meet US EPA requirements.

EPI has successfully worked with the Districts to develop a product that not only meets their efficiency requirements for alternative daily cover, but also meets the variable daily cover exposure durations at the Puente Hills Landfill.

At the Puente Hills Landfill, it's not good enough to just cover the face for a day. The daily cover would often have to be reliable and cost effective as deployed for multiple days and even weeks – over steep slopes as well. Most ADC's are simply too expensive for such an approach (as with removable tarps) or do not hold up for longer term exposure (as with foams and slurries). The slopes adjacent to the working face are not necessarily covered with waste the following day and can remain exposed until the operation cycle returns to that area, which might be up to 4 weeks or more. Therefore, these adjacent slopes require a cover that provides a prolonged period of coverage, but unlike the intermediate decks, do not require a firm structural cover.

Apart from the operation cycle, there are other situations where prolonged coverage of refuse slopes is required. On wet days in winter the conditions of wet soil cover on top of the intermediate deck inhibits the movement of on-site traffic. The waste disposal operation has to be relocated to a "winter deck" area, where the deck is covered with recycled asphalt grindings and ash to support the heavy trucks. The disposal operation would continue on the winter deck until the intermediate deck in the main working face has dried up. That is typically several days after the rain has stopped. Since the relocation of the waste disposal to the winter deck is unpredictable due to uncertainty in the weather, the daily cover material on the winter deck working face has to be able to remain intact for a prolonged period of time.

The prolonged coverage period at Puente Hills Landfill on the side slopes for the occasions described above presented a new challenge to the alternative daily cover industry, to provide products that could satisfy these conditions.

Selection of Alternative Daily Covers

The Districts worked with several different ADC's as it tried to come up with cost effective and efficient methods for regularly covering the daily waste volumes. The Enviro™ Cover System was part of its program of testing and selection. A polyethylene film alternative daily cover that does not require removal and can be buried along with the waste, Enviro™ Cover comes in a selection of grades for different covering purposes. Since Daily Enviro™ Covers (DEC) are designed with a coverage period ranging from a day to about one week for conventional daily covering applications and Intermediate Enviro™ Covers (IEC) are designed for several months and more, a progressive daily cover (Extended Enviro™ Cover - EEC), was specifically developed for The Districts to meet their 4 week coverage requirements.

The Districts also found that the new Model 800 Deployer brings an easy-to-operate and cost-effective dimension to the Enviro™ Cover System. The deployer unrolls the film and secures it to the working face with continuous lines of mounded ballast material (usually soil) released behind the deployer onto the unrolled film in such a way that the film panels are sealed by the ballast soil. The soil presses the top overlapped film panel against the outside edge of the ballast soil on the film panel below (see Figures 3 and 4 on next page).

Sealed in this way the Enviro™ Cover System provides a surface barrier which sheds around 98% of rainfall over its coverage area, providing tremendous leachate treatment cost savings when left in place for interim periods and graded to drain as appropriate.

Extended Enviro Cover (EEC) and Intermediate Enviro Cover (IEC) Cross Section

Compression Overlap 20%

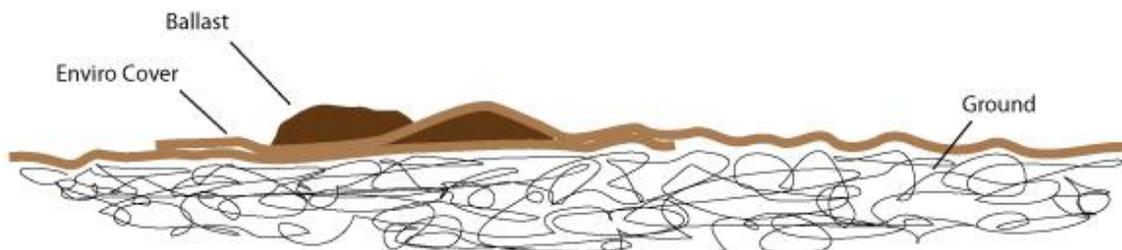


Figure 3 – Cross-section of overlapped film edges with ballasted mounds adjacent to each other in such a way as to provide an effective edge seal.



Figure 4 – Photo of Model 800 Deployer with focus on ballast placement.

Some comments made from Puente Hill's personnel and unit operators about the Model 800:

“And with the track-loaded self-propelled vehicle, time to deploy has been cut in half.”

“The guys like running it because it’s fast.”

“The thing can go almost anywhere and is easy to drive with 2 sticks. It’s awesome!”

“At one time we were using several scrapers, dozers and compactors just to cover our work face with soil every day. A scraper can use up a lot of diesel in an hour – using the Model 800 instead equals quite a substantial amount of savings just in fuel costs!”

Indeed, the advantages of the Model 800 Deployer, variable life films and method of placement, though perfected for the needs of Puente Hills, offer attractive benefits for many landfill operations.

Non-reusable Daily Cover

Like all EPI’s Enviro™ Covers, Progressive Enviro™ Cover (PDC), otherwise known as Extended Enviro™ Cover (EEC), is a geosynthetic alternative daily cover which does not require removal after its use. It is mechanically destroyed by subsequent placement of waste and by stress conditions within the landfill, and therefore not impeding the movement of leachate and gas..

Progressive Enviro™ Cover (PDC) is specially designed and engineered with high tensile strength, extreme elongation performance, and tear resistance. Its elongation of over 5 to 6 times its original length enables PDC to stretch over irregular waste surfaces. PDC has an extended coverage period from a few weeks to a month or more, while complying with mandated daily cover requirements. The 2.0 mil (51 micron) Progressive Enviro™ Cover developed for Puente Hills Landfill has a targeted coverage period of 5 weeks.

Evaluation and Conclusion

The Districts have sought to find a cost-effective alternative cover material that meets the variable covering requirements at Puente Hills Landfill – and to do so with efficiency while providing improved operation in wet conditions. They sought to comply with regulatory requirements for controlling disease vectors, odors, litter control, and scavenging – for up to 4 weeks at a time. With the Enviro™ Cover System perfected for Puente Hills, this has come to pass.

They needed a daily cover that would provide the barrier action yet would not interfere with waste decomposition, nor intercept fluid movement (landfill gas) within the landfill.

Non-reusable plastic film with an effective coverage method has provided these needed functions – giving excellent barrier performance at the surface cover location when initially deployed and is mechanically destroyed by subsequent placement of waste and by stress conditions within the landfill.