

Weston Solutions' \$7.5M Elmendorf AFB Landfill Cap Construction Project Nears Completion

▶ BACKGROUND

The former landfill on Elmendorf Air Force Base was last permitted for municipal solid waste acceptance in 1992. The waste cell closure areas cover approximately 59 acres; including transition areas the site encompasses approximately 70 acres. The landfill is bordered by a section of the Alaska Railroad and lies between the north-south runway and a Base housing development. The Alaska Department of Environmental Conservation (ADEC) Solid Waste Regulation requires landfills to receive a final cover system as part of site closure. Under ADEC regulations, a low-permeability soil cap (e.g., compacted-clay) or an alternative approved cover system is required. A closure plan was established in 1996 for this landfill assuming a compacted-clay cap; however, in 2003 the final cover system was redesigned for an alternative cover system.



▶ INNOVATION AT WORK

In 2004, ADEC approved the use of an alternative cover system for the Elmendorf landfill. The system approved was an evapotranspiration (ET) cover, which uses the natural moisture uptake by living plant material to mitigate water infiltration into landfilled materials (the compacted-clay cap routes water off the cover). Although ET technology has a proven track record in the Lower 48 through various EPA studies, this alternative treed cover system is the first publicly-documented in Alaska.

Why an ET cover?

- **Lower maintenance costs:** With a natural vegetative cover, maintenance efforts are considerably reduced when compared with efforts required by a compacted-clay cap, suggesting the technology might be particularly beneficial for rural landfill sites, where annual maintenance may be cost-prohibitive;
- **An end product that is less attractive to geese:** A treed cover is less likely to attract geese in an area where there is concern over Bird Airstrike Hazard (BASH) risk. A compacted-clay cap is vegetated with grass which would be problematic with the landfill's proximity to the north-south runway on Elmendorf; and
- **Increased habitat for moose:** Elmendorf is required to have an equivalent amount of moose habitat to be added whenever habitat is destroyed. The habitat to be created would be used to offset removed habitat as part of housing construction in a joint effort between Elmendorf AFB and adjacent Ft. Richardson.
- **Establishment of a sound and visual barrier between new Base housing and the active Runway.**



Construction of the cover required approximately 195,000 cubic yards (CY) of material (soil and concrete debris) to be brought into the site to complete restoration of the former gravel pit and waste cell area prior to ET cover soil placement. Additionally, approximately 242,000 CY of various topsoils were required for use as the surface material for planting.

WESTON Provides Solutions

Many hurdles were overcome to complete the cover installation construction. For example, for ADEC acceptance of the final landfill cover, the effectiveness of the alternative cover system had to be proven to provide an equivalent reduction in infiltration to that of a low-permeability soil cap. As such, WESTON is coordinating with the University of Alaska Anchorage (UAA) to provide a third-party pilot study to verify the effectiveness of the cover system. In addition, the response to new or changed conditions required that many significant changes be managed as part of this lump sum construction project. Value engineering ideas were incorporated to avoid overall project cost increases and to mitigate project change cost impacts.

▶ CHANGE MANAGEMENT

The originally-specified well-and-pump watering system required deep wells to access the lower aquifer, avoiding the potentially-contaminated upper aquifer. On the advice of expert botanists, WESTON installed a lower-cost irrigation system which included connection to a fire hydrant near the site. The irrigation system uses water from Fort Richardson during low-demand hours, avoiding the upper aquifer water source.

The landfill's footprint in provided drawings encompassed approximately 55 acres. During drainage channel construction, WESTON encountered municipal solid waste and used surface geophysics to determine the size and configuration of the additional waste cell area. This temporarily halted work on the drainage channel and increased the landfill's closure size considerably. The original source for ET cover material was also no longer available. WESTON was able to procure the needed cover material from other nearby construction sites. These efforts were completed with no change orders and at no additional cost to the project, due to savings realized through project-associated value engineering.

Originally, WESTON planned to use rooted saplings to provide the tree cover for the ET cover vegetation. The ET cover vegetation included 40% balsam poplar, 40% cottonwood, 10% willow, and 10% quaking aspen (a design species mix under patent with Ecolotree). After consulting with local experts, UAA, and Colorado State University (CSU), WESTON chose to use cuttings to provide the tree cover at the landfill (aspen vegetation still required the use of saplings to ensure good survivability). These cuttings have a 90 percent survival rate when provided irrigation during their first growing season. This cost savings funded the other cost increases discussed elsewhere.

At the request of Elmendorf Air Force Base personnel, WESTON changed the mix of tree species planted in the transition areas between the waste cells (areas designated as moose browse). As the transition areas are to be occasionally hydro-axed to improve moose browse, there was strong interest in creating an improved moose habitat. Since the cover over the transition areas does not need to function at same the level as that over the waste cells, the addition of birch to the planned species (and removal of cottonwood and poplar) presented no performance concerns for the cap while adding the benefit of a superior habitat for the moose.

▶ RECIPE FOR SUCCESS – WESTON BUILDS TEAMS

Without the integrated efforts of numerous state, local and federal entities, the third-party pilot study and ET cover installation project could not have succeeded. One of the reasons for selecting WESTON for this project was their proven ability to integrate complex teams. WESTON brought together a complex and diverse team to accomplish the simultaneous. The primary project team members included: 3CES/CEVQ, Elmendorf AFB; Privatization Flight, USAF; ADEC; UAA; CSU; and WESTON.

In addition, numerous firms were employed to perform construction, including subcontractors for: earthwork, geophysical investigation, testing, survey, vegetation/irrigation, fencing, electrical/communication, and instrumentation.



▶ WHERE ARE WE TODAY

The last of the ET cover soils for the full-scale cover are expected to be placed in late fall 2006. In 2005, the first 24 acres of ET cover vegetation was planted. Planting efforts will continue through 2007 for the roughly 70 acre site. Final planting will include the installation of approximately 169,400 trees (cuttings and saplings). To date there have been 48-acres of the 70-acre site planted. The vegetation is thriving.

In addition, based on data collected since mid-2005, the ET cover system appears to be allowing slightly less percolation through the cover than the compacted-clay cap. Instrumentation will be installed in fall 2006/spring 2007 in the full-scale cover to provide necessary data to correlate the full-scale cover with the lysimeter study.

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