Closed Landfill Cover Space Reuse: Park, Golf Course or a Tomb?[1]

G. Fred Lee, Ph.D., P.E., D.E.E. and Anne Jones-Lee, Ph.D.

G. Fred Lee & Associates
El Macero, CA 95618
https://www.gfredlee.com

Typically today at a proposed landfill siting hearing before administrative bodies, landfill applicants will claim that after closure of the landfill (cessation of acceptance of waste) the landfill area will be converted into a public park, golf course or some other amenity for desirable public use. Such claims are often supported by statements about how a particular landfill that was closed some years ago was converted to a desirable beneficial use. While a number of classical sanitary landfills have been converted to shopping centers, golf courses, parks, airports, etc., this use has often encountered significant problems that detract from the utility of the use. Problems associated with differential rates of settling of the waste, landfill gas emissions, etc. make the reuse of the classical sanitary landfill space difficult. While it can be done, often severe problems develop that unless highly aggressive, fairly expensive maintenance is practiced, the use of the areas will be impaired.

The US EPA as part of implementing Subtitle D requirements for RCRA adopted the "dry tomb" landfilling approach in October 1991. As of October 1993 all municipal landfills in the US are to be of the "dry tomb" type. This type of landfill involves placing plastic sheeting (flexible membrane liners) and compacted soil - clay layers around the garbage - MSW to try to create a "tomb" that is dry. The basic premise is that if the wastes can be kept dry, no leachate will be generated and therefore, the groundwater pollution problems associated with the classical sanitary landfill will be avoided.

Since it was recognized that it will be virtually impossible with conventional approaches using plastic sheeting and/or compacted soil cover layers to prevent moisture from entering the landfill and developing leachate, the "dry tomb"-type landfills involve a leachate collection and removal system which is based on the plastic sheeting layer within the landfill liner. The ability of a leachate collection and removal system depends on the integrity of the plastic sheeting and intimate contact with a compacted soil - clay layer underlying the plastic sheeting.

The waste in a municipal solid waste "dry tomb" landfill will be a threat to groundwater quality forever; the 30-year required post-closure maintenance and monitoring period is an infinitesimally small part of the time that Subtitle D "dry tomb" landfills will be a threat to groundwater quality. Contrary to statements often made, this threat does not significantly diminish with time. In fact, with the deterioration of the plastic sheeting liner, the threat increases. Ultimately the leachate collection and removal systems will not function effectively to prevent leachate generated in the landfill arising from moisture entering the wastes through the cover from passing through the liner system and polluting the groundwaters in the vicinity of the

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[1] Reference as:
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landfill, rendering them unusable for domestic water supply purposes. This situation causes many who understand the properties of municipal solid waste landfills to conclude that the US EPA made a significant error in adopting the "dry tomb" landfilling approach since, at best, it only postpones when groundwater pollution occurs; it will not prevent it.

Because of the inevitable failure of the liner and associated leachate collection and removal system, and since it cannot be repaired without removing all the wastes, the key to the period of time over which a "dry tomb" landfill will protect groundwater resources is ultimately directly dependent on the integrity of the cover. If the cover is maintained in a high state of repair, then the amount of leachate that is generated within a landfill will be significantly reduced compared to covers whose integrity is not maintained.

There are a wide variety of factors that can influence the integrity of a landfill cover. One of the areas of concern is potential influence of plants, especially deep-rooted plants, to create channels through which water can pass through the cover to generate leachate in the waste. It is clear that any reuse of landfill surface area will have to involve shallow-rooted vegetation such as grasses if the problems of root penetration of the cover are to be controlled. Not only will grasses have to be planted, but they will have to be maintained in perpetuity. Other areas of concern in maintaining cover integrity include burrowing animals, waste differential settling-caused cracks in the cover, breaks in seals around pipes that penetrate the cover, etc.

While landfill applicants claim in permitting hearings that the integrity of the cover can be maintained by visual inspection and low-cost repair, the facts are that the low permeability layer which is the key to cover integrity is buried several feet below a topsoil layer and is therefore not available for visual inspection. The detection of the breach in cover integrity will typically be made by finding increased amounts of leachate generated in the landfill and/or detection of groundwater pollution by landfill leachate.

Similar situations exist where attempts are made to place low permeability covers on classical unlined sanitary landfills. The maintenance of the cover integrity will have to be aggressively pursued in perpetuity if further pollution of groundwaters by landfill leachate is to be minimized.

Rather than being able to construct a park-like setting or golf course on the landfill cover which would be watered, landscaped with trees, shrubbery, etc., the cover will have to be vigorously maintained for shallow-rooted grass culture. Further, periodically over the *ad infinitum* period that the cover will have to be maintained, the low permeability layer of the cover will have to be replaced. The "dry tomb" landfilling approach will require detailed constant attention to maintain the cover of the "tomb" in order to keep the amount of moisture which enters the landfill to a minimum. Failure to do so will ultimately mean that the site will become an MSW "Superfund" site and require very expensive clean-up of the groundwaters in the vicinity of the landfill.

It can be concluded that significant beneficial use of a landfill cover area for closed "dry tomb"-type landfills of the type being developed today is not very likely since any such use

would be in the direction of disrupting the integrity of the "tomb" cover which would lead to increased groundwater pollution by landfill leachate.

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