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Cost Comparison of Three Ex Situ Treatments of Perchlorate-Contaminated Soil

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A cost comparison was performed to determine the most cost-effective remediation strategy to treat approximately 84,705 cubic yards of perchlorate-contaminated soil via ex situ anaerobic degradation. The soils are to be excavated as part of the closure of open burn units as per the RCRA Part B for an industrial facility. The soils to be excavated consist of predominately silt and clay with variable amounts of sand in the area of the excavation. Previous investigations of the area indicated perchlorate concentrations as high as 1,473 mg/L. Three remedial options for the excavated soils were evaluated to determine the most cost-effective method to remediate the soil.

The first option being considered involves dividing the excavation into four large sections. Each of the four excavations will be used to create an anaerobic biocell to biologically treat the identified perchlorate contamination using indigenous anaerobic microorganisms. Each excavation will be lined with a water tight liner to create a biocell. After soil conditioning and the addition of substrate amendments the excavated soil will be returned to the in situ biocell. The installed liner is utilized to prevent the migration of the perchlorate through the biocell to the native soil and to retain the required moisture content. The excavated soils will be mixed with approximately 5-10 percent hardwood mulch and saturated with an approximate 1-2% solution of a liquid amendment capable of supporting the perchlorate degrading microbes that have been observed on the site. When the appropriate moisture content and soil amendments are completed the biocell will be covered with a water tight liner to create a closed system to prevent the evaporation of water from the biocell and prevent oxygen from defusing into the biocell.

The second option being considered involves building a water-tight concrete structure for the treatment of the perchlorate contaminated soils in an ex situ anaerobic biocell. The concrete structure will consist of several cells capable of treating approximately 400 cubic yards of soils per cell. Soil amendments and conditions will be the same as the first option. This option will require the excavation of contaminated soil to occur in phases allowing for the reuse of the concrete structure until the completion of the remedial project.

The third option being considered involves placing the excavated soils in Ag-Bags as typically used in agricultural composting activities. Soil amendments will be same as previous options. The soils will be mixed using a pug mill prior to being placed in the Ag-Bags. When the Ag-Bag has been filled to capacity with the appropriate moisture content obtained; the bag will be sealed until treatment is complete.

This type of comparison is important to determine the most cost-effective remediation option while also considering the site-specific remediation time lines when evaluating future development plans at the site.