EXPLANATION OF SIGNIFICANT DIFFERENCES

MAXEY FLATS DISPOSAL SITE
FLEMING COUNTY, KENTUCKY

EPA Region 4 September 2014

Introduction

This Explanation of Significant Differences (ESD) for the Maxey Flats Disposal Site (MFDS) in Fleming County, Kentucky, has been prepared by the Region 4 Office of the United States Environmental Protection Agency (EPA). The changes being documented are based on revised cap layers utilizing modern technologies evaluated in the Remedial Design of the Final Cap, including: use of a geosynthetic clay liner (GCL) in-place of the two-foot layer of compacted clay described in the MFDS Record of Decision (ROD); using a 60-mil geomembrane rather than an 80-mil geomembrane described in the ROD; and using a geonet drainage layer in-place of the one-foot of crushed rock with a minimum permeability of $1x10^{-3}$ cm/sec. Additionally, geogrid reinforcing layers are being added to ensure the stability of the cap over the trenches, and applicable location-specific Endangered Species Act requirements are being identified.

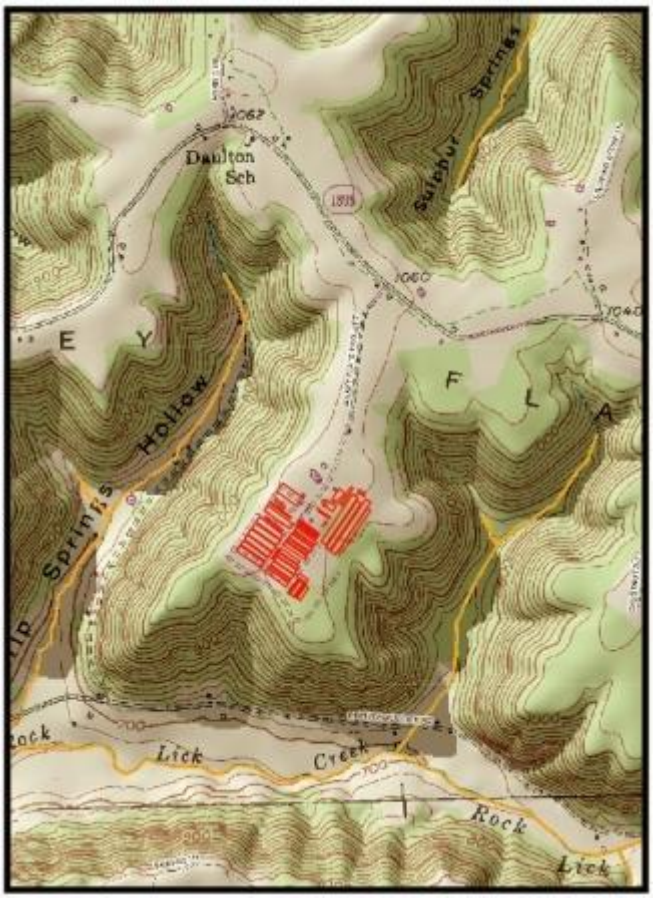
This ESD is being issued as part of public participation responsibilities under Section 117(c) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended by Superfund Amendments and Reauthorization Act (SARA), and Section 300.435(c)(2)(i) of the National Contingency Plan (NCP), 40 CFR Part 300.

The Administrative Record contains documents used as the basis for remedy selection at the Site, including the Record of Decision (ROD) and Responsiveness Summary. This ESD and the documentation supporting the changes described are part of the Administrative Record in accordance with Section 300.825(a)(2) of the NCP. The Administrative Record documents are available for public review and copying in the Maxey Flats Disposal Site information repository located at the following address:

Fleming County Public Library
202 Bypass Boulevard
Flemingsburg, KY 41041-1298
Phone: 606-845-7851
Fax: 606-845-7045

Site Background

The Maxey Flats Disposal Site, located in Fleming County, Kentucky, is an inactive



Topo. Map of Site showing trench locations.

low-level radioactive waste site owned by the Commonwealth of Kentucky situated approximately ten (10) miles northwest of Morehead, Kentucky.

In January 1963, the Commonwealth of Kentucky issued a license to the Nuclear Engineering Company, Inc. (NECO) for the disposal of solid by-product, source and special nuclear material on a 252-acre tract now known as MFDS. From May 1963 through December 1977, NECO managed and operated the disposal of an estimated 4,750,000 cubic feet of low-level radioactive waste (LLRW) at the Site. Environmental monitoring in 1972 by the Commonwealth revealed possible migration of radionuclides from the "Restricted Area." A special study performed by the Commonwealth in 1974 confirmed that tritium and other radioactive contaminants were migrating out of the trenches and that some radioactive material had migrated into unrestricted areas.
In 1977, it was determined that leachate was migrating through the subsurface geology and NECO was ordered to cease the receipt and burial of radioactive waste. NECO's license was transferred back to the Commonwealth's Department of Natural Resources and Environmental Protection in 1979, when the Commonwealth hired independent contractors to assist in stabilization and maintenance activities for the 27-acre trench disposal area.
From 1973 through April 1986, an evaporator was operated at the Site as a means of managing the large volume of water infiltrating the disposal trenches as well as waste water generated by on-site activities. The evaporator processed over 6,000,000 gallons of liquids during its operation and the evaporator concentrates were solidified and disposed of on-site.

From 1983 to 1986, MFDS was in the process of being listed on EPA's National Priorities List (NPL) at the request of the Commonwealth. In 1986, the listing was finalized and the EPA issued general notice letters to 832 Potentially Responsible Parties (PRPs) informing them of their potential liability with respect to site contamination.
In March 1987, 82 PRPs signed an Administrative Order by Consent to perform the Remedial Investigation and Feasibility Study (RI/FS).

The RI/FS was completed in May 1991. The Proposed Plan Fact Sheet was sent to the community on May 30, 1991. A public meeting was held on June 13, 1991, to discuss the proposed remedy and to begin the sixty-day public comment period which ended on August 13, 1991. After responding to public comments, the ROD was signed on September 30, 1991.

Meanwhile, in December 1989, the EPA initiated an Emergency Response Action at Maxey Flats due to an imminent threat to public health, welfare, and the environment posed by the potential release of liquids stored in on-site storage tanks. The EPA installed heaters in the tank farm building to prevent freezing and possible rupturing and installed additional storage capacity on-site. The EPA also solidified 286,000 gallons of radioactive liquids stored in the tanks and on the floor of the tank building. These 216 solidified blocks were buried in newly constructed trenches within the "Restricted Area."

Selected Remedy

The remedy selected for the MFDS is natural stabilization, which will allow the materials in the trenches to subside naturally to a stable condition prior to installation of a final engineered cap. The major components of the selected remedy include:

- Excavation of additional on-site disposal trenches for disposal of site debris and solidified leachate;
- Demolition and on-site disposal of site structures;
- Extraction, solidification, and on-site disposal of approximately three million gallons of trench leachate;
- Installation of an initial cap consisting of clay and a synthetic liner;
- Re-contouring of capped disposal area to enhance management of surface water runon and runoff;
- Installation of a ground water flow barrier, if necessary;
- Installation of an infiltration monitoring system to continuously verify remedy performance and detect the accumulation of leachate in disposal trenches;
- Monitoring of ground water, surface water, air, selected environmental indicators, and rates of subsidence;
- Procurement of a buffer zone adjacent to the existing Site property boundary, estimated to range from 200 to 400 acres, for the purposes of preventing deforestation of the hillslopes or other activities which would accelerate hillslope erosion and affect the integrity of the selected remedy, and providing frequent and unrestricted access to areas adjacent to the site to allow monitoring;
- Installation of a multi-layer engineered soil cap with synthetic liner after natural subsidence process is complete;
- Five-year reviews to evaluate the protectiveness of the remedy and to ensure the selected remedy is achieving the necessary remedial action objectives; and
- Institutional controls to restrict the use of the MFDS and to ensure monitoring and maintenance in perpetuity.

View of the Initial Remedial Phase (IRP) Cap Completed in 2003.

The components identified above were then separated in to four phases in the Consent Decree and Statement of Work signed by the responsible parties who agreed to perform the work: the Initial Remedial Phase (IRP), the Interim Maintenance Period (IMP), the Final Closure Period (FCP), and the Institutional Control Period (ICP).

Explanation of Significant Differences

The purpose of the ESD is to document significant changes to the final cap components in the remedy and to identify applicable location-specific requirements that were not described in the 1991 ROD for the Site.

The final cap changes proposed during the remedial design include: 1) use of a geosynthetic clay liner (GCL) in-place of the two-foot layer of compacted clay with permeability not exceeding 1 x 10^{-7} cm/sec described in the ROD; 2) use of a 60-mil geomembrane rather than an 80-mil geomembrane described in the ROD; and 3) use of a geonet drainage layer in-place of the one-foot of crushed rock with a minimum permeability of 1x10^{-3} cm/sec. Additionally, geogrid reinforcing layers are being added to ensure the stability of the cap over the trenches.

First, a geosynthetic clay liner (GCL) was proposed to replace the two-foot layer of compacted clay described in the ROD. GCLs

are manufactured under controlled conditions and therefore have more consistent quality than field compacted clay barriers. A GCL is an industry-standard product that is designed to provide equivalent or better infiltration reduction performance to a compacted clay component of a composite cover system. GCLs are easily transported and installed compared to clay barriers, making them less expensive. GCLs use a clay core that is two orders of magnitude less permeable than the currently specified clay with permeability not exceeding 1 x 10^{-7} cm/sec. There are fewer field quality control requirements. The clay swells when wetted, leading to an increase in the thickness of and enhanced infiltration barrier capacity for the GCL.

Second, 60-mil high-density polyethylene (HDPE) geomembrane is more available and easier to install and thus will cost less than the 80-mil material. The 60-mil HDPE, when incorporated with the designed protective layers, will provide sustainable performance for the Maxey Flats cap. The proposed HDPE geomembrane is the industry-standard material for use in this application. It has demonstrated chemical stability, durability, and hydraulic barrier performance demanded by this application. This textured (on both sides) geomembrane material offers superb frictional resistance and improved cap stability. The 60-mil thickness offers the optimal combination of environmental protection, flexibility, conformability, and constructability and cost.

Third, a geonet drainage layer was proposed to replace the one-foot of crushed rock with a minimum permeability of 1x10-3 cm/sec described in the ROD. The engineering functions of filtration, drainage, and protective cushion can be provided by a single engineered product. The ROD described design does not provide cushion protection to the geomembrane from the stone to be placed directly on it. The current design does not specify the material to be used to construct the synthetic liner.

Finally, geogrid reinforcing layers are being added to ensure the stability of the final cap. The geogrid adds stability to the cap, reduces the weight of the leveling fill layer, lowers the profile of the cap and thus reduces the erosion potential and improves storm water runoff control, and improves resistance to possible future subsidence.

In addition to the changes to the final cap described above, the remedial design identified that haul road construction activities will be performed in an area identified as “potential habitat” for the Indiana Bat. The potential Indiana Bat habitat issue was not identified at the time the ROD was prepared and thus no Endangered Species Act requirements were identified in the ROD. In consultation with the U.S. Fish and Wildlife Service, tree clearing for the haul road during bat hibernation months (Nov. 15 – March 31) is acceptable and in compliance with federal guidelines.

Applicable or Relevant and Appropriate Requirements

The applicable or relevant and appropriate requirements (ARARs) identified in the

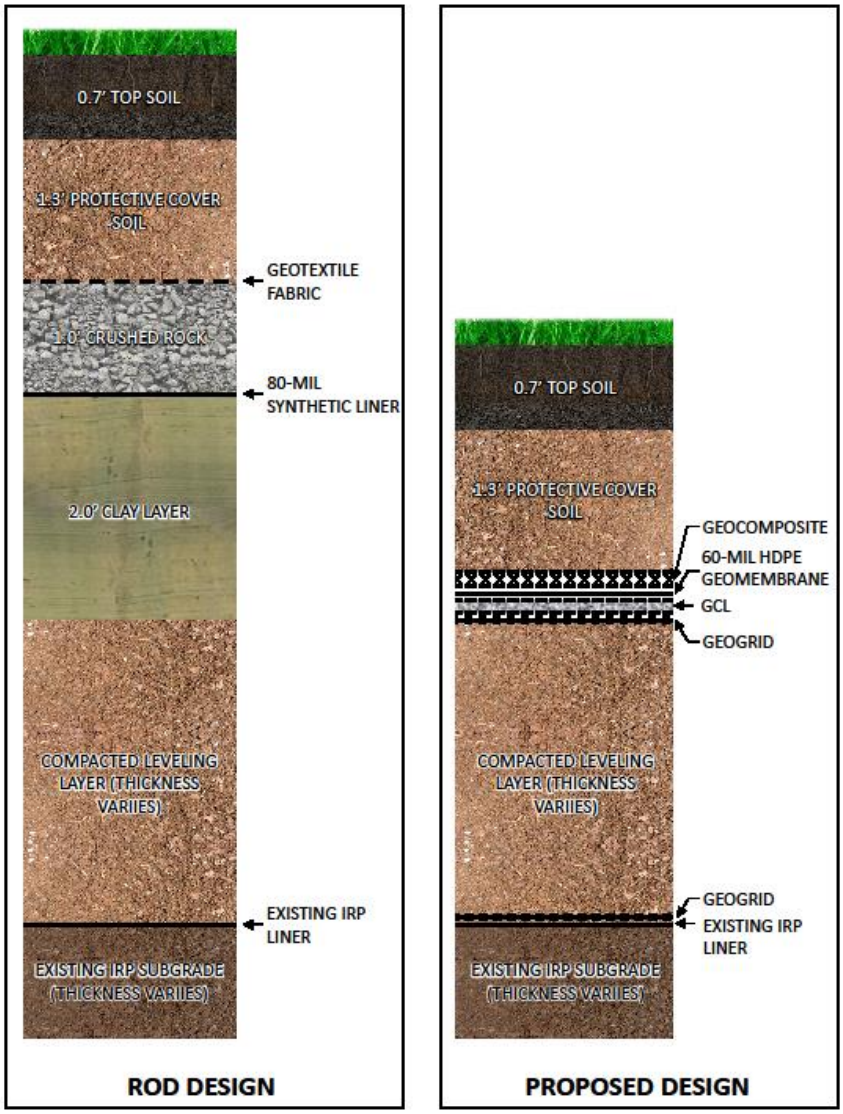


Illustration of Changes Made to Final Cap for Maxey Flats

ROD pertaining to the final cap include the Resource Conservation and Recovery Act (RCRA) Subtitle C hazardous waste landfill cover requirements in 40 CFR §264.310 (401 KAR §34:230)

The RCRA Subtitle C capping regulations allow a performance-based final cover system designed and constructed to function with minimum maintenance, promote drainage and minimize erosion of the cover, provide long-term minimization of migration of liquids through the closed landfill, accommodate settling and subsidence so that the cover's integrity is maintained, and have a permeability of less than or equal to the permeability of any bottom liner systems (i.e., hydraulic conductivity of no more than 1×10^{-7} cm/sec) or natural subsurface soils present.

The ROD also identified relevant and

appropriate federal and state requirements for closure of radioactive waste disposal sites in 10 CFR 61.42, 61.44, 61.51(a), and 902 KAR 100:022 Sections 19, 21, and 23. These performance-based requirements are analogous to most of the RCRA requirements above and also specify that closure shall be designed to achieve long-term stability and waste isolation; to protect against individuals inadvertently intruding into the disposal site at any time after active Institutional Controls are removed; and to eliminate, to the extent practicable, the need for on-going, active maintenance of the disposal site so that only surveillance, monitoring and minor custodial care is required.

The final cap when installed will provide an effective barrier against vertical infiltration of water and will direct percolating water away from the disposed waste. The vegetated topsoil layers and lower slope design will enhance erosion control and lower rates of surface runoff.

After the final cap has been constructed, the Custodial Maintenance Period (CMP) will begin, during which the Commonwealth will continue Site maintenance, monitoring and surveillance in perpetuity. The CMP initiates the Institutional Control Period (ICP), which must be implemented for at least 100 years following completion of site closure, and includes active measures to control access to the Site, periodic surveillance, custodial care, and filing of notices and restrictive covenants in the appropriate land records. The Site surface monuments, notices and restrictive covenants, the geosynthetic layers and, in some locations, concrete layers will continue to provide a warning to inadvertent intruders beyond the 100-year active ICP that the area might be dangerous.

Historical reports indicate that when the trenches were filled, the waste was typically covered with 3 to 10 feet of clay and crushed shale, and liquid wastes were solidified with a mixture of cement, paper mache', clay, newspaper, and/or urea formaldehyde before burial in trenches. Additionally, hot wells (10 to 15 feet deep and 1 to 2 feet in diameter) for disposal of higher activity wastes were constructed of concrete, coated steel pipe, and tile, and were capped with large slabs of concrete. During the IRP, liquid wastes were solidified (with cement) and placed in concrete bunkers and void spaces grouted creating a monolith. Soil and geosynthetic layers of the IRP cap increased the thickness over the top of the trenches an additional three feet. The soil and geosythetic layers of the proposed final cap vary in thickness from to 2 to 14 feet to create the desired 5 % slope to minimize cap erosion and the rate of surface runoff from the cap. Upon completion of construction of the final cap, the total thickness of soil and geosynthetic layers over the waste trenches will vary from 8 to 20 feet.

The location-specific ARARs being added by this ESD include requirements from the Endangered Species Act that must be met during haul road construction activities to be performed in an area identified as "potential habitat" for the Indiana Bat. The requirements are included in Table 1 below. In consultation with the U.S. Fish and

Wildlife Service, tree clearing for the haul road during bat hibernation months (November 15 – March 31) is acceptable and in compliance with federal guidelines.

Affirmation of the Statutory Determination

The changes to the ROD documented in this ESD are considered to be protective of human health and the environment, comply with Federal and State requirements that are applicable or relevant and appropriate to this remedial action, are cost effective, and use permanent solutions to the maximum extent practicable for this Site.

What Happens Next?

With Remedial Design of the final cap complete, the Commonwealth of Kentucky is evaluating bids to perform the final cap Remedial Action. Construction of the final cap may extend over one or two construction periods. An availability meeting will be held with the community to present the final cap design and to discuss any concerns the community may have about the upcoming construction activities.

For More Information

For more information about the significant changes described in this fact sheet or the construction of the final cap at the Maxey Flats Disposal Site, please contact:

Pam Scully
USEPA Region 4
61 Forsyth Street, SW
Atlanta, GA 30303
Phone: (404)562-8935
E-mail: scully.pam@epa.gov

Table 1. LOCATION-SPECIFIC ARARs - Endangered Species

Presence of Endangered Wildlife listed in 50 CFR 17.11(h) –***or critical habitat of such species***	Federal agency shall, in consultation with and with the assistance of the Secretary, insure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined by the Secretary of Interior, after consultation as appropriate with affected States, to be critical, unless such agency has been granted an exemption for such action by the Committee pursuant to subsection (h) of this section.	Agency action that may jeopardize listed wildlife species, or destroy or adversely modify critical habitat – **applicable**	16 U.S.C. 1536 (a)(2) – *Endangered Species Act of 1973*
Presence of Endangered Wildlife listed in 50 CFR 17.11(h)	It is unlawful to take threatened or endangered wildlife in the United States. *Note:* Under 50 CFR 10.12 *Definitions* the term *Take* means to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect.	Action that may jeopardize listed wildlife species – **applicable**	50 CFR 17.21(c)

U.S. Environmental Protection Agency
Region 4, Atlanta Federal Center
61 Forsyth Street, S.W.
Atlanta, Georgia 30303-8960

Attn: Pam Scully, SRB