United States Environmental Protection Agency

Office of Solid Waste and Emergency Response
Office of Superfund Remediation and Technology Innovation
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Greener Cleanups Bulletin:

Application of the *ASTM Standard Guide for Greener Cleanups* at the North Ridge Estates Superfund Site

This news bulletin is one in a series highlighting reductions in the environmental footprint of contaminated site cleanup

The North Ridge Estates Superfund site encompasses a residential subdivision approximately three miles north of Klamath Falls, Oregon. The site is contaminated with asbestos-containing materials (ACM) resulting from demolition of approximately eighty 1940s-era military barracks buildings. In the area of a former onsite power plant, the soil also contains arsenic.

Site restoration after excavation and soil capping will include planting tree and shrub species that are native to the Cascade Mountain ecosystem.

Onsite removal actions were taken at selected parcels in 2008, 2011 and 2013. Final remediation plans for the site's Operable Unit (OU) 1, which covers about 125 acres, involve excavation, capping systems and institutional controls. In the majority of parcels, contaminated materials will be excavated to depths of 2 to 4 feet or until ACM is no longer observed; the amount of material excavated also must be sufficient to accommodate installation of a frost-protective cap that maintains proper grades. All excavated material will be consolidated and placed in onsite repositories that will be capped with clean soil to break the soil-to-air exposure pathway associated with residual ACM. In other OU1 parcels, soil will be left in place and capped with clean soil to prevent potential release of residual fibers and to bring ground surfaces back to grade.

Greener Cleanup Approach

The U.S. Environmental Protection Agency (EPA) used the ASTM *Standard Guide for Greener Cleanups* (E2893-13) ("standard guide") to sequentially screen, prioritize and select best management practices (BMPs) for reducing the environmental footprint of OU1 activities. The selected BMPs were incorporated into:

- Criteria and guidelines in the remedy design undergoing development.
- EPA solicitation of remedial action services and associated proposals.
- Operating procedures for the remedial action.

The standard guide provides a multi-step process for identifying BMPs that reduce the environmental footprint of site-specific cleanup activities. It also provides flexibility for refining the practices as cleanup progresses from site investigation through long-term operation and maintenance of a remedy.

Results

Professional judgment by the remediation project team suggested that the most significant contributions to the environmental footprint of OU1 activities would result from:

- Fuel consumption by onsite excavation equipment.
- Fuel consumption by machinery and vehicles used to transport excavated soils to the onsite repositories.
- Fuel consumption associated with import of clean soil needed to cover the repositories and potential residual asbestos-contaminated soil left in place.
- Air emissions associated with onsite and offsite combustion of fuel and offsite production of the fuel.

Detailed quantification of the estimated footprint, an option included in the standard guide, was deemed unnecessary due to the remedy's relative simplicity.

The process of screening and refining BMPs provided in the standard guide resulted in identification of 30 BMPs applying to the site. Of these, 12 had been previously incorporated into the remedy design. The remaining 18 BMPs were prioritized on a relative scale of high, medium and low based on their likelihood to reduce the anticipated environmental footprint. Results of the prioritization process indicated three BMPs of high priority, eight BMPs of medium priority and seven BMPs of low priority. The 12 BMPs already reflected in the pending remedy design also were prioritized to better understand their value in potentially reducing the environmental footprint throughout construction and maintenance of the remedy.

BMPs selected through this process were added or retained as specifications in project documentation such as remedial action service contracts or the remedy design. The anticipated ease of implementation was reflected in BMP decision making.

Examples of Prioritized BMPs Integrated into Cleanup at the North Ridge Estates Superfund Site				
BMP Category	**BMP**	**Potential Footprint Reduction**	**Ability to Implement**	**Relevant Project Document**
Power and Fuel	Use biodiesel produced from waste or cellulose-based products, preferably from local sources	High	High	Remedy construction service contract [1]
Site Preparation and Land Restoration	Use onsite or nearby sources of contaminant-free material as backfill for excavated areas	High	High	Remedy design
Vehicles and Equipment	Implement an idle reduction plan	High	High	Site plan
Vehicles and Equipment	Minimize diesel emissions by using retrofitted engines or filter/treatment devices	High	High	Remedy construction service contract
Materials	Use material with recycled content such as recycled concrete and asphalt aggregate	Low	High	Annual progress report
Site Preparation and Land Restoration	Maximize use of native non-invasive and drought-resistant vegetative cover during site restoration	Low	High	Annual progress report
Surface and Storm Water	Install vegetated earthen berms along landfill cover perimeters as a low-impact design technique to divert run-on and run-off stormwater	Low	Low [2]	Annual progress report

[1] *Subsequently excluded due to unanticipated logistical problems encountered during remedy construction planning.*
[2] *Subsequently elevated to a high priority due to new information gathered during remedy construction planning.*

Use of diesel retrofit technology in machinery, vehicles and equipment is expected to significantly reduce onsite emission of air pollutants. EPA anticipates that any diesel generator used on the site for more than 10 total days will meet EPA Tier 4 nonroad emission standards or be fitted with emission control technology verified by EPA or the California Air Resources Board for use with nonroad engines to reduce particulate matter emissions by a minimum of 85%. The same criteria will be applied incrementally for all nonroad construction equipment; at least 25% of the equipment deployed onsite is expected to meet the criteria at the onset of field activities and 50% of the onsite equipment should meet the criteria during the second year. The quality assurance project plan for remedial action outlines the diesel emission control technologies and idling requirements, which will be tracked through tools such as the Clean Diesel Clearing House.

Diesel Retrofit Technology	Estimated Emission Reductions			
	Particulate Matter (PM)	**Hydrocarbons**	**Carbon Monoxide (CO)**	**Nitrogen Oxides (NOx)**
Diesel oxidation catalyst	20-40%	40-75%	Up to 60%	-
Diesel particulate matter filter	95%	90%	90%	-
Partial diesel particulate filter	50%	75%	75%	-
Selective catalytic reduction	-	-	-	65%

Notable fuel conservation and emission reductions also are expected through the idle reduction plan, which generally limits engine idling to five minutes while waiting to load or unload. EPA findings on cleaner diesel reports that a typical mid-size track-type tractor, for example, consumes approximately one gallon of fuel per hour at idle. For a typical backhoe loader, reducing a single hour of unnecessary idling would reduce PM emissions by 13 grams, NOx emissions by 155 grams, CO emissions by 65 grams and carbon dioxide emissions by a similar amount. EPA plans to monitor environmental footprint metrics such as fuel and water consumption during remedy construction expected to begin in late 2015 and throughout long-term maintenance of the cover systems.

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More information about cleanup at North Ridge Estates is available in a Superfund site progress profile.

To learn more about greener cleanup strategies, visit the CLU-IN Green Remediation Focus website.