

Combining Green and Sustainable Remediation Evaluations with Cost/Risk Analysis as Effective Communication Tools to Drive Cleanup Decisions

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Background/Objectives. Cost/risk analysis and green and sustainable remediation (GSR) evaluations were initiated by the Department of Energy (DOE) during the planning of soil remediation at Area IV and the northern buffer zone (NBZ) in the Santa Susana Field Laboratory (SSFL) in Ventura County, California. There are three remedial action alternatives being considered; and they all have excavation/disposal as the core remedial technology, with the difference being the three levels of cleanup standards under the respective alternatives. Due to the history of the SSFL, the local community as well as the regulatory agency had previously been driving the cleanup towards the remedial action alternative with the most stringent cleanup standards. The key objective of this study is to assess the remaining human health risk, the cost effectiveness, as well as short and long-term impacts to the community and to the environment under each of the remedial action alternatives.

Approach/Activities. The cost/risk analysis estimated the remaining human health risks subsequent to the implementation of each of the remedial action alternative as well as the associated cost of each remedial action alternative. The GSR evaluation included an environmental footprint analysis, a social-economic impact analysis, and a community impact analysis. The environmental footprint analysis quantified the total energy and water resources used; landfill space and top soil consumption; and emissions of greenhouse gases, nitrogen oxides, sulfur oxides, and coarse particulate matter. The social-economic impact analysis quantified in monetary terms the impacts of emissions to society, including climate change, agricultural productivity, energy production, human health, and biodiversity. Finally, the community impact analysis qualitatively evaluated the potential positive and negative short- and long-term impacts of each remedial action alternative.

Results/Lessons Learned. Results from the cost/risk analysis completed in late 2015 demonstrated that the alternative with the most stringent cleanup standards offered only a slight amount of additional reduction in remaining human health risk when compared to the other two remedial action alternatives (less than 1% additional reduction in risk compared to one of the alternative, and between 2% to 22% additional risk reduction compared to the other alternative), but costs approximately three times as much to implement. The remedial action alternative with the most stringent cleanup standards was also shown to have the highest environmental footprint (most emissions, energy consumption, and resources lost), the highest social cost, the highest short-term community impact, and would take the longest time to achieve benefits to the community. When used together, these results could become powerful visual/numerical tools for communicating to the decision makers, the regulatory agency, and the community that the remedial action alternative with the most stringent cleanup standards does not necessarily protect the community or the environment better, but could actually contribute greater short- and long-term negative impacts.