GREEN AND SUSTAINABLE REMEDIATION (GSR) GUIDANCE DOCUMENT – EPA REGION 1

SUGGESTIONS/IDEAS FOR GREEN REMEDIATION INCORPORATION INTO BROWNFIELDS ASSESSMENTS AND CLEANUPS

(modified from EPA Region 2 "Clean and Green Policy", Att. B: Region 2 "Green Checklist")

Note: Information presented in the following bullets provides a good framework for considering the incorporation of green remediation into a project. However, the information provides suggestions, not requirements. In addition, the information provided does not represent a comprehensive listing of all green remediation options, and not every green remediation measure will be applicable, beneficial, or feasible for a given project. Always remember to take into consideration the specific needs and circumstances of a project when incorporating green remediation.

ADMINISTRATIVE

- **Incorporate green remediation principles into the contracting process, as possible** (http://www.epa.gov/oswer/greencleanups/principles.html)
  - Suggest contractors follow Region 1's Clean and Green Policy for Contaminated Sites (http://www.epa.gov/region1/brownfields/pdfs/CleanGreenPolicy.pdf)
  - Suggest contractors consider green remediation best management practices, as applicable (http://www.clu-in.org/greenremediation/docs/GR_Quick_Ref_FS_Intro.pdf and http://www.clu-in.org/greenremediation/docs/GR_factsheet_topics_update.pdf)
  - Encourage the use of laboratory sub-contractors that are committed to green chemistry (http://www.epa.gov/greenchemistry/). The purpose is to reduce the amount and toxicity of chemicals used and required to be disposed.
  - Encourage use of contractors who utilize clean fuel and emission technologies to operate heavy equipment onsite (http://www.clu-in.org/greenremediation/docs/Clean_FuelEmis_GR_fact_sheet_8-31-10.pdf).

- **Consider future use at the beginning of project to guide the investigation and remedy selection**
  Note: Sampling and remedial action selection should first be based on state and federal requirements for being protective of human health and the environment. Once feasible alternatives that satisfy those requirements are identified, then selection and improved efficiency of those alternatives can be considered.
  - Future use and redevelopment layout may guide the type of sampling and remediation required; ensure that sampling and remedial actions are the most efficient and sustainable methods available
  - Encourage development of renewable energy production facilities on contaminated lands
  - Consider the type and location of contamination on the property to help guide green infrastructure choices if it is a desired or required component of site redevelopment (http://cfpub.epa.gov/npdes/home.cfm?program_id=298)

- **Reporting and Communication**
  - Interim and final documents should be submitted in digital rather than hardcopy format, unless otherwise requested by EPA or required by law, in an effort to save paper. This is especially applicable to voluminous data reports.
  - Optimize the use of electronic and centralized communication and outreach to the local community.

GENERAL ON-SITE OPERATIONS

- **Encourage sustainable practices in trailers/buildings**
  - Utilize existing buildings for field office, if possible/safe
  - Situate trailer to benefit from existing vegetation (e.g., shaded by trees in the summer to reduce cooling costs and out in the open during cooler months to utilize natural solar heat)
  - Utilize "green" trailers if possible

- **Minimize non-renewable energy consumption**
  - Use energy efficient equipment
  - Purchase renewable energy supply through local utility programs
  - Purchase Renewable Energy Credits/Certificates (RECs or Green Tags)
  - Research potential for Green Pricing Programs and Power Purchase agreements
  - Utilize renewable Onsite Generation Systems, e.g., solar photovoltaic (PV), wind turbines, and biomass combustion

- **Use environmentally preferable products**
  For guidance, see the EPA Environmentally Preferable Purchasing (EPP) website (http://www.epa.gov/epp/)
  - Compact Fluorescent Lights (CFL) or LED
  - Environmentally friendly electronics (e.g., ENERGY STAR)
  - Recycled products
  - Avoid use of pesticides where feasible and follow EPA's Integrated Pest Management Practices (http://www.epa.gov/pesticides/factsheets/ipm.htm)
  - Use native plants instead of placing hydroseed for erosion control
  - Use plants instead of rip rap for erosion control, if practical

- **Encourage sustainable and environmentally responsible practices**
  Minimize waste
  - Reuse or recycle waste
  - Protect and conserve water
  - Use alternative fuel vehicles (hybrid-electric, biodiesel, ultra-low sulfur diesel)
  - Carpool
  - Schedule activities efficiently so as to minimize travel to and from the site
  - Consider ecological revitalization needs and potential through remediation (http://www.epa.gov/superfund/accomp/news/ecological_revitalization.htm)

FIELD INVESTIGATIONS/REMEDIATIONS

- **Mobilization**
  - Encourage use of fuel-efficient / alternative fuel vehicles and equipment
  - Minimize mobilizations
  - Use existing roadways where available
  - Provide for erosion and sediment control to minimize runoff into environmentally sensitive areas
  - Avoid environmentally sensitive areas and cutting native trees/vegetation when placing trailers and storage areas, and while building access roads

- Encourage use of diesel engines that meet the most stringent EPA on-road emissions standards available upon time of project's implementation or utilize EPA or CARB verified emission control technology to reduce particulate matter (PM) emissions by a minimum of 85% when technologically feasible on all on-road diesel engines (http://www.clu-in.org/greenremediation/docs/Clean_FuelEmis_GR_fact_sheet_8-31-10.pdf)

- **Demolition of on-site structures**
  - Minimize demolition of structures and buildings, when possible
  - Recycle demolition and construction material where possible
  - Keep the ultimate redevelopment of the site in mind. Enable the reuse of clean demolition and construction materials on site whenever possible.
  - For further guidance: see the EPA Construction and Demolition Waste site (http://www.epa.gov/wastes/nonhaz/industrial/cd/)

- **Field Screening**
  - Use non-invasive technologies, where feasible, for subsurface characterization to minimize wastes (Electrical Resistivity Tomography, Borehole Radar Tomography, Ground Penetrating Radar, Seismic Refraction/Reflection, Electromagnetic Survey).
  - Incorporate systematic planning, dynamic work strategies, and real-time measurements into work plans (TRIAD) to promote efficiency in investigations (http://www.epa.gov/tio/download/misc/triadprimer.pdf)
  - Minimize number of field mobilizations
  - Minimize number of samples sent to laboratories, with state approval, of course
  - Use mobile laboratories

- **Drilling/Excavating**

  Elements of each of the following are discussed at: http://www.clu-in.org/greenremediation/docs/Clean_FuelEmis_GR_fact_sheet_8-31-10.pdf
  - Have idle reduction policy and idle reduction devices installed on machinery
  - Use ultra-low sulfur diesel and/or fuel-grade biodiesel as fuel on machinery
  - Maximize use of machinery equipped with advanced emission controls
  - Encourage use of diesel engines that meet the most stringent EPA on-road emissions standards available upon time of project's implementation or utilize EPA or CARB verified emission control technology to reduce PM emissions by a minimum of 85% when technologically feasible on all on-road diesel engines.
  - Have contractors conduct regular engine maintenance on machinery to improve efficiency

- **Transport and Disposal of Soils and Backfill**
  - Maximize efficiency in transport/disposal of soils and backfill, utilizing practices such as backloading.