Construction & Demolition Materials Recovery

There are many opportunities to safely reuse and recycle the construction and demolition (C&D) materials generated on sites. C&D materials include brick, concrete, masonry, soil, rocks, lumber, paving materials, shingles, glass, plastics, aluminum (including siding), steel, drywall, insulation, asphalt roofing materials, electrical materials, plumbing fixtures, vinyl siding, corrugated cardboard, and land clearing debris. For a visual overview of demolition materials which can and cannot be recovered, see www.epa.gov/brownfields/tools/cdbrochure.pdf.

EPA Region 5's *Greener Cleanup Interim Policy* encourages cleanup practices that divert from the landfill, via reuse and recycling, at least 50 percent (by weight) of uncontaminated construction and demolition materials generated at the site.

Benefits Reusing and recycling uncontaminated C&D materials can reduce overall project expenses through avoided disposal costs, creates jobs in reuse and recycling industries, reduces the environmental impact of producing new materials, and conserves landfill space. Reusing and recycling C&D materials is an integral part of reducing the environmental impact of a cleanup project.

How?

1. Include **requirements** for C&D materials reuse and recycling in bid specifications, requests for proposals (RFPs), administrative corrective action orders, contracts, grants, and other documents.

   When demolition is required, a structural audit can help identify the types and quantities of uncontaminated C&D materials that can be reused and recycled; this information could be included in a bid spec or RFP to identify the desired outcome for C&D materials generated during the project.

2. Require contractors and facility owner/operators to develop a **waste management plan** that indicates how material will be tested for the presence of contaminants, and how uncontaminated C&D materials are going to be reduced, reused, recycled, and documented.

   Keep in mind that some uncontaminated C&D materials may be able to be reused directly on site as fill or landscaping materials instead of materials that would otherwise be procured. In cases where concrete or other material could be crushed and used as fill, the waste management plan should address whether there is a need for such material on site, and how much is needed. **Check with state and local authorities for authorized on-site uses of clean C&D materials.**

3. Set a **diversion goal**. Because a 50 percent diversion rate for uncontaminated material is typically easy to achieve, you may want to set both a minimum diversion rate (e.g., 50 percent) and a higher goal (e.g., 75 percent) to motivate contractors, etc., to look for markets beyond those for concrete and metal.

4. Use the attached tracking sheet to **document** reuse and recycling. You can use the information compiled on this sheet to communicate to project partners and stakeholders the results of your green remediation efforts.

PROJECT SPOTLIGHT:
Former Automotive Assembly Plant,
Pontiac, Michigan

As part of the "right-sizing" of the General Motors Corporation's manufacturing capacity, the Pontiac Validation Center in Pontiac, Michigan, was deconstructed between November 2006 and February 2008. Production at the assembly plant had ceased in 2005. The 133-acre industrial site included 1.68 million square feet of primarily steel and concrete buildings (only 10,000 square feet of wood plank flooring was present). Project partners MCM Management Corporation and BBL Arcadis diverted between 92% and 97% of materials from the landfill. Office furnishings were donated for reuse, 180,000 cubic yards of concrete were used onsite as fill, and over 21,000 tons of ferrous metals and 300,000 pounds of non-ferrous metals were recycled.

Detailed case study at: www.michigan.gov/documents/deq/dnre-oppca-cw-cs-gmpontiac1_334842_7.pdf.

Sample Specifications

Construction Waste Management Specification in the Federal Green Construction Guide for Specifiers: www.wbdg.org/ccb/FEDGREEN/fgs_017419.pdf

Free sample specifications from WasteCap Resource Solutions: www.wastecapwi.org/services/construction-and-demolition-specifications/

General Resources

EPA Brochure "Recover Your Resources Reduce, Reuse, and Recycle Construction and Demolition Materials at Land Revitalization Projects," 2008: www.epa.gov/brownfields/tools/cdbrochure.pdf

C&D Recycling Toolkit, developed by the Associated General Contractors of America, EPA, and the Industrial Resources Council: www.agc.org/cs/recycling_toolkit

EPA C&D Materials website: www.epa.gov/cdmaterials

EPA Region 5 C&D Debris Management on Brownfields website: www.epa.gov/reg5rcra/wptdiv/solidwaste/debris/brownfields/index.htm

Directories of C&D materials Reuse and Recycling Facilities

National directories: www.agc.org/cs/industry_topics/environment/recycling_toolkit/start_recycling

Michigan directory: www.michigan.gov/documents/deq/deq-ess-p2-green-cw-matls_206061_7.doc

Minnesota Tank and Waste Petroleum Recyclers directory: www.pca.state.mn.us/publications/t-u6-02.pdf

PROJECT SPOTLIGHT: Former Automotive Site, Detroit, Michigan

In December 2005, the cleanup of a two-acre former automotive property in Detroit, Michigan, was made possible through the leadership of a local nonprofit organization and funding assistance provided by EPA, in-kind services, and C&D waste recycling activities. Working within a tight budget, Focus: HOPE Revitalization conducted demolition and cleanup activities on the brownfields property for its intended reuse as a parking lot for a planned mixed-use development on the adjacent property. Largely, the C&D waste recycling activities made the project feasible by reducing the total project cost by 20 percent, a savings of $150,000, through the recycling of approximately 1,200 tons of materials and over 13,000 gallons of waste water. As a result, the property's reuse provided a catalyst to revitalization in the surrounding neighborhood.

Detailed case study at: www.epa.gov/brownfields/success/Detroit_MI_Success_012808.pdf

Ohio directory:
www.epa.ohio.gov/ocapp/Recycle.aspx

Wisconsin directory:
www.wastecap.org/wastecap-direct/

State-Specific Resources

The Beneficial Use State Program Locator provides an overview of individual state rules and programs addressing beneficial use, including a state contact: www.envcap.org/statetools/brsl/

Indiana Brownfields Program Factsheet: Demolition … Deconstruction … Environmentally-Responsible Waste Management … Responsible Brownfields Redevelopment:
www.in.gov/ifa/brownfields/files/Demolition_and_Construction_debris_recycling3-12-10.pdf

Michigan DEQ provides several resources for construction waste recycling:
www.michigan.gov/deq/0,1607,7-135-3585_57802_24843---,00.html

Michigan DEQ's Demolition, Deconstruction, and Decommissioning Frequently Asked Questions
www.michigan.gov/documents/deq/deq-ess-p2tas-faq-cdwaste_197547_7.pdf

Minnesota - Asset recovery is conducted via Equipment Reporting through the office of Minnesota Management and Budget (MMB). This is a program for Fund-financed projects.

Ohio EPA Factsheet: On-Site Disposal of Construction & Demolition Debris:
www.epa.state.oh.us/portals/34/document/guidance/gd_549.pdf

Ohio EPA Guidance Document #0560: Disposal and Beneficial Use of Construction and Demolition Debris: www.epa.state.oh.us/portals/34/document/guidance/gd_560.pdf

Ohio EPA Fact Sheet: Clean Hard Fill: www.epa.state.oh.us/portals/34/document/guidance/gd_563.pdf

Ohio EPA Topics Index for additional information: epa.ohio.gov/KeywordIndex.aspx

Opportunities for Materials Reuse in Site Design

The remediation of sites offers many opportunities to use recycled and reclaimed materials, including:

- Using compost for erosion control.
- Using compost, foundry sand[1], and other materials as soil amendments for remediation, revitalization, and reuse.
- Using compost and foundry sand in manufactured soils as a growing medium (in place of top soil brought on-site).
- Selecting native plants during revegetation.

EPA Region 5's *Greener Cleanup Interim Policy* encourages cleanup practices that incorporate environmentally sustainable site design, including use of compost for erosion control and as a soil amendment, use of environmentally safe recycled materials in manufactured soils, and use of native plants during re-vegetation.

Compost and the **composting** process can bring numerous direct benefits to a cleanup:

- **An economical choice** Composting contaminated soils or applying compost to contaminated soil may provide a less costly alternative to conventional methods of remediating certain contaminants in soil. Using compost can also reduce the need for water, artificial fertilizers, soil amendments, and pesticides. Adding compost to soils can also help to speed the establishment of grass and other ground cover while reducing the growth of weeds.
- **Enrichment of soils** Compost has the ability to help regenerate poor soils. The humus in compost increases the nutrient content in soils and helps soils retain moisture. Compost has also been shown to suppress plant diseases and pests, reduce or eliminate the need for chemical fertilizers, and promote higher yields of agricultural crops.
- **Remediation of contaminated soil** The composting process has been shown to absorb odors and treat semivolatile and volatile organic compounds, including heating fuels, polyaromatic hydrocarbons, and explosives when contaminated soils are composted. The composting process degrades and, in some cases, completely eliminates certain wood preservatives, pesticides, and both chlorinated and nonchlorinated hydrocarbons in contaminated soils. Also, when placed in-situ, compost has been shown to bind heavy metals and prevent them from migrating to water resources or being absorbed by plants.
- **Stormwater management and erosion control** Compost has the ability to prevent

[1] Foundry sand must meet state beneficial use requirements (see www.envcap.org/statetools/fsand/). Foundry sand is a silica sand byproduct of the metal casting industry. EPA and USDA have completed a risk evaluation of the use of foundry sand in manufactured soil and road sub-base. The conclusions of the risk evaluation are: 1) metal concentrations in the foundry sand samples were very similar to and often less than metal levels in native U.S. soils, and 2) the risk assessment demonstrated use of non-olivine sand from iron, steel, and aluminum foundries as an ingredient in manufactured soil, soil-less media, and road sub-base does not pose a threat to human health or the environment.

pollutants in stormwater runoff from reaching surface water resources. Compost has been shown to prevent erosion and silting on embankments parallel to creeks, lakes, and rivers. Compost also prevents erosion and turf loss on roadsides, hillsides, playing fields, and golf courses.

- **Market Development** Creating demand for quality compost supports the development of food and yard waste composting capacity and jobs in the region.

Ecological restoration Ecological restoration with soil amendments† is an *in situ* process that reduces contaminant exposure by limiting exposure pathways, limits bioavailability by immobilizing contaminants, and restores soil quality. Soil amendments, when used appropriately and according to regulatory requirements*, can address a variety of contaminant bioavailability/phytoavailability, soil health, and ecosystem function problems at cleanup sites:

- soil toxicity
- high or low soil pH
- soil sodicity or salinity
- poor soil physical properties
- soil nutrient deficiencies

There are numerous soil amendments that are residuals of other processes, including compost, foundry sand, municipal biosolids, manures and litters, wood waste, wood ash, and sugar beet lime. Beneficially using these materials diverts them from the landfill and eliminates the need to use new materials.

Manufactured soils Manufactured soils may be an environmentally preferable alternative to borrow soil trucked to a cleanup site from another location. Some landscaping companies produce manufactured soils that contain compost, foundry sand, and other recovered materials. Blending manufactured soils with poor soils and subsoils can result in a high quality top soil.

Native plants Native plants can be planted as part of the remediation plan for several compounds and eventually become part of the ultimate property reuse, or they can be planted during site revegetation. When properly planted and established, native plants can require less long-term maintenance than non-native species, provide a habitat for wildlife, protect water quality (by controlling soil erosion and moderating floods and droughts), and improve air quality (by both reducing the use of lawn maintenance equipment and acting as a carbon sink).

How? An upfront task that can be included in a contractor work assignment would be to have project remediation managers, stormwater managers, and/or landscape designers **identify opportunities** to use high quality compost, foundry sand, soil amendments, and native plants for erosion control, stormwater management, remediation, landscaping, and revegetation needs. When the techniques are deemed appropriate and the materials are available, **specify** use of quality compost, foundry sand, reclaimed soil amendments, and native plants for use in remediating and landscaping sites. Finally, use the attached tracking sheet to **document** reuse and recycling. You can use the information compiled on this sheet to communicate to project partners and stakeholders the results of your green remediation efforts.

* **Because compost and recovered materials may contain contaminants, always consult the appropriate state environmental agency for requirements for the beneficial use of recovered materials and compost.**

PROJECT SPOTLIGHT:
Native Plants Part of a Final Remedy at a Former Rubber Products Manufacturing Facility, Noblesville, Indiana

The Firestone rubber products manufacturing facility located in Noblesville, Indiana, operated from 1936-2009. PCB-containing fluid was used at the facility through the 1970s, when a release occurred to an engineered drainage channel that led to a major creek within a residential area, Stony Creek. PCBs were found within the soils of the residential area as well as an adjacent riparian floodplain. The approximate 1-mile stretch of Stony Creek affected is a critical watershed management area and riparian ecosystem because of its high quality habitat and continuous vegetated buffer.

Given the overall quality of the area, EPA approved a conservative, risk-based remediation which preserved many high-quality mature trees. Further, each homeowner was offered an opportunity to enhance the landscape with native trees, shrubs, or groundcover. The additional plantings were proposed to enhance the understory of the riparian ecosystem, ensure that any removed vegetation was sufficiently replaced, and to provide extra incentive to homeowners to participate in the remediation. All top soil, vegetation, and mulch was locally sourced and native. In all, approximately 200 plants were planted within the 1-mile riparian buffer zone.

The non-residential land will also be receiving locally sourced, native groundcover, 100 native tree seedlings, and 50 bat houses. EPA's responsibility under Section 7 of the Endangered Species Act is to, in part, promote the health and preservation of threatened and endangered species or their designated critical habitat. This component of the Firestone final remedy is designed to enhance the already high quality habitat while further encouraging the Indiana bat's successful recovery.

For more information, contact Michelle Kaysen, U.S. EPA Region 5, 312-886-4253.

A Note on EPA's Comprehensive Procurement Guidelines Under RCRA Section 6002 (a) and Executive Order 13423, EPA is required to designate products that are, or can be made with, recovered materials and to recommend practices for buying these products. **Procuring agencies (federal, state, local agencies or government contractors) that spend more than $10,000 a year on a designated item are required to purchase it with the highest recovered material content level practicable**. EPA's Comprehensive Procurement Guidelines offer products in a number of categories appropriate for cleanup projects, including compost for use in applications such as landscaping, seeding of grasses or other plants on roadsides and embankments, nutritious mulch under trees and shrubs, and erosion control and soil reclamation. See www.epa.gov/cpg.

Sample Specifications

Compost quality standards and specifications for using compost for a number of landscaping applications can be found in "The Landscape Architecture Design Specifications for Compost Use" from the U.S. Composting Council: www.epa.gov/waste/conserve/rrr/greenscapes/pubs/la-specs.pdf

Standard Specifications for Compost for Erosion/Sediment Control

- compost blankets: www.alexassoc.net/organic_recylcing_composting_documents/standard_compost_erosion_sediment_control_specs.pdf
- compost filter berms and compost filter socks: www.alexassoc.net/organic_recylcing_composting_documents/FILTER%20BERMS%20AND%20FILTER%20SOCKS%20StandardCompostForErosionSpecs1.pdf

Sample Specification for Stormwater Management by Compost in the Federal Green Construction Guide for Specifiers: www.wbdg.org/ccb/FEDGREEN/fgs_312573.pdf

"An Introduction to Using Native Plants in Restoration Projects," by Jeanette Dorner, has tips on writing specifications for obtaining native plants or seeds. See pp. 37-38: www.nps.gov/plants/restore/pubs/intronatplant/index.htm

Soil Amendments

EPA EcoTools: Tools for Ecological Land Reuse – Soil Amendments: www.cluin.org/ecotools/soil.cfm

† EPA, "The Use of Soil Amendments for Remediation, Revitalization, and Reuse," 2007: www.clu-in.org/download/remed/epa-542-r-07-013.pdf
Accompanying fact sheet: www.clu-in.org/download/remed/540R07013.pdf
Technical performance measures: www.clu-in.org/products/tpm/

Compost

EPA Compost website: www.epa.gov/compost

Stormwater Best Management Practices (BMPs), such as compost blankets, compost filter berms, and compost filter socks, provide effective treatment of stormwater when used in construction and post-construction stormwater BMPs:

- www.epa.gov/reg5rcra/wptdiv/solidwaste/recycle/compost/webinars.html

EPA, "An Analysis of Composting as an Environmental Remediation Technology," 1998:

- www.epa.gov/epawaste/conserve/rrr/composting/pubs/analpt1.pdf
- www.epa.gov/epawaste/conserve/rrr/composting/pubs/analpt2.pdf
- www.epa.gov/epawaste/conserve/rrr/composting/pubs/analpt3.pdf
- www.epa.gov/epawaste/conserve/rrr/composting/pubs/analpt4.pdf

EPA fact sheets on Innovative Uses of Compost:

- "Bioremediation and Pollution Prevention": www.epa.gov/epawaste/conserve/rrr/composting/pubs/bioremed.pdf
- "Composting of Soils Contaminated by Explosives": www.epa.gov/epawaste/conserve/rrr/composting/pubs/explos.pdf
- "Reforestation, Wetlands Restoration, and Habitat Revitalization": www.epa.gov/epawaste/conserve/rrr/composting/pubs/reforest.pdf

Foundry Sand

EPA, Region 5, Fact Sheet: "Interim Research Results Show Foundry Sand Safe for Reuse," June 2010: www.afsinc.org/images/Marketing/r5%20foundry%20sand%20fact%20sheet_7_10.pdf

The Foundry Sand Reuse State Resource Locator can be used to locate information on state beneficial use requirements: www.envcap.org/statetools/fsand/

Native Plants and Green Landscaping

EPA EcoTools: Tools for Ecological Land Reuse – Plants and Revegetation: www.cluin.org/ecotools/plants.cfm

"An Introduction to Using Native Plants in Restoration Projects," by Jeanette Dorner: www.nps.gov/plants/restore/pubs/intronatplant/index.htm

EPA Fact Sheet "Revegetating Landfills and Waste Containment Areas Fact Sheet": www.epa.gov/tio/download/remed/revegetating_fact_sheet.pdf

EPA Region 5 brochure "Green Landscaping: Landscaping with Native Plants" includes a list of plants native to the Midwest and links to resources, by state:
http://epa.gov/greenacres/nativeplants/factsht.html

FHWA Publication "Roadside Use of Native Plants" includes lists of native plants, noxious species, and experts/resources by state: www.environment.fhwa.dot.gov/ecosystems/vegmgmt_rdsduse.asp

The Sustainable Sites Initiative is an interdisciplinary effort by the American Society of Landscape Architects, the Lady Bird Johnson Wildflower Center at The University of Texas at Austin and the United States Botanic Garden to create voluntary national guidelines and performance benchmarks for sustainable land design, construction, and maintenance practices:
www.sustainablesites.org

State-Specific Resources

The Beneficial Use State Program Locator provides an overview of individual state rules and programs addressing beneficial use, including a state contact: www.envcap.org/statetools/brsl/

Michigan DEQ Green Landscaping Resources:
www.michigan.gov/documents/deq/dnre-oppca-gb-LandscapingResources_323965_7.pdf

Minnesota PCA Green Building Resources: Site & Water:
www.pca.state.mn.us/oea/greenbuilding/site.cfm

Minnesota DOT Seeding Manual, 2007 Edition:
www.dot.state.mn.us/environment/pdf_files/seedingmanual.pdf

Minnesota Board of Water and Soil Resources, Native Vegetation for Wetlands:
www.bwsr.state.mn.us/wetlands/vegetation/index.html

Minnesota Native Wildflower/Grass Producers Association: www.mnnwgpa.org/

Ohio EPA Division of Solid Water – Composting – forms and publications:
www.epa.state.oh.us/dsiwm/pages/comp_docs.aspx

Ohio EPA Division of Surface Water – Guide to Developing Watershed Action Plans in Ohio:
epa.ohio.gov/portals/35/nps/wsguide.pdf

Ohio DNR – Invasive Species Information:
ohiodnr.com/tabid/2005/default.aspx

Use of Reclaimed Materials in Fills and Pavements

In the course of developing work plans for site remediation, look for opportunities to use recycled or reclaimed materials as fill or as a component in pavements. Consider reusing materials already on the site, industrial byproducts, and recycled-content products. Many reclaimed materials can be used in construction applications in lieu of mined or borrow materials. On cleanup sites, there may be opportunities to use reclaimed materials in fills and pavements.

EPA Region 5's *Greener Cleanup Interim Policy* encourages cleanup practices that utilize products with recycled content and environmentally safe industrial materials that have been approved for use by state environmental agencies.

Benefits Reusing materials and using recycled materials reduces the need to extract and process virgin resources. This saves energy and water and reduces the generation of greenhouse gases and other air pollutants, water pollutants, and waste. Reusing on-site materials may even lower project costs. It also creates demand for recycled materials and creates jobs in reuse and recycling industries. Using reclaimed materials is an integral part of reducing environmental impact for a greener cleanup.

How?

1. An upfront task that can be included in a contractor work assignment would be to **identify opportunities** to use recycled and reclaimed materials in any fill, paving, or construction task during the cleanup project.

   - Slag, foundry sand[2], recycled asphalt pavement, scrap tires, crushed concrete and other on-site clean hard fill materials, and other materials can be used in place of borrow in **fills***.
   - Spent foundry sand, slag, coal fly ash, and recycled concrete aggregate can be used in **cement and concrete***.
   - Slag, coal fly ash and bottom ash, foundry sand, reclaimed asphalt pavement, asphalt roofing shingles, recycled glass, scrap tire rubber, and other byproducts can be used in **asphalt concrete pavement***.
   - Look for **recycled content products** when purchasing other materials, from recycled plastic lumber to office supplies and indoor furnishings.

[2] Foundry sand is a silica sand byproduct of the metal casting industry. EPA and USDA have completed a risk evaluation of the use of foundry sand in manufactured soil and road sub-base. The conclusions of the risk evaluation are: 1) metal concentrations in the foundry sand samples were very similar to and often less than metal levels in native U.S. soils, and 2) the risk assessment demonstrated use of non-olivine sand from iron, steel, and aluminum foundries as an ingredient in manufactured soil, soil-less media, and road sub-base does not pose a threat to human health or the environment. Foundry sand must meet state beneficial use requirements (See www.envcap.org/statetools/fsand/).

* **Because reclaimed materials can contain contaminants, always check state environmental agency requirements for beneficial use to ensure that use of the material will not contaminate surface or ground water. Also check for local restrictions on the use of clean C&D materials as fill.**

2. When available, **specify** use of reclaimed materials. Look, too, for recycled content products. Buying recycled generates demand for recycled materials, closing the recycling loop.

3. Use the attached tracking sheet to **document** reuse and recycling. You can use the information compiled on this sheet to communicate to project partners and stakeholders the results of your green remediation efforts.

A Note on EPA's Comprehensive Procurement Guidelines
Under RCRA Section 6002 (a) and Executive Order 13423, EPA is required to designate products that are, or can be made with, recovered materials and to recommend practices for buying these products. **Procuring agencies (federal, state, local agencies or government contractors) that spend more than $10,000 a year on a designated item are required to purchase it with the highest recovered material content level practicable.** EPA's Comprehensive Procurement Guidelines offer products in a number of categories appropriate for cleanup projects, including construction and transportation products. See www.epa.gov/cpg.

Sample Specifications

National Standards and Specifications for various industrial byproducts, compiled by the Recycled Materials Resource Center: www.rmrc.unh.edu/tools/uguidelines/index.asp

Indiana DOT Recycled Foundry Sand Standards:
www.in.gov/dot/div/contracts/standards/rsp/sep07/200/200-R-401%20070901.pdf

Arizona DOT Asphalt Rubber Specifications:
www.asphaltrubber.org/ari/Specifications/ADOT_AR_Binder_Spec.doc

Additional Resources

EPA Industrial Materials Recycling Resources: www.epa.gov/industrialmaterials

FHWA Tools and Resources for Using Industrial By-Product Materials in Road Construction: www.fhwa.dot.gov/pavement/recycling/rectools.cfm

User Guidelines for the use of various industrial byproducts compiled by the Recycled Materials Resource Center: www.rmrc.unh.edu/tools/uguidelines/index.asp

State-Specific Resources

The Beneficial Use State Program Locator provides an overview of individual state rules and programs addressing beneficial use, including a state contact: www.envcap.org/statetools/brsl/

Michigan DEQ Solid Waste Exemptions and Guidance: www.michigan.gov/deq/0,1607,7-135-3312_4123-14201--,00.html

Minnesota Environmentally Preferable Purchasing Guide: www.rethinkrecycling.com/government/eppg

Ohio EPA Fact Sheet: Clean Hard Fill: www.epa.state.oh.us/portals/34/document/guidance/gd_563.pdf

Ohio EPA Guidance Document: Disposal and Beneficial Use of Construction and Demolition Debris: www.epa.state.oh.us/portals/34/document/guidance/gd_560.pdf

Ohio EPA Guidance Document: Beneficial Uses of Scrap Tires: www.epa.state.oh.us/portals/34/document/guidance/gd_671.pdf

Ohio EPA Guidance Document: Considerations for Development On or Adjacent To a Closed Solid Waste Landfill: www.epa.state.oh.us/LinkClick.aspx?fileticket=loETtOWQw0g%3d&tabid=2597

The EPA Region 5 Interim Resource Guide *Greener Cleanups through Sustainable Materials Management* is a working document. It will be updated as more information becomes available and experience with greener cleanups grows. Please contact Julie Gevrenov with questions and suggestions (312-886-6832, gevrenov.julie@epa.gov).

Greener Cleanups Materials Reuse & Recycling Tracking Sheet

Site	Material	Amount *(Short Tons)*	Reused or Recycled?	How?	Avoided GHG Emissions *(MTCO2E)*	Calculator Used[3]	Cost Savings *if applicable*
Example	*concrete*	*1,000*	*recycled*	*Crushed and reused in new concrete pavement onsite*	*47*	*WARM*	
Total Short Tons Material Reused or Recycled			Total Associated Avoided GHG Emissions (MTCO2E)				

[3] EPA's Waste Reduction Model (WARM) can be used to estimate the greenhouse gas emissions reductions achieved by reusing or recycling materials rather than disposing of them in a landfill. The web-based calculator can be accessed at www.epa.gov/warm.