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Dredged Material Reclamation at the Jones Island Confined Disposal Facility

Innovative Technology Evaluation Report

National Risk Management Research Laboratory
Office of Research and Development
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Notice

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Foreword

The U.S. Environmental Protection Agency is charged by Congress with protecting the Nation's land, air, and water resources. Under a mandate of national environmental laws, the Agency strives to formulate and implement actions leading to a compatible balance between human activities and the ability of natural systems to support and nurture life. To meet this mandate, EPA's research program is providing data and technical support for solving environmental problems today and building a science knowledge base necessary to manage our ecological resources wisely, understand how pollutants affect our health, and prevent or reduce environmental risks in the future.

The National Risk Management Research Laboratory (NRMRL) is the Agency's center for investigation of technological and management approaches for reducing risks from threats to human health and the environment. The focus of the Laboratory's research program is on methods for the prevention and control of pollution to air, land, water, and subsurface resources; protection of water quality in public water systems; remediation of contaminated sites and ground water; and prevention and control of indoor air pollution. The goal of this research effort is to catalyze development and implementation of innovative, cost-effective environmental technologies; develop scientific and engineering information needed by EPA to support regulatory and policy decisions; and provide technical support and information transfer to ensure effective implementation of environmental regulations and strategies.

This publication had been produced as part of the Laboratory's strategic long-term research plan. It is published and made available by EPA's Office of Research and Development to assist the user community and to link researchers with their clients.

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Abstract

The Jones Island Confined Disposal Facility (JICDF) located in Milwaukee Harbor Wisconsin, receives dredged materials from normal maintenance of Milwaukee's waterways, and has done so for many years. Like many CDFs across the country, Jones Island faces the dilemma of steady inputs and no feasible alternative for expansion. The U.S. Army Corps of Engineers (USACE) in partnership with the Milwaukee Port Authority is exploring a large range of beneficial reuse options for the dredged material, from building and road fill, to landscape material.

Aged dredged material at Jones Island is heterogeneous in composition because it comes from waterway sources over a wide area over many years. Some dredged materials contain EPA listed wastes from industrial discharge, spills, and urban run-off in varying concentrations. Natural attenuation processes occur at differing rates due to random placement in the CDF and fluctuating oxygen and moisture levels and weathering impacts.

The first step taken on this project toward determining appropriate end use of the stored material was a detailed characterization across the CDF with samples taken at three depths and analyzed for PAHs, PCBs, DRO, and metals. The resultant map showed areas of high and low concentrations, and pinpointed areas of opportunity for testing. Concurrent treatability studies conducted by the USACE using crops and grasses determined that plants would survive in the material and degrade the contaminants. A corn hybrid had the highest degradation effect over the short test period.

Field plots were established on the CDF by excavating, mixing, and depositing soil in test cells. The test plots closely follow established protocols for plot size, sampling, and statistical design. The field demonstration involved four different treatment plots: hybrid corn, an indigenous willow, local grasses, and an unplanted control. The EPA Superfund Innovative Technology Evaluation Program (SITE) and USACE evaluated the demonstration for a two-year period (2001-2002). The effectiveness of the various plantings was monitored directly through soil sampling and indirectly with a variety of plant assessments.

This Innovative Technology Evaluation Report presents the results from sampling, monitoring, and modeling efforts to date.

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Acronyms, Abbreviations and Symbols

ac	ac
AQMD	Air Quality Management District
ARAR	Applicable or Relevant and Appropriate Regulation
^{o}C	Degree Centigrade
CAA	Clean Air Act
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CDF	Confined Disposal Facility
CERCLA	Comprehensive Environmental Response, Cleanup, and Liability Act
CFR	Code of Federal Regulations
cm	centimeter
CV	Coefficient of Variation
CWA	Clean Water Act
DOER	Dredging Operations and Environmental Research
DRO	Diesel Range Organic
EPA	U.S. Environmental Protection Agency
^{o}F	Degree Fahrenheit
ECD	Election Capture Detection
ERDC	Engineer Research and Development Center
FID	Flame Ionization Detection
ft	foot
FY	Fiscal Year
g	gram
gal	gallon (US)
GC/MS	Gas Chromatography/Mass Spectrometry
ha	hectare
HASP	Health and Safety Plan
HAP	Hazardous Air Pollutant
HAZWOPER	Hazardous Waste Operations and Emergency Response
in	inch
ITER	Innovative Technology Evaluation Report
JICDF	Jones Island Confined Disposal Facility
kg	kilogram
km	kilometer
L or l	liter
LCS/LCSD	Laboratory Control Sample/Laboratory Control Sample Duplicate
LRD	Lower Reference Datum
m	meter
mg	milligram
mi	standard mile
mm	millimeter
MS/MSD	Matrix Spike/Matrix Spike Duplicates
NAAQS	National Ambient Air Quality Standards
NOAA	National Oceanic and Atmospheric Administration
NCP	National Contingency Plan
NESHAP	National Emission Standards for Hazardous Air Pollutants

Acronyms, Abbreviations and Symbols(Cont'd)

NPDES	National Pollution Discharge Elimination System
NPL	National Priority List
NPK	Nitrogen, Phosphorous, and Potassium
NRMRL	National Risk Management Research Laboratory
O&M	Operations & Maintenance
OSHA	Occupational Safety and Health Administration
OSWER	Office of Solid Waste and Emergency Response
ORD	Office of Research and Development
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PPE	Personal Protective Equipment
ppm	part per million
PVC	Polyvinyl chloride
QA/QC	Quality Assurance/Quality Control
RCL	Residual Cleanup Level
RCRA	Resource Conservation and Recovery Act
RTDF	Remediation Technologies Demonstration Forum
s	second
SAIC	Science Applications International Corporation
SARA	Superfund Amendments and Reauthorization Act
SDWA	Safe Drinking Water Act
SIM	Selective Ion Monitoring
SITE	Superfund Innovative Technology Evaluation Program
T=0	Baseline Sampling Event
T=1	Mid-Term Sampling Event
T=2	Final Sampling Event
TER	Technology Evaluation Report
TSCA	Toxic Substances Control Act
UCL	Upper Control Limit
ug	microgram
USACE	U.S. Army Corps of Engineers
VOC	Volatile Organic Compound
WDNR	Wisconsin Department of Natural Resources

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