
PUBLIC REVIEW DRAFT

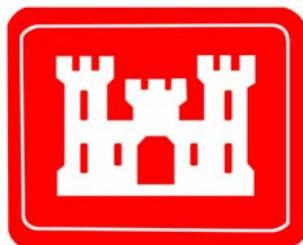
FIVE-YEAR REVIEW REPORT

INITIAL FIVE-YEAR REVIEW REPORT

FOR

**FORMERLY UTILIZED SITES REMEDIAL ACTION
PROGRAM (FUSRAP) ST. LOUIS SITES
ST. LOUIS, MISSOURI**

PREPARED BY



**US Army Corps
of Engineers®**

ST. LOUIS DISTRICT

June 23, 2004

PUBLIC REVIEW DRAFT

Five-Year Review Report

Initial Five-Year Review Report

for

FUSRAP St. Louis Sites

St. Louis, Missouri

June 23, 2004

PREPARED BY

**U.S. Army Corps of Engineers, St. Louis District
Formerly Utilized Sites Remedial Action Program
8945 Latty Avenue
Berkeley, MO 63134**

Approved by:

Date:

[Name]
[Title]
[Affiliation]

Approved by:

Date:

[Name]
[Title]
[Affiliation]

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
LIST OF TABLES.....	ii
LIST OF FIGURES	iii
LIST OF APPENDICES.....	iii
ACRONYMS AND ABBREVIATIONS	iv
EXECUTIVE SUMMARY	ES-1
FIVE-YEAR REVIEW SUMMARY FORM.....	S-1
I. INTRODUCTION.....	I-1
II. SITE CHRONOLOGY.....	II-1
III. BACKGROUND.....	III-1
IV. ST. LOUIS SITE RESPONSE ACTIONS.....	IV-1
V. PROGRESS SINCE THE LAST REVIEW	V-1
VI. FIVE-YEAR REVIEW PROCESS	VI-1
VII. TECHNICAL ASSESSMENT.....	VII-1
VIII. ISSUES	VIII-1
IX. RECOMMENDATIONS AND FOLLOW-UP ACTIONS	IX-1
X. PROTECTIVENESS STATEMENT	X-1
XI. NEXT REVIEW	XI-1
XII. REFERENCES	XII-1

LIST OF TABLES

Table ES-1.	St. Louis Downtown Site Remedial Action Summary	ES-1
Table ES-2.	SLAPS Removal Action Summary.....	ES-2
Table ES-3.	HILL and VP-2(L) Removal Action Summary.....	ES-3
Table II-1.	Chronology of Site Events.....	II-1
Table III-1.	St. Louis Downtown Site Properties.....	III-4
Table III-2.	North St. Louis County Site Properties – SLAPS and SLAPS VPs	III-11
Table III-3.	North St. Louis County Site Properties – The HILL and HILL/Latty VPs.....	III-13
Table III-4.	North St. Louis County Site Properties – Coldwater Creek	III-15
Table IV-1.	St. Louis Downtown Site Remedial Activities Summary.....	IV-6
Table IV-2.	SLAPS Removal Action Summary.....	IV-18
Table IV-3.	HILL Stockpiles Removal Summary	IV-19
Table VI-1.	List of Response Action Documents.....	VI-2
Table VI-2.	List of Implementation Documents	VI-3
Table VI-3.	List of Response Action Evaluation Documents	VI-4
Table VI-4	Revised Background Values for the North St. Louis County Sites HZ-C/HZ-E Hydrostratigraphic Zones	VI-8
Table VI-5.	Summary of Wastewater Discharges at the SLDS	VI-29
Table VI-6.	External Gamma Radiation Monitoring Results at the SLDS	VI-35
Table VI-7.	External Gamma Dose Rate at the SLDS	VI-35
Table VI-8.	Air Particulate Monitoring at the SLDS	VI-36
Table VI-9.	Airborne Particulate Dose Rate at the SLDS	VI-37
Table VI-10.	Radon Monitoring at the SLDS	VI-38
Table VI-11.	Radon Concentration and Dose Rate at the SLDS.....	VI-38
Table VI-12.	External Gamma Radiation Monitoring at the SLAPS.....	VI-40
Table VI-13.	External Gamma Dose Rate at the SLAPS	VI-40
Table VI-14.	Air Particulate Monitoring at the SLAPS	VI-41
Table VI-15.	Airborne Particulate Dose Rate at the SLAPS.....	VI-42
Table VI-16.	Radon Monitoring at the SLAPS	VI-42
Table VI-17.	Radon Concentration and Dose Rates at the SLAPS.....	VI-43
Table VI-18.	External Gamma Radiation Monitoring at the HILL	VI-45
Table VI-19.	External Gamma Dose Rate at the HILL	VI-45
Table VI-20.	Air Particulate Monitoring at the HILL	VI-46
Table VI-21.	Airborne Particulate Dose Rate at the HILL	VI-47
Table VI-22.	Radon Monitoring at the HILL	VI-48
Table VI-23.	Radon Concentration and Dose Rate at the HILL.....	VI-48
Table VI-24.	Radon Release Rate at the HILL	VI-49
Table VI-25.	SLS Confirmatory Soil Sampling Program Completed Actions	VI-50
Table VII-1.	Changes in Standards and Investigation Limits.....	VII-3
Table VIII-1.	SLDS Issue.....	VIII-1
Table VIII-2.	North St. Louis County Sites Issue	VIII-2

LIST OF FIGURES

Figure III-1.	Location Map of the St. Louis Sites.....	III-2
Figure III-2.	Plan View of the SLDS.....	III-3
Figure III-3.	Generalized Stratigraphic Columns for the SLDS.....	III-5
Figure III-4.	North St. Louis County Site Map	III-9
Figure III-5.	Location of Hazelwood Interm Storage Site (HISS)	III-10
Figure III-6.	Generalized Stratigraphic Column for the SLAPS and the HISS.....	III-18
Figure IV-1.	St. Louis Airport Site	IV-17
Figure VI-1.	Ground-water Monitoring Well Locations at the HISS in CY 2002	VI-12
Figure VI-2.	Trend Analysis at the HISS.....	VI-13
Figure VI-3.	Ground-water Monitoring Well Locations at the SLAPS in CY 2002	VI-18
Figure V1-4.	Trend Analysis at the SLAPS-Arsenic	VI-21
Figure VI-5.	Trend Analysis at the SLAPS-Selenium.....	VI-23
Figure VI-6.	Trend Analysis at the SLAPS-Total Uranium	VI-25
Figure VI-7.	Trend Analysis at the SLAPS-Trichloroethene	VI-26
Figure VI-8.	Ground-water Monitoring Well Locations at the SLDS in CY 2002	VI-28
Figure VI-9.	Trend Analysis at the SLDS	VI-30
Figure VI-10.	Trend Analysis for Wells Exceeding Investigative Limits at the SLDS ...	VI-31
Figure VI-11.	Trend Analysis for Radionuclides in Coldwater Creek Surface Water	VI-55
Figure VI-12.	Trend Analysis for Radionuclides in Coldwater Creek Sediment	VI-56

LIST OF APPENDICES

APPENDIX A - LIST OF DOCUMENTS REVIEWED

APPENDIX B - SUMMARIES OF DOCUMENTS REVIEWED

APPENDIX C - SITE INSPECTION REPORTS

ACRONYMS AND ABBREVIATIONS

µCi/mL	microcuries per milliliter
µg/L	micrograms per liter
µL/L/hr	microliters per liter per hour
Ac	actinium
ADM	Archer Daniels Midland
AEC	Atomic Energy Commission
ARAR	applicable or relevant and appropriate requirement
As	arsenic
ATD	alpha track detector
AWQC	ambient water quality criteria
bgs	below ground surface
Cd	cadmium
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
Ci	curies
cm	centimeter
cm/s	centimeter/second
COC	contaminant of concern
CSR	Code of State Regulations
C-T	columbium and tantalum
CWP	Construction Work Plan
CY	calendar year
DCE	dichloroethene
DCGLs	Derived Concentration Guideline Limit
DDE	deep dose equivalent
DOE	U.S. Department of Energy
EDE	effective dose equivalent
EE/CA	engineering evaluation/cost analysis
EMDAR	Environmental Monitoring Data and Analysis Report
FFA	Federal Facility Agreement
FS	feasibility study
FSS	Final Status Survey
FUSRAP	Formerly Utilized Sites Remedial Action Program
FY	fiscal year
gal	gallon(s)
GIFREHC	General Investment Funds Real Estate Holding Company
GRAAA	Ground-Water Remedial Action Alternative Assessment
HISS	Hazelwood Interim Storage Site
HU	hydrostratigraphic unit
HZ	hydrostratigraphic zone
IA	investigation area
IL	investigative limit
in.	inch(es)
IT	IT Corporation
K-Pad	Building K foundation
LTS	long-term stewardship

ACRONYMS AND ABBREVIATIONS (Cont'd)

MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MCL	maximum contaminant level
MDNR	Missouri Department of Natural Resources
MED	Manhattan Engineer District
m ²	square meter
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MI	Mallinckrodt, Inc.
MOU	Memorandum of Understanding
mrem/hr	millirem per hour
mrem/yr	millirem per year
MSD	Metropolitan St. Louis Sewer District
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
ND	non-detect
NESHAP	National Emission Standards for Hazardous Air Pollutants
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NRC	Nuclear Regulatory Commission
O&M	operations and maintenance
ORNL	Oak Ridge National Laboratory
OU	operable unit
pCi/g	picocuries per gram
pCi/L	picocuries per liter
pCi/m ² /s	picocuries per square meter per second
PRG	preliminary remediation goal
Ra	Radium
RAO	Remedial action objective
RAWP	Removal Action Work Plan
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RG	Remediation Goal
RI	remedial investigation
Rn	Radon
ROD	record of decision
ROW	right-of-way
SAIC	Science Applications International Corporation
SARA	Superfund Amendments and Reauthorization Act of 1986
SLAPS	St. Louis Airport Site
SLDS	St. Louis Downtown Site
SLS	St. Louis Site
SMCL	secondary maximum contaminant level
SOR	sum of ratios
SU	survey unit
TCE	Trichloroethene
TEDE	total effective dose equivalent

ACRONYMS AND ABBREVIATIONS (Cont'd)

Th	Thorium
TLD	thermoluminescent dosimeter
U	Uranium
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
VP	vicinity property
yd ³	cubic yard