Westinghouse Non-Proprietary Class 3

Record of Decision
Operable Unit 1
Buried Waste, Impacted Soils, and Sediment

Westinghouse Electric Company LLC
Former Fuel Cycle Facility, Hematite, Missouri

May 18, 2009

Westinghouse

3300 State Road P, Festus, MO 63028

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TABLE OF CONTENTS

Page

PART 1 - DECLARATION FOR THE RECORD OF DECISION

1.1 SITE NAME AND LOCATION 1-2
1.2 STATEMENT OF BASIS AND PURPOSE 1-2
1.3 ASSESSMENT OF THE SITE 1-2
1.4 DESCRIPTION OF THE SELECTED REMEDY 1-2
1.5 STATUTORY DETERMINATIONS 1-3
1.6 RECORD OF DECISION DATA CERTIFICATION CHECKLIST 1-3
1.7 AUTHORIZING SIGNATURES AND APPROVALS 1-4

PART 2 - THE DECISION SUMMARY

2.1 SITE NAME, LOCATION AND BRIEF DESCRIPTION 2-2
2.1.1 Site Name and Location 2-2
2.1.2 Site Description 2-2
2.1.3 Lead and Support Agencies 2-2
2.1.3.1 Atomic Energy Commission/Nuclear Regulatory Commission 2-2
2.1.3.2 Missouri Department of Natural Resources 2-2

2.2 SITE HISTORY, PREVIOUS INVESTIGATIONS, AND RESPONSE ACTIONS 2-3
2.2.1 Site History 2-3
2.2.2 Previous Investigations and Response Actions 2-3
2.2.2.1 Remedial Investigation 2-3
2.2.2.2 CERCLA Removal Actions 2-4
2.2.2.3 Supplemental Site Radiological Characterization 2-4
2.2.2.4 Ongoing Environmental Monitoring Programs 2-4

2.3 COMMUNITY PARTICIPATION 2-5

2.4 SCOPE AND ROLE OF OPERABLE UNIT 2-6

2.5 SITE CHARACTERISTICS 2-7
2.5.1 Physical Site Location 2-7
2.5.2 Topography, Drainage, and Surface Water 2-7
2.5.3 Stratigraphy 2-8
2.5.4 Geology/Soil 2-9
2.5.5 Hydrogeology/Ground Water 2-9
2.5.6 Climatology 2-9
2.5.7 Rare, Threatened, and Endangered Species 2-10
2.5.8 Archaeological and Historical Sites 2-10
2.5.9 Conceptual Site Model 2-10

TABLE OF CONTENTS
(CONTINUED)

Page

2.6 CURRENT AND POTENTIAL FUTURE LAND USE 2-11

2.7 SUMMARY OF SITE RISKS 2-12
- 2.7.1 Human Health Risks 2-12
  - 2.7.1.1 COPCs and Exposure Point Concentrations 2-13
  - 2.7.1.2 Exposure Assessments 2-13
  - 2.7.1.3 Toxicity Assessment 2-13
  - 2.7.1.4 Risk Characterization for Radiological Constituents 2-14
  - 2.7.1.5 Uncertainty Analysis 2-15
- 2.7.2 Ecological Risk 2-17

2.8 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS 2-17

2.9 BASIS FOR ACTION 2-19

2.10 REMEDIAL ACTION OBJECTIVES 2-19
- 2.10.1 Remedial Action Objectives 2-19
- 2.10.2 Derivation of Remediation Goals 2-20
  - 2.10.2.1 Chemical Preliminary Remedial Goals 2-20
  - 2.10.2.2 Radiological Derived Concentration Guideline Limits 2-21

2.11 DESCRIPTION OF ALTERNATIVES 2-21
- 2.11.1 Alternative 1: No Action 2-22
- 2.11.2 Alternative 2: In-Situ Containment with Access Control as Interim Remedial Action to Defer Final Remediation 2-22
- 2.11.3 Alternative 3: Removal, Treatment of VOC Waste, and Disposal of LLRW and Non-Hazardous Treatment Residues in an On-Site Facility 2-23
- 2.11.4 Alternative 4: Removal, Treatment of VOC Waste, and Off-Site Disposal of LLRW and Non-Hazardous Treatment Residues 2-25
- 2.11.5 Alternative 5: Removal and Off-Site Disposal 2-26

2.12 COMPARATIVE ANALYSIS OF THE ALTERNATIVES 2-27
- 2.12.1 Summary of the CERCLA Criteria 2-27
  - 2.12.1.1 Threshold Criteria 2-27
  - 2.12.1.2 Primary Balancing Criteria 2-27
  - 2.12.1.3 Modifying Criteria 2-28

TABLE OF CONTENTS
(CONTINUED)

Page

2.12.2 Comparison of the Alternatives using the CERCLA Criteria..... 2-29
2.12.2.1 Overall Protection of Human Health and the Environment. 2-29
2.12.2.2 Compliance with ARARs 2-29
2.12.2.3 Long-Term Effectiveness and Permanence 2-29
2.12.2.4 Reduction in Toxicity, Mobility, or Volume through Treatment 2-30
2.12.2.5 Short-Term Effectiveness 2-31
2.12.2.6 Implementability 2-32
2.12.2.7 Cost 2-32
2.12.2.8 State and Community Acceptance 2-33
2.12.3 Summary of Comparative Analysis 2-33

2.13 PRINCIPAL THREAT WASTES 2-34

2.14 SELECTED REMEDY 2-34
2.14.1 Rationale for the Selected Remedy 2-34
2.14.2 Description of the Selected Remedy 2-34
2.14.2.1 Site Preparation and Controls 2-35
2.14.2.2 Excavation 2-35
2.14.2.3 Removal of Contaminated Sediments 2-36
2.14.2.4 Treatment of VOC-Contaminated Soils 2-37
2.14.2.5 On-Site Water Treatment and Discharge 2-38
2.14.2.6 Off-Site Transportation and Disposal of Contaminated Soil and Waste 2-29
2.14.2.7 Site Restoration 2-40
2.14.3 Expected Outcome of the Selected Remedy 2-40

2.15 STATUTORY DETERMINATIONS 2-40
2.15.1 Protection of Human Health and the Environment 2-40
2.15.2 Compliance with Applicable or Relevant and Appropriate Requirements 2-41
2.15.3 Cost Effectiveness 2-41
2.15.4 Utilization of Permanent Solutions and Alternative Treatment Technology to the Maximum Extent Possible 2-42
2.15.5 Preference for Treatment as a Principal Element 2-42
2.15.6 Five-Year Review Requirements 2-42

2.16 DOCUMENTATION OF SIGNIFICANT AND OTHER CHANGES FROM THE PREFERRED ALTERNATIVE OF THE PROPOSED PLAN 4-43

TABLES
FIGURES

TABLE OF CONTENTS
(CONTINUED)

Page

PART 3 – RESPONSIVENESS SUMMARY

3.1 GENERAL 3-2

3.2 BACKGROUND ON COMMUNITY INVOLVEMENT 3-2

3.3 SUMMARY OF COMMENTS AND RESPONSES 3-3
- 3.3.1 Introduction 3-3
- 3.3.2 Westinghouse's Responses to Comments 3-3
  - 3.3.2.1 Westinghouse's Responses to General Comments 3-3
  - 3.3.2.2 Westinghouse's Responses to Specific Comments 3-9
- 3.3.3 Comments on the Proposed Plan for the Hematite Site with Responses Prepared by MDNR 3-19

3.4 REMEDIAL DESIGN AND REMEDIAL ACTION 3-40

APPENDIX A: WESTINGHOUSE RESPONSES TO COMMENTS ON RI AND OTHER PRIOR DOCUMENTS

LIST OF TABLES

Table No.	Title
1	Identified Areas of Concern, Operable Unit 1
2	Selection of Constituents of Potential Concern
3	Calculated Carcinogenic and Non-Carcinogen Risks, Exposure to Site-Related COPCs
4	Calculated Total Radiological Dose and Carcinogenic Risks
5	OU1 ARARs and TBC Guidance
6	Chemical Remediation Goals for Soils and Sediments

LIST OF FIGURES

Figure No.	Title
1	Site Location Map
2	Site Plan
3	Conceptual Site Model, Operable Unit 1
4	Conceptual Design, VOC Material Treatment Tanks

The tables and figures, all of which are cited in Section 2, follow the text of Section 2.

LIST OF ACRONYMS

AEC	Atomic Energy Commission
ALARA	As low as reasonably achievable
AOC	Area of concern
ARAR	Applicable or relevant and appropriate requirement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COPC	Constituent of potential concern
CSM	Conceptual site model
CSR	Code of State Regulations
DCGL	Derived Concentration Guideline Limit
DNAPL	Dense non-aqueous phased liquid
DOT	U.S. Department of Transportation
EE/CA	Engineering Evaluation and Cost Analysis
EPA	U.S. Environmental Protection Agency
EPC	Exposure point concentration
ESD	Explanation of Significant Differences
FS	Feasibility Study
ft-bgs	Feet below ground surface
ft-msl	Feet above mean sea level
GARDIAN	Gamma Radiation Detection and In-Container Analysis
GBCS	GARDIAN Box Counting System
gpm	Gallons per minute
HAER	Historic American Engineering Record
HAP	Hazardous air pollutant
HHRA	Human health risk assessment
HI	Hazard index
HQ	Hazard quotient
HSU	Hydrostratigraphic unit
IGMP	Interim Groundwater Monitoring Plan
LDR	Land Disposal Restriction
LLMW	Low-level mixed waste
LLRW	Low-level radioactive waste
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual

LIST OF ACRONYMS
(Continued)

MDNR	Missouri Department of Natural Resources
mph	Miles per hour
MRBCA	Missouri Risk-Based Corrective Action
mg/kg	Milligram per kilogram (parts per million)
mrem/yr	Millirem per year
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NESHAPS	National Emissions Standards for Hazardous Air Pollutants
NPDES	National Pollutant Discharge Elimination System
NRC	U.S. Nuclear Regulation Commission
O&M	Operation and maintenance
OU1	Operable Unit 1
PAH	Polynuclear aromatic hydrocarbon
ppb	Parts per billion
ppm	Parts per million
PCE	Perchloroethylene (tetrachloroethylene)
PRG	Preliminary remediation goal
RACM	Regulated asbestos-containing material
RAO	Remedial action objective
RCRA	Resource Conservation and Recovery Act
RfC	Reference concentration
RfD	Reference dose
RG	Remediation goal
RI	Remedial Investigation
ROD	Record of Decision
RSMo	Revised Statutes of Missouri
SAIC	Science Applications International Corporation
SLERA	Screening-Level Ecological Risk Assessment
SNM	Special nuclear material
SVE	Soil vapor extraction
TBC	To be considered (guidance)
TCE	Trichloroethylene
TEDE	Total Effective Dose Equivalent

LIST OF ACRONYMS
(Continued)

UCL	Upper confidence level (of the mean)
U.S.C.	United States Code
UUUE	Unlimited use and unrestricted exposure
VOC	Volatile organic compound

PART 1

THE DECLARATION

1.0 DECLARATION FOR THE RECORD OF DECISION

1.1 SITE NAME AND LOCATION

The Westinghouse Electric Company LLC (Westinghouse) Hematite Former Fuel Cycle Facility (Hematite Site or Site) is located at 3300 State Road P in Jefferson County, Missouri near the unincorporated village of Hematite. The Hematite Site is identified on the Comprehensive Environmental Response, Compensation, and Liability Information System (Site ID No. MOD 985770767) but is not currently on the National Priorities List.

1.2 STATEMENT OF BASIS AND PURPOSE

This decision document presents the Selected Remedy for Operable Unit 1 at the Hematite Site, which consists of the remediation of buried waste, impacted soil, and sediments. Groundwater impacted by project-related constituents of potential concern (COPCs) will be addressed subsequent to implementation of the Selected Remedy for Operable Unit 1.

The Operable Unit 1 Selected Remedy was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act, as amended by the Superfund Amendments and Reauthorization Act, and in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan. This decision is based on information documented in the Administrative Record for the Site.

Missouri Department of Natural Resources (MDNR) has reviewed the Record of Decision and has Approved the Selected Remedy in accordance with the terms of the Consent Decree entered between Westinghouse and MDNR. The Consent Decree provides for MDNR oversight of those portions of the investigation and selection of the remedy for Operable Unit 1 that are not preempted by the Atomic Energy Act of 1954, as amended. As noted herein, the Selected Remedy will be coordinated with the decommissioning process that Westinghouse is following in connection with its license with the U.S. Nuclear Regulatory Commission (NRC).

1.3 ASSESSMENT OF THE SITE

The response action selected in this Record of Decision is necessary to protect public health, public welfare, or the environment from actual or threatened releases of hazardous substances into the environment.

1.4 DESCRIPTION OF THE SELECTED REMEDY

The Selected Remedy for Operable Unit 1 at the Hematite Site is described in the Feasibility Study and the Proposed Plan as Alternative 4: Removal, Treatment of Volatile Organic Compound Waste, and Off-Site Disposal of Low-Level Radioactive Waste and Non-Hazardous Treatment Residues. To the extent practicable, the Selected Remedy provides for

treatment of the source materials constituting principal threat waste and associated impacted soils. Groundwater, as well as subsurface soils containing volatile organic compounds (VOCs) and situated below the groundwater table, are not addressed as part of this remedial activity but will be addressed in the future.

The main components of the Selected Remedy include the following:

- Exhumation of buried waste (including principal threat wastes in the Burial Pit Area) to meet the remediation goals (RGs) that support unlimited use and unrestricted exposure (UUUE) and disposal of impacted materials at off-site permitted facilities;

- Exhumation of impacted soil to meet the RGs that support UUUE and either treatment to standards that allow on-site reuse or disposal of impacted materials off-site at permitted facilities; and

- Exhumation of impacted sediment to meet the RGs that support UUUE and disposal off-site at permitted facilities.

The Selected Remedy provides the flexibility to allow treatment of low-level mixed waste (i.e., waste that is both hazardous and radiologically contaminated) at permitted off-site facilities if such off-site treatment is proven to be technical feasible and cost-effective.

1.5 STATUTORY DETERMINATIONS

The Selected Remedy meets the threshold criteria of being protective of human health and the environment, complies with requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. The Selected Remedy uses permanent solutions to the maximum extent practicable. Based on the information available at this time, Westinghouse believes that the Selected Remedy will achieve substantial and long-term risk reduction through treatment and disposal, will be cost-effective, will utilize permanent solutions and alternative treatment technologies to the maximum extent practicable, and will allow the property to be used for the most restrictive reasonably anticipated future land use. Under the decommissioning process, NRC requires future exposure scenarios based on most probable use; for the Site, Westinghouse is evaluating future land use by a residential farmer.

The Selected Remedy satisfies the statutory preference for treatment as a principal element of the remedy by primarily reducing the volume of wastes to be sent off-site and secondarily by reducing the toxicity of the VOCs in the wastes present at the Site.

1.6 RECORD OF DECISION DATA CERTIFICATION CHECKLIST

The following table is provided to summarize the key remedy selection information contained in this Record of Decision. The table also provides a “roadmap” of where this key information can be found in the Decision Summary Section (Part 2) of this Record of Decision. Additionally, supporting remedy selection information can be found in the

Administrative Record for the Site at the Festus Public Library, located at 300 N. Mill Street in Festus, Missouri.

Record of Decision Data Checklist Item	Decision Summary Page Number
☑ COPCs and their respective concentrations	2-13
☑ Baseline risk represented by the COPCs	2-13
☑ Remediation goals established for the COPCs and the basis for these goals	2-20
☑ How source materials constituting principal threats are addressed	2-34
☑ Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of ground water used in the Baseline Risk Assessment and Record of Decision	2-11
☑ Potential land use that will be available at the Site as a result of the Selected Remedy	2-11
☑ Estimated capital, annual operation and maintenance, and the total present worth costs, discount rate, and the number of years over which the remedy cost estimates are projected	2-42
☑ Key factor(s) that led to selecting the remedy	2-34

1.7 AUTHORIZING SIGNATURES AND APPROVALS

WESTINGHOUSE ELECTRIC COMPANY LLC

E. Kurt H

6/17/09

E. Kurt Hackmann
Decommissioning Project Manager
Westinghouse Electric Company, LLC

Date

The department Approves this Record of Decision in accordance with the terms of the Consent Decree.

Daniel Schuette

7/21/09

Daniel Schuette, Director
Division of Environmental Quality
Missouri Department of Natural Resources

Date

PART 2

THE DECISION SUMMARY

2.0 THE DECISION SUMMARY

2.1 SITE NAME, LOCATION, AND BRIEF DESCRIPTION

2.1.1 Site Name and Location

The Westinghouse Electric Company LLC (Westinghouse) Hematite Former Fuel Cycle Facility (Hematite Site or Site) is located at 3300 State Road P in Jefferson County, Missouri near the unincorporated village of Hematite (Figure 1). The Hematite Site is identified on the Comprehensive Environmental Response, Compensation, and Liability Information System (Site ID No. MOD 985770767) but is not currently on the National Priorities List.

2.1.2 Site Description

The Westinghouse Hematite property consists of 228 acres, with the primary operations for nuclear fuel manufacturing historically being conducted within approximately 8 acres of the property. As used throughout this document, and consistent with the Remedial Investigation (RI) Report, the "Hematite Facility" refers to the historical primary operations area as well as Site Pond and Burial Pit Area, while the "Hematite Site" refers to the Hematite Facility plus other areas that were the focus of investigations based on potential impacts by previous Facility operations. Figure 2 shows the Hematite Site, the extent of Westinghouse property, and the former primary operations area.

2.1.3 Lead and Support Agencies

2.1.3.1 Atomic Energy Commission/Nuclear Regulatory Commission

The Atomic Energy Commission (AEC) and later the U.S. Nuclear Regulatory Commission (NRC) have regulated licensed operations throughout the history of the Hematite Facility. AEC/NRC licensing regulations applicable to Hematite operations from 1956 to present include those contained in Title 10 of the Code of Federal Regulations (CFR), Parts 30 through 36, 40, 70, 71, 73, and 74. The original Special Nuclear Material (SNM) License for the Hematite Facility (License No. SNM-33) was issued by the AEC to Mallinckrodt Chemical Works (Mallinckrodt) on June 18, 1956.

2.1.3.2 Missouri Department of Natural Resources

The State of Missouri has been involved in regulatory and remedial aspects at the Hematite Site for over a decade. The state's initial involvement with groundwater characterization began in 1996. In 2002, Westinghouse and the Missouri Department of Natural Resources (MDNR) entered into a Letter Agreement, which, among other things, provided for MDNR oversight of certain studies and response actions in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) under the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. §§ 9601 et seq. Subsequently, Missouri and Westinghouse entered into a Consent

Decree, and the Letter Agreement was terminated. The Consent Decree provides for MDNR oversight of those portions of the investigation and selection of the remedy for Operable Unit 1 (OU1) that are not preempted by the Atomic Energy Act of 1954, as amended.

2.2 SITE HISTORY, PREVIOUS INVESTIGATIONS, AND RESPONSE ACTIONS

2.2.1 Site History

Nuclear-related operations at the Hematite Facility began in 1956 after the purchase of the property by Mallinckrodt. In addition to Mallinckrodt, various entities owned and operated the Hematite Facility over the years before Westinghouse acquired it in 2000.

Throughout its history, the primary activity at the Facility was producing uranium metal and compounds from enriched uranium. The uranium metals and compounds were used to produce nuclear reactor fuel. Secondary activities included uranium scrap recovery and limited work with thorium compounds. Prior to 1974, most of the Facility operations were related to work for the U.S. Government, some of which was classified. After 1974, Facility operations focused on commercial fuel production.

In 2001, Westinghouse ceased fuel production at the Hematite Facility and requested from NRC an amendment of its nuclear materials license to change the scope of licensed activities to those focused on decommissioning. NRC issued the requested license amendment in 2002.

2.2.2 Previous Investigations and Response Actions

The following sections briefly describe previous Site investigations. More detail can be found in the referenced reports, especially the RI Report.

2.2.2.1 Remedial Investigation

Between 2003 and 2005, Science Applications International Corporation (SAIC) conducted the RI for the Hematite Site under contract to Westinghouse. In accordance with CERCLA and the NCP, the objective of the RI was to characterize environmental media at the Site sufficiently to allow for the evaluation of the need for remedial action and, if remedial action was deemed necessary, for the development and evaluation of remedial alternatives in the Feasibility Study (FS). Building on the findings of prior studies, and through an extensive field investigation and analytical program, the RI established the basis for an understanding of the geology, hydrology, and the nature and extent of contamination in surface water, soils, and groundwater at the Hematite Site and used these data to evaluate potential human health and ecological risks posed by chemicals of potential concern (COPCs) associated with these media.

Coupled with process knowledge for the Hematite Facility and known potential source areas for contaminants, the RI studies led to the development of a conceptual site model (CSM)

from which the fate and transport of COPCs in groundwater were assessed. The CSM also formed the basis from which a groundwater flow and transport model was constructed and calibrated against empirical data. Further groundwater monitoring, as defined in the MDNR-approved Interim Groundwater Monitoring Plan (IGMP), is being conducted to refine and enhance, as needed, the CSM and fate and transport analyses presented in the RI.

2.2.2.2 CERCLA Removal Actions

In addition to the development of the RI, Westinghouse has taken a number of other steps over the last several years in response to environmental conditions at and around the Site. Various actions from 2002 through 2005 were implemented to address off-site groundwater impacts (i.e., provision of alternative water supplies to affected residents), to remove uranium-impacted soils from an on-site area known as Deul's Mountain, and to remove radiologically contaminated and other equipment from the property. Each of these actions was conducted in accordance with the NCP and NRC regulations if applicable. Review, approval, and oversight were conducted by the respective regulatory agency (i.e., NRC and/or MDNR).

2.2.2.3 Supplemental Site Radiological Characterization

Westinghouse conducted additional Site radiological characterization in November 2007 and in June and July 2008. These supplemental investigations were conducted to provide additional information regarding the radiological conditions of specific portions of the Site, specifically, the Burial Pits, soils beneath the process buildings, and other on-site areas with potential radiological contamination in surface or subsurface soils. This information is being used in planning the remediation of radiological materials and will be documented in the decommissioning plan to be submitted to NRC.

Concurrent with the supplemental radiological characterization, Westinghouse collected additional data regarding VOCs in select areas of the Site. These data will also be used in remedial planning and design.

Several shallow wells were also installed in the vicinity of the Burial Pits to conduct pump and recharge rate tests and to measure drawdown of neighboring wells. This testing was performed to help estimate the volume of water to be managed and disposed under remedial alternatives that include excavation technologies.

2.2.2.4 Ongoing Environmental Monitoring Programs

Stormwater runoff and treated wastewater discharges from the Site currently pass through five outfalls that are monitored regularly for flow rate and water quality parameters. These discharges are regulated by MDNR under a Water Pollution Control Program permit, and effluent monitoring results are provided quarterly to the State. "Treated wastewater" currently refers to domestic sewage and water collected during Site investigations. During the remedy, treated wastewater will also include water collected within excavations from rain and perched groundwater infiltration.

Beginning in June 2007, Westinghouse has conducted the comprehensive Site groundwater monitoring program defined in the IGMP. This effort includes 106 wells that are checked for water levels, recharge rates during pumping, various water quality parameters, volatile organic compounds (VOCs), or radiological parameters according to the classification of the well. These data are being compiled and will be used to further assess the conditions of groundwater prior to the development of future response actions.

In addition to these activities, certain environmental monitoring requirements are also specified in Westinghouse's NRC license. As Site decommissioning and remedial action proceed, environmental monitoring efforts will be expanded per both MDNR and NRC requirements.

2.3 COMMUNITY PARTICIPATION

Westinghouse has actively sought public input so that the remedy selected for OU1 addresses the expressed concerns of the local community. The Administrative Record contains the documentation used to support the Selected Remedy and is available for review at the following location:

Festus Public Library
300 N. Mill Street
Festus, Missouri 63028

The FS, which is included in the Administrative Record, also includes a detailed list of references with citations to all of the MDNR, NRC, and U.S. Environmental Protection Agency (EPA) guidance documents cited in this Record of Decision (ROD).

A letter announcing the publication and availability of the Proposed Plan as well as the public meeting on the Proposed Plan and the public comment period was sent to residents on the Site mailing list, including local elected officials. Legal advertisements announcing the availability of the Proposed Plan, public meeting, and public comment period were published in the *Jefferson County Leader* on June 26, 2008 and in the *St. Louis Post Dispatch Suburban Journal* on June 28, 2008.

The public meeting was held on July 10, 2008 at the National Guard Armory on State Road P in Festus, Missouri. The meeting, which was conducted by Westinghouse in coordination with MDNR, included a presentation of the proposal, a group question and answer session (including an offer to allow attendees to make verbal statements for the record), and a one-on-one private question-and-answer session. In addition, an offer was made to receive written or electronic comments. The initial comment period was scheduled to expire on July 26 but was subsequently extended to August 15, 2008.

Based on the lack of adverse comments from the local community, Westinghouse believes the community supports the Selected Remedy. The sole submittal of comments by mail was from legal counsel for past owners and operators of the Hematite Facility. Those comments, along with responses, are included in Section 3.0, the Responsiveness Summary. The comments included questions or statements pertaining, among other things, to regulatory

authority, suggestions to modify Alternative 2 (encapsulation in place and slurry wall installation), and groundwater impact interpretation.

In response to the comments, the Responsiveness Summary provides further explanation of regulatory authority for this action. The Responsiveness Summary also explains that Alternative 2, even if modified, would not comply with applicable regulatory requirements. Also, the Responsiveness Summary points out that the groundwater investigation is on-going and that a proposal for a remedy for groundwater impacts has not been made.

After consideration of comments received, it was deemed appropriate by Westinghouse and MDNR to proceed with the Selected Remedy.

2.4 SCOPE AND ROLE OF OPERABLE UNIT

The NCP defines an operable unit as "a discrete action that comprises an incremental step toward comprehensively addressing site problems" (40 CFR 300.5). At the Hematite Site, OU1 addresses buried waste, impacted soils, and impacted sediments. As discussed in greater detail in Section 2.10.1, the objectives of the response action for OU1 include: 1) to eliminate materials that could potentially pose an unacceptable human health risk due to direct exposure to radiological and chemical constituents; 2) to remove materials that cause or contribute radiological and chemical constituents to groundwater and potentially result in unacceptable human health risk; and 3) to address materials whose radiological or chemical contamination levels exceed allowable levels specified by legally applicable or relevant and appropriate Federal and State laws and regulations. The selected remedy for OU1 will accomplish the following:

- Remove and dispose or treat contaminated materials that pose unacceptable risk for future potential exposure scenarios (some of which is identified as Principal Threat Waste as defined by EPA November 1991 guidance);

- Remove and dispose or treat contaminated materials which, if left in place, would provide an on-going contaminant source to groundwater; and

- Remove and dispose or treat contaminated materials that exceed legally allowable levels specified by applicable or relevant and appropriate Federal and State laws and regulations.

OU1 specifically addresses VOC-impacted soils in the vadose zone above the groundwater table. VOC-impacted soils in the saturated zone and groundwater will be the focus of future response actions.

2.5 SITE CHARACTERISTICS

2.5.1 Physical Site Location

The Hematite Site is located in Jefferson County, Missouri, approximately ¾ mile northeast of the unincorporated town of Hematite, four miles southwest of the town of Festus, and 35 miles south of the city of St. Louis. Figure 1 shows a site location map for the facility. The address is 3300 State Road P, Festus, Missouri 63028.

2.5.2 Topography, Drainage, and Surface Water

The topography in the region of the Hematite Site consists of gently rolling hills dissected by streams. The Site sits on a transitional grade between rolling hills directly to the north and Joachim Creek to the south. In the immediate vicinity of the Hematite Site, Joachim Creek is at an elevation of approximately 410 feet above mean sea level (ft-msl) and occupies a narrow valley that trends east-northeast. The valley is bounded both to the north and south by uplands that reach elevations in excess of 600 ft-msl. A number of intermittent streams exist as tributaries to Joachim Creek resulting in the distinctive dissected topography characteristic of this region.

Most infiltration from precipitation in the vicinity of the Hematite Site follows short, subsurface flow paths in soils and alluvial sediments and discharges into local streams. Remaining flow enters the bedrock recharging bedrock aquifers. Groundwater flow in shallow bedrock formations is influenced by local topography, with short flow paths followed by discharge at seeps and springs or into the alluvium.

There are several surface water features present on the Hematite Site. Surface water tributaries generally flow southeast or northwest from the highlands to their points of confluence with Joachim Creek. These surface water features are summarized as follows:

- The Site spring flows at an estimated 10 gallons per minute (gpm) for most of the year; however, flows from this spring can be significantly greater depending on seasonal precipitation levels. The spring is likely a result of fracture flow in the Jefferson City-Cotter Dolomite that receives its source water from the hills northwest of the Hematite Site.

- The Site Pond is a small concrete dam impoundment southwest of the facility. It receives flow from the Site spring and stormwater runoff from much of the Facility.

- The Site Creek is fed by overflow from the Site Pond dam. It passes through a culvert crossing beneath the railroad track and joins an unnamed tributary that is the receiving stream for the entire Virginia Drainage Basin. The Site Creek is also the receiving stream for the Hematite Facility stormwater runoff and treated wastewater.

- The combined Lake Virginia/Site Creek tributary flows east to Joachim Creek.

- The northeast Site Creek flows southeast, then east to its confluence with the East

Lake tributary. That tributary then eventually joins Joachim Creek.

- East Lake, located east of the Hematite Facility, is an earth impoundment lake used as water supply for cattle. There is no evidence that East Lake was ever used in conjunction with Hematite Facility operations.

- North Lake Tributary is comprised of drainage from North Lake and North Tributary. This tributary crosses the terrace west of East Lake.

- North Tributary is an intermittent stream west of North Lake.

In November 2003, SAIC conducted a wetland and surface water assessment to delineate and classify potential jurisdictional wetlands and surface water bodies at the Hematite Site. The single potential wetland identified within the Site boundary is a small, isolated, forested/scrub area of approximately 3,000 square feet. It is confined to the south and southwest by the gravel road and to the north by the railroad berm. The primary source of recharge into this wetland appears to be stormwater runoff from the surrounding areas.

2.5.3 Stratigraphy

The surficial deposits in the vicinity of the Site are Holocene alluvium and terrace deposits. Holocene alluvium is described as clay, silt, sand, and gravel chiefly derived from local loess and colluvium. Colluvium is described as a mixture of residuum, from fines to cobbles, and loess that is moving down slope as a result of slope wash and gravity. Colluvium accumulates at the base of valley slopes and, in large valleys, washes onto the floodplain, blending with the alluvium. Terraces typically contain lenticular beds of sand and gravel interbedded with silt and clay.

The overall thickness of alluvium/terrace deposits underlying the Joachim Creek valley near the Site varies from 20 to 35 feet. These deposits consist of 10 to 20 feet of fine-grain silts and clay that overlie coarser-grain material (sands and gravels) near the bedrock surface. The thickness of the coarse-grain units is highly variable in this region and ranges from 0 to greater than 20 feet.

The local soil profile generated during the various Site investigations indicates upper alluvial soils of stiff, very silty clays containing some sand, underlain by silty clays of firm to stiff consistency to depths of 10 to 13.5 feet below ground surface (ft-bgs). Beneath this surface unit lies very stiff, highly plastic clay with limestone fragments to depths of approximately 22 ft-bgs. Firm to stiff, sandy, silty clay was then found, until auger refusal occurred on boulders or limestone bedrock, at an approximate depth of 36 ft-bgs. The overburden consists of Quaternary alluvial and colluvial deposits of silts, clays, sands, gravel, and cobbles. Overburden depths vary across the Site from 8.5 to 45 ft-bgs, being deeper near Joachim Creek and shallower towards State Road P.

2.5.4 Geology/Soil

The geology of the Hematite Site is dominated by two key bedrock formations, the Jefferson City-Cotter Dolomite Formation and the Roubidoux Formation, which underlie the Hematite Site. The Jefferson City Dolomite is described as mostly light-brown to medium-brown, medium to finely crystalline dolomite and argillaceous dolomite. The Jefferson City Dolomite is typically 125 to 325 feet thick and is bounded above by the Cotter Formation, also mostly dolomite, and below by the Roubidoux Formation, predominately a sandy dolomite with lesser beds of dolomite sandstone and dolomite. These formations dip gently toward the northeast. The regional landscape is highly dissected by streams resulting in topographic relief in excess of 150 feet locally. The Hematite Facility is built atop terrace/alluvial flood plain sediments overlying bedrock within the valley carved by Joachim Creek.

The upland regions to the north and south of Joachim Creek are underlain by the Cotter Dolomite. The Jefferson City Dolomite is exposed in the valley walls of the tributaries to Joachim Creek. The nearest outcropping of the Roubidoux Formation is in the city of Desoto, Missouri, approximately 6 miles to the southwest of the Hematite Site.

2.5.5 Hydrogeology/Ground Water

In the unconsolidated terrace/alluvial flood plain sediments (herein referred to as the overburden), groundwater flow is primarily within the basal, coarse-grain unit. Flow and transport are in a southeasterly direction with discharge to Joachim Creek. With increasing depth below the surface, flow/transport directions gradually shift from southeasterly (overburden), to a blend of southeasterly and a regionally imposed northeasterly component (Jefferson City-Cotter Hydrostratigraphic Unit [HSU]); and finally, to a regional northeasterly direction (Jefferson City-Roubidoux contact zone and Roubidoux HSUs). Northeasterly groundwater flow is consistent with the regional groundwater flow direction in the Roubidoux Formation.

Vertical head gradients are downward from the shallow to deep overburden. Between the deep overburden and Jefferson City-Cotter HSU, gradients are downward in the vicinity of the Hematite Facility and generally upward near Joachim Creek. Vertical gradients tend to be upward between the Jefferson City-Cotter HSU and deeper HSUs. Until approximately mid-2004, however, this gradient was reversed (i.e., downward) as a result of the significant lowering of heads in the Roubidoux Formation. A possible reason for lower heads in the deeper HSUs was the pumping of groundwater from the Roubidoux Formation by water supply wells in the nearby city of Festus.

2.5.6 Climatology

General climatological characteristics of the site area can be inferred from those of St. Louis, Missouri, the location of the nearest U.S. Weather Bureau recording station. The region experiences a modified continental climate without prolonged periods of extreme cold, extreme heat, or high humidity. Generally, air masses moving northward from the Gulf of Mexico bring warm, moist air, while colder, drier air masses typically approach from the

north. These air masses, along with local weather phenomena, produce a variety of weather conditions. Winters are brisk but seldom severe. Minimum temperatures remain as cold as 32˚F or lower for fewer than 20 to 25 days annually. Summers are warm with a maximum temperature of 90˚F or higher for an average of 35 to 40 days per year. From May to October, prevailing winds are generally from the south at 8 to 9 miles per hour (mph) average and, from November to April, are from the west-northwest at 10 to 11 mph average.

Snowfall has averaged less than 20 inches per winter season since 1930. December, January, and February are the driest months, while April and May are normally the wettest. It is not unusual to have extended periods (1 to 2 weeks or more) without appreciable rainfall, from the middle of summer into the fall. Thunderstorms occur on average between 40 and 50 days per year, mostly between May and August.

2.5.7 Rare, Threatened, and Endangered Species

Based on the habitat requirements, it was determined to be unlikely that identified rare, threatened, or endangered species are present at the Hematite Site. In a December 10, 2004 letter to NRC regarding the Hematite Site, the U.S. Department of the Interior, Fish and Wildlife Service, had previously determined that "…no Federally listed, proposed or candidate species or critical habitat occurs on or near the project site."

2.5.8 Archaeological and Historical Sites

The historical significance of the Hematite Facility relates to its role during the Cold War era. From 1956 to 1974, the Hematite Facility supplied highly enriched nuclear fuel for the U.S. Navy nuclear submarine program and other reactor programs. The Hematite Facility was also the first commercial nuclear fuel processing plant in the United States. Because demolition of the Facility buildings will result in the permanent loss of these structures from the historical record, the National Park Service and State Historic Preservation Officer required that a Historic American Engineering Record (HAER) be compiled for each of the buildings at the Facility. Westinghouse completed the HAER process for the Hematite Facility, including photographic documentation of both the process equipment and buildings. The National Park Service provided its concurrence for both the equipment removal and building demolition and has no further issues concerning the historical aspects of the Site.

2.5.9 Conceptual Site Model

As described in Section 2.2.2.1, the RI included the development of a CSM that formed the basis from which a groundwater flow and solute transport model was constructed. For OU1, the CSM is much simpler, being focused on buried waste, impacted soils, and sediment. OU1 is designed to address sources of COPCs in groundwater, but does not address management of COPC migration through groundwater.

Figure 3 presents a straightforward CSM for OU1 at the Hematite Site, listing the sources, release mechanisms, exposure pathways, and potential receptors. The sources include several of the Areas of Concern (AOCs) investigated in the RI where past operations resulted

in impacts to on-site surface and subsurface soils. Table 1 lists these AOCs and the associated COPCs in soils. As shown in Table 1, two of these AOCs, the Burial Pits and the Red Room Roof Burial Area, contain buried low-level radioactive waste (LLRW).

All of the identified AOCs pose a potential source of exposure via direct contact pathways. Polynucleated aromatic hydrocarbons (PAHs), arsenic, and radiological contaminants are the principal COPCs that contribute to such exposures. At the Burial Pits, VOC-impacted wastes and soils are present in addition to radiological wastes, and these Burial Pits wastes are a primary source of chemical and radiological impacts to groundwater. Accordingly, the Burial Pit materials are considered principal threat waste pursuant to EPA guidance (November 1991). The Evaporation Ponds, soils beneath the process buildings, and the former septic System Leach Field are also sources of VOCs and/or radiological contaminants in groundwater.

Surface water runoff from the former Facility area drains to the Site Pond. As a result of this runoff, the sediments in the Site Pond contain PAHs and some radiological contaminants.

As described in the baseline human health risk assessment (HHRA), potential receptors include current and future area residents (including residents who practice agricultural activities), Site workers, and visitors/trespassers. Section 2.7 of this ROD summarizes the findings of the baseline HHRA as well as the Screening-Level Ecological Risk Assessment (SLERA).

2.6 CURRENT AND POTENTIAL FUTURE LAND USE

The primary land use within a five-mile radius of the Site consists of deciduous forest, pasture (agriculture), soybeans (agriculture), and low-density, single family, urban/residential. There are several businesses, hotels/motels, and shopping centers in the residential communities of Festus and Crystal City to the east, between the three and five mile radii from the site. Other residential communities in or near the boundary of the five-mile radius of the Facility include Hematite to the south; Mapaville to the north; Horine, Munsons, and Silica to the northeast; and Hillsboro to the northwest. The closest commercial or industrial facilities are the National Guard Armory, a Missouri Natural Gas Company Service Center (a subsidiary of Laclede Gas Company), and an Ameren Company utility staging area, which are all approximately 1½ miles northeast of the Site, near the intersection of State Roads A and P. Other commercial and industrial facilities are located in Festus and Crystal City. Land use classifications within a five-mile radius of the site are based on the National Land Cover Dataset.

It is anticipated that future uses of the land within and around the Site will remain generally consistent with current land use in the area. In November 2001, as part of the formal Community Relations Plan for the Hematite Site, a series of interviews was conducted with residential neighbors, adjoining property owners and other community leaders and officials to determine the interests and concerns of the community. The issues of future land use and development opportunities for the Site were discussed, and the community expressed

significant interest in future development of the Site. As of July 2008, however, no definite plans had been made for specific future uses of the Site.

2.7 SUMMARY OF SITE RISKS

As required under the CERCLA process, Westinghouse assessed potential risks to human health and to ecological receptors under baseline (unremediated) Site conditions. In these risk assessments, the actual contents of the Burial Pits were not evaluated as an exposure medium because of the difficulty of obtaining representative data of the heterogeneous material contained in them. Therefore, with respect to the Burial Pits, consistent with the NCP (40 CFR 300.430(d)(4)), the risk assessments characterized the current and potential future threats to human health and the environment that may be posed by constituents that may migrate from these buried materials to potential points of exposure, including groundwater. Exposure to the wastes contained in the Burial Pits or to the soils immediately adjacent to these wastes would be expected to result in risks greater than those quantified in the baseline risk assessments.

Potential human health risks modeled in the baseline HHRA included cancer (carcinogenic) and toxic (non-carcinogenic) effects. Cancer risk estimates were compared to the EPA risk range outlined in the NCP, whereby acceptable exposure levels are those that represent an excess upper-bound lifetime cancer risk to an individual in the range of one in a million (10^{-6}) to one in ten thousand (10^{-4}). The potential for non-carcinogenic effects was evaluated by adding for each chemical the ratio of potential intake to a published chronic reference dose. These ratios were then summed to obtain a hazard index (HI). An HI greater than 1.0 indicates a potential for adverse non-carcinogenic health effects.

Ecological risk screening was conducted by comparing the maximum concentrations of COPCs at the Site to ecological benchmarks. The ecological evaluation also considered the rarity, diversity, and importance of habitats at the Site.

2.7.1 Human Health Risks

The baseline HHRA followed EPA December 1989 and subsequent guidance in evaluating potential risks to current and potential future human receptors from exposure to various constituents identified at the Hematite Site. Receptors included potential future residents, Site workers, and other Site users/visitors.

The HHRA and other documents were produced in conjunction with the RI Report. Regarding these documents, MDNR stated in their July 19, 2007 letter, “The department has determined that the Remedial Investigation Report and related documents adequately characterize site conditions as they pertain to Operable Unit 1. This determination is based on our review of the referenced documents, supplemented with subsequent clarifying discussion with Westinghouse technical consultants. Therefore, the Remedial Investigation is considered approved for OU-1.”

Further review of the doses and risks associated with radiological constituents, as mentioned in Section 2.7.1.4 of this document, will be conducted by NRC as part of the decommissioning aspects of this project.

2.7.1.1 COPCs and Exposure Point Concentrations

COPCs in affected environmental media were determined through a series of screening steps designed to identify those chemical constituents that had the potential to contribute significantly to human health risks. These chemical COPCs are presented in Table 2. All Site-related radionuclides were retained as COPCs.

To develop exposure point concentrations (EPCs) of COPCs in affected environmental media, the HHRA included data collected Site-wide at the Hematite Site as a single exposure unit. As described in the HHRA, evaluating data on a Site-wide basis is appropriate to evaluate baseline risks and is a conservative approach because RI sampling was biased toward known impacted areas.

EPCs were calculated using statistical procedures designed to define reasonable maximum exposure conditions, in accordance with EPA guidance (December 2002, April 2004). Specifically, EPCs were calculated to represent the upper 95-percent confidence limit of the mean (95% UCL), a statistically derived value that is not likely to be exceeded at the Site. The COPC concentration data considered in the baseline risk assessment included information collected from affected environmental media (i.e., groundwater, subsurface soil) but not the buried waste contained within the Burial Pits or soils immediately adjacent to these wastes.

2.7.1.2 Exposure Assessments

Exposure assessments were conducted by modeling the potential intake of COPCs in affected environmental media by human receptors. These assessments evaluated the transfer of COPCs from the environmental medium to the exposure medium (e.g., subsurface soil to indoor air), as needed, and applying EPA default and Site-specific intake factors based on the expected behavior patterns of the human receptors.

2.7.1.3 Toxicity Assessment

Toxicity criteria (i.e., reference doses and cancer slope factors) for the COPCs were gathered from the Integrated Risk Information System, the Health Effects Assessment Summary Tables, and the National Center for Environmental Assessment. EPA toxicity criteria are not available for lead. In the absence of such criteria, lead was evaluated by modeling potential blood lead levels in exposed receptors (i.e., EPA Integrated Exposure Uptake Biokinetic Model for children and the EPA Adult Lead Model).

Using these calculations of intakes, and published health factors provided by EPA (i.e., cancer slope factors), the baseline HHRA evaluated total carcinogenic risk associated with exposure to chemical constituents. The baseline HHRA also evaluated potential health hazard from exposure to non-carcinogenic constituents through various pathways. This type of risk is expressed as a hazard quotient (HQ) that is derived primarily using exposure

assumptions and reference doses provided in EPA guidance documents. An HQ is the ratio of a single substance exposure level over a specified period to a reference dose (or concentration) for that substance for a similar exposure period. An HI is the sum of HQ values related to exposure to the individual COPCs.

Table 3 summarizes the calculated carcinogenic and non-carcinogen risks associated with exposure to site-related chemical constituents. As shown in Table 3, the potential carcinogenic site-related risk under baseline (unremediated) conditions exceeds 10^{-4} for hypothetical future site residents, commercial/industrial workers, and an agricultural worker. The 10^{-4} incremental lifetime cancer risk value is used by EPA as a basis for action (EPA, August 1997) indicating that remedial action is warranted at the Hematite Site to address unacceptable potential human health risks. In the case of future site residents, nearly all of the calculated risk results from exposures relate to the assumed use of bedrock groundwater as a potable water supply. Such use results in potential human health risks primarily because of the potential to inhale VOC-containing vapors during showering and bathing. For potential future industrial/commercial workers, nearly all of the calculated risk results from the assumed use of contaminated bedrock groundwater as a source of drinking water.

Similarly, HI values exceed 1.0 for potential future Site residents and construction workers. EPA uses an HI greater than 1.0 as indicative of the need to address non-carcinogen human health risks. For both types of receptors, the exposure routes contributing significantly to non-carcinogenic risks are the same as those contributing to carcinogenic risks.

The health hazards associated with lead were evaluated apart from the main portion of the risk assessment due to the sensitive population affected by exposure to lead. As recommended by the EPA (August 1998), the Integrated Exposure Uptake Biokinetic model was used to evaluate blood-lead levels in children from six months to seven years of age. This evaluation showed that the site does not pose an unacceptable lead health hazard.

2.7.1.4 Risk Characterization for Radiological Constituents

The baseline HHRA specifically addressed the total dose and total excess lifetime cancer risks associated with radiation exposure from affected environmental media under current and future land-use scenarios. The total dose is expressed as the annual Total Effective Dose Equivalent (TEDE), which is the sum of the dose from all sources both internal and external averaged over the exposure period and expressed in units of millirem per year (mrem/yr). The dose and risk from potential exposure were evaluated and summed to estimate the total dose and risk.

The total radiological dose and risk estimates based on reasonable maximum exposure factors to affected environmental media are presented in Table 4. As shown in this table, the calculated incremental lifetime cancer risks from exposure to radiological constituents are on the order of 10^{-7} to 10^{-5} for the various receptor populations. These risks are within, and generally at the lower (less risk) end of, the 10^{-4} to 10^{-6} acceptable risk range. As previously noted, however, these calculated risks are based on EPCs that do not include radiological data for the buried waste or adjacent affected soils associated with the Burial Pits.

Further presentation and review of dose and risks related to radiological constituents will be part of the decommissioning documents to be submitted to NRC.

2.7.1.5 Uncertainty Analysis

Under CERCLA, the baseline HHRA is designed to quantify risks to potential receptors who are potentially present at the Site and who engage in specific activities (e.g., contacting impacted soils) that result in exposure to COPCs. Although the risk assessment process relies on a number of exposure assumptions, thereby introducing uncertainties in the calculated risks, the process provides a margin of safety by examining individuals who represent the reasonably maximum exposed individual. This conservatism is built into the process through exposure assumptions and scenarios.

To allow risk-management decisions to consider not only the calculated risks but an evaluation of the uncertainties associated with these computations, baseline HHRAs conducted under CERCLA include a discussion of uncertainties. The following paragraphs summarize the uncertainty analysis presented in the baseline HHRA for the Hematite Site.

Analytical Data

The RI sampling, upon which potential receptor exposures were computed, was biased towards locations of known or suspected contamination. This practice was employed to expedite the Site evaluation and the development of proposed actions and to provide conservatism in the calculation of potential exposures. Post-remedial risks will be further evaluated through the completion of verification sampling and final status surveys

An occupant's true exposure would depend on which portions of the property to which they were present, the duration, their activities, and many other variables that are difficult to predict. The data and assumptions used in the human health risk assessment likely represent an occupant with a higher than typical exposure. Incorporating such conservatism into the analysis is both an intentional and standard practice.

Exposure Point Concentrations

Statistical analysis showed that the RI data for soils and groundwater exhibited wide ranges of values for certain COPCs. The large variability may be the result of combining samples collected from known areas of contamination and samples collected randomly. To address variability in COPC concentrations, the EPCs used in the exposure assessment for the reasonable maximum exposed receptors are based on 95% UCLs of the mean. These 95% UCL values provide a conservative estimate of potential exposure.

Exposure Factors

Uncertainties related to the conservative aspect of the risk analysis process and methodologies are especially apparent in the exposure assessment. The EPA model for conducting human health risk assessments presently requires the use of point estimates for all parameters (e.g., chemical concentration, body weight, length of residence) to establish risk estimates for exposure scenarios. EPA default values for many parameters, such as those for

ingestion rates of environmental media, dermal absorption, exposure duration, and frequency of events, tend to overestimate exposure in the current and future land-use scenarios. Single-point estimates, however, do not demonstrate the similarity or variability of the data. Therefore, uncertainty analysis is limited to qualitative statements about the confidence placed in critical data or default input parameters used in the exposure assessment used to establish the baseline HHRA.

Uncertainties in Toxicity Assessment

Toxicity assessment relies upon the use of toxicity values developed by EPA to evaluate potential chronic toxicity of COPCs. These toxicity values may be estimated from human data, but the process is largely dependent upon laboratory animal data generated from a variety of toxicology and safety testing studies conducted on constituents.

Toxicity values are not available for all COPCs. As a result, health risks cannot be quantitatively assessed for all constituents, and the total risk for the Site may be underestimated in such circumstances.

The toxicological information for trichloroethylene (TCE) is under review. EPA recommends using the upper end of the slope factor range for susceptible populations having risk factors for TCE-induced cancer. The upper-end slope factor was used in this risk assessment to assure that risk to susceptible individuals is not underestimated, but risks to the general exposed population may be overestimated.

Toxicity values derived to estimate chronic dosages that may induce non-cancer adverse effects also have a number of limitations. Unlike cancer risk assessment, by convention non-cancer adverse effects are assumed to occur in a dose-response manner only after a threshold dose has been exceeded. This assumption is the basis for the use of the reference dose (RfD) or reference concentration (RfC) in estimating the HI. If this ratio is greater than 1.0, such exposures may be considered hazardous. The HI can only be used to qualitatively rank the possibility of adverse non-cancer effects occurring. The HI used to describe non-cancer health hazards has an inherent uncertainty. For example, RfDs are derived from animal studies or human exposure investigations. Depending on the quality of the available data, the determined response levels are divided by an uncertainty factor ranging from 1 to 10,000. Large uncertainty factors used in extrapolating animal effects to human effects may over-estimate non-cancer hazards.

The HI approach assumes that all non-cancer adverse effects to the same organ or systems are additive. While this approach may be sound for assessing a series of constituents that have similar modes of action and act on the same target organ, it may not be appropriate when there are different modes of action. Summation of HQs to calculate a total HI for an exposure scenario can generate a very large number. The HI is a ratio of estimated exposure compared to a “safe” exposure dose. A health hazard is indicated if this ratio exceeds one. The magnitude of a calculated HI greater than one has little bearing on the potential severity of adverse effects.

A number of factors contributed to uncertainties in this risk characterization. These uncertainties are attributable to the risk characterization procedure itself and to several site-specific factors. Quantitative risk characterization is largely dependent upon laboratory-derived animal toxicity values (carcinogenic slope factors, non-carcinogenic RfDs, and RfCs) for the constituents of potential concern. Toxicity values are not available for all COPCs; therefore, risks/hazards cannot be quantitatively characterized for these constituents and the total calculated risk/hazard for the site may be underestimated. Additionally, toxicity values derived from animal studies are given the same weight as toxicity values derived from human data.

COPCs with different carcinogenic weights of evidence are summed in this risk characterization. The carcinogenic risk equation for multiple substances sums all carcinogens equally, giving as much weight to Group B1 or B2 carcinogens as to Group A carcinogens. This tends to overestimate calculated carcinogenic risks.

2.7.2 Ecological Risk

The SLERA, conducted in accordance with EPA June 1997 and subsequent guidance, concluded that no further ecological risk evaluation was needed for the Hematite Site because of the low probability of significant ecological effects on local populations and the lack of unique, rare, and critical habitat at the Hematite Site. The ecological risk evaluation concluded that remediation of the Site was not required to protect ecological receptors, with the exception of sediments within the Site Pond. Based on these findings, the Site Pond sediment will be addressed in remediation.

The SLERA and other documents were produced in conjunction with the RI Report. Regarding these documents, MDNR stated in their July 19, 2007 letter, "The department has determined that the Remedial Investigation Report and related documents adequately characterize site conditions as they pertain to Operable Unit 1. This determination is based on our review of the referenced documents, supplemented with subsequent clarifying discussion with Westinghouse technical consultants. Therefore, the Remedial Investigation is considered approved for OU-1."

2.8 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

CERCLA requires the selection of a remedial action that is protective of human health and the environment and complies with "applicable or relevant and appropriate requirements (ARARs)." ARARs consist of two distinct categories of environmental laws and regulations that affect what remediation may be required and how that remediation is executed: applicable requirements and relevant and appropriate requirements. The NCP (40 CFR 300.5) and EPA guidance (August 1988) define these concepts as follows:

> "Applicable requirements means those clean-up standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal environmental or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other

circumstance found at a CERCLA site. Only those state standards that are identified by a state in a timely manner and that are more stringent than Federal requirements may be applicable.

"Relevant and Appropriate requirements means those clean-up standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal environmental or state environmental or facility siting laws that, while not applicable to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well-suited to the particular site. Only those state standards that are identified in a timely manner and are more stringent than Federal requirements may be relevant and appropriate."

If a particular requirement is found not to be applicable, it may be found relevant and appropriate. 40 CFR 300.400(g) lists factors to be examined for relevance and appropriateness to determine whether a requirement addresses problems or situations sufficiently similar to circumstances of the release or remedial action contemplated and whether the requirement is well suited to the site. The determination that a requirement is relevant and appropriate is a two-step process: 1) determination if a requirement is relevant; and 2) determination if a requirement is appropriate. A requirement may be relevant, but not appropriate given the circumstances of a particular site.

The NCP and EPA (August 1988) guidance further defines three specific types of ARARs:

- Chemical specific;
- Location-specific; and
- Action specific.

Chemical-specific ARARs include those requirements that regulate the amounts or concentrations of hazardous substances that may be found in or discharged to the environment. Chemical-specific ARARs are important in determining whether soil, groundwater, surface water, and sediment at a site are impacted and in determining the residual levels of constituents allowable after site remediation. For OU1 at the Hematite Site, the most significant chemical-specific ARARs are the NRC requirements that establish soil cleanup standards for removing radiological constituents in buried waste, soils, and sediment. These chemical-specific ARARs will be defined in submittals to NRC that specify Derived Concentration Guideline Limits (DCGLs) and other aspects of the cleanup subject to NRC review.

Location-specific ARARs apply to the area in which a site is located. Regulations that are potential ARARs may require actions to preserve or protect aspects of the environment or cultural resources that may be threatened by the site or by the remedial actions to be undertaken. While there are several environmental considerations that are potential location-specific ARARs for the Hematite Site, these do not define remediation requirements for this Site.

"Action-specific ARARs are regulations that apply to specific actions or technologies to be

used in site remediation. For OU1 at the Hematite Site, action-specific ARARs include the NRC regulations for decommissioning and terminating nuclear materials licenses and the Missouri Hazardous Waste Management Law and pertinent State Regulations. Missouri has been delegated Resource Conservation and Recovery Act (RCRA) authority by EPA, and the Missouri regulations implement the RCRA program in the state by establishing standards for managing both non-hazardous and hazardous waste. Missouri water pollution control permitting, wellhead protection (i.e., well abandonment), and air pollution permitting requirements also comprise action-specific ARARs.

In addition to the legally binding requirements established as ARARs, many Federal and State programs have developed criteria, advisories, guidelines, or proposed standards that may provide useful information or recommended procedures if no ARARs address a particular situation or existing ARARs do not provide protection. In such situations, these "to be considered" (TBC) criteria or guidelines can be used (e.g., to set PRGs).

Table 5 presents ARARs and TBC guidance for OU1 at the Hematite Site.

2.9 BASIS FOR ACTION

It is Westinghouse's and MDNR's current judgment that the response action selected in this ROD is necessary to protect human health or welfare from actual or threatened releases of hazardous substances into the environment at the Hematite Site and to comply with ARARs.

2.10 REMEDIAL ACTION OBJECTIVES

2.10.1 Remedial Action Objectives

To determine the preferred remedial action, the NCP sets forth a procedure by which remedial action objectives (RAOs) are first established, based on the nature and extent of contamination, threatened resources, the potential for human and environmental exposure, and reasonably anticipated land uses. At the Hematite Site, Westinghouse established the following RAOs for OU1:

- Eliminate potential unacceptable human health or environmental risks that could result from contact with the buried waste and impacted soils and sediment, including contact via direct exposure, ingestion, dermal contact, and inhalation of particulates or VOCs in soil gas;

- Eliminate potential ecological risks associated with impacted sediments in the Site Pond;

- Address the waste contained in the Burial Pits as a principal source of contamination through active remediation;

- Comply with ARARs and, to the extent practicable, other pertinent regulatory agency TBC guidance; and

- Reduce the potential for buried waste and impacted soils to serve as a source of future groundwater contamination.

2.10.2 Derivation of Remediation Goals

2.10.2.1 Chemical Preliminary Remedial Goals

Preliminary remediation goals (PRGs) are derived from the RAOs but are more-specific statements of the desired endpoint concentrations or risk levels established to protect human health and the environment. EPA guidance (August 1997) provides that, to the extent possible, applicable chemical-specific ARARs should be used to define PRGs. In the absence of chemical-specific ARARs, EPA guidance (April 1991) states that, for chemicals which pose carcinogenic risks, PRGs should generally be established at concentrations that achieve a 10^{-6} excess lifetime cancer risk as the "point of departure" for remedial planning. For individual chemicals that pose non-carcinogenic risks, PRGs should generally be established at concentrations that achieve an HI of 1.0.

When determining Site-specific PRGs, Westinghouse evaluated various guidance sources that provide default cleanup levels in soil and which can be used for remedial planning, including the Missouri Risk-Based Corrective Action (MRBCA) technical guidance, EPA Soil Screening Levels, EPA Region III Risk-Based Concentrations, and EPA Region IX PRGs. With input from the MDNR, the Proposed Plan applied the MRBCA default target levels as the chemical-specific PRGs for OU1 at the Hematite Site. The MRBCA program covers all environmental media (i.e., surface water, groundwater, and soil) and provides default target levels to be used for remediation decisions. The program also considers institutional controls and activity and use limitations to ensure long-term stewardship. The MRBCA program is the current State guidance for risk-based remediation. The chemical PRGs derived for OU1 at the Hematite Site are those shown in Table 6. These chemical PRGs are based on future residential use of the Hematite Site.

OU1 addresses the soils, sediment, and other impacted materials located above the groundwater table. The PRGs for VOCs in soils under OU1 take into account exposure scenarios resulting in the most restrictive values, including the potential migration of the COPCs in vadose zone soils to underlying groundwater. Ongoing investigations and future remedy assessments will address impacted groundwater and saturated soils below the groundwater table.

VOC-impacted soils below the water table are not addressed under OU1 because implementable and cost-effective remedial technologies applicable to such soils are not necessarily the same as those required to address radiologically impacted soils, buried waste, and shallow VOC-impacted soils. VOCs in deeper saturated soils are often most effectively remediated using technologies that treat both saturated soils and groundwater at the same time. Further feasibility evaluations are needed before the appropriate remedy for deeper VOC-impacted soils can be determined.

2.10.2.2 Radiological Derived Concentration Guideline Limits

NRC regulations establish requirements for protection against ionizing radiation resulting from activities conducted under licenses issued by the NRC. These regulations define remediation requirements for radiological contaminants either for unrestricted release or for restricted release of a site. The NRC regulations require that the dose contribution from all sources, including any remaining on-site disposal areas, be accounted for at the time of license termination.

A site is considered acceptable for unrestricted use if the residual radioactivity above background radiation results in a TEDE to an average member of the receptor population of 25 mrem/yr or less. For unrestricted release, the residual radioactivity must also be reduced to levels that are as low as reasonably achievable (ALARA).

The criteria for restricted release can be used only if a licensee can demonstrate that further reductions in residual radioactivity necessary to achieve unrestricted release would result in more public or environmental harm or were not being made because the residual levels associated with restricted release are ALARA. Restricted release also requires the use of legally enforceable institutional controls to reasonably assure that the TEDE from residual radioactivity above background will not exceed 25 mrem/yr. Pursuant to these NRC requirements, Westinghouse is developing DCGLs for soil and building surfaces. These DCGLs will be specified in the Decommissioning Plan that will undergo NRC review and approval prior to commencing remediation. The DCGLs for the Hematite Site will be based on unrestricted release. Westinghouse will not begin to implement the Selected Remedy until all necessary approvals, including the approval of DCGLs, have been received from NRC.

2.11 DESCRIPTION OF ALTERNATIVES

In the FS, Westinghouse evaluated a variety of potential remedial technologies and process options with the potential to achieve the RAOs and meet the Site-specific cleanup levels in the form of PRGs and DCGLs. These technologies were screened to identify the more technically effective, implementable, and cost-effective remedial methods. The technologies that passed screening were then assembled into four remedial action alternatives for further evaluation. In addition, in accordance with NCP and CERCLA guidance, a “no action” alternative was evaluated and serves as the baseline against which other remedial alternatives are compared.

The remedial alternatives for OU1 at the Hematite Site are presented in the following sections and numbered to correspond with the numbers in the FS and the Proposed Plan. For the reasons discussed in this ROD and the supporting Administrative Record, Alternative 4 is the Selected Remedy.

2.11.1 Alternative 1: No Action

Estimated Capital Cost: $0
Estimated Annual Operation and Maintenance (O&M) Cost: $0
Estimated Present Worth Cost: $0
Estimated Construction Timeframe: None

Alternative 1 involves no further remedial action for the buried waste, impacted soils, and impacted sediment at the Hematite Site. The no action alternative for OU1 would allow buried waste and impacted soils to remain on-site and allow future Site users to potentially be exposed to these materials. Impacted sediment in the Site Pond and associated potential ecological risks would likewise not be addressed.

Alternative 1 does not comply with ARARs. Residual contamination in buried waste, impacted soil, and impacted sediment would remain on site at levels that would exceed guidelines. No reduction of the potential risks would be realized under this alternative.

2.11.2 Alternative 2: In-Situ Containment with Access Control as Interim Remedial Action to Defer Final Remediation

Estimated Capital Cost: $7,185,300
Estimated Annual O&M Cost: $1,312,500
Estimated Present Worth Cost: $38,930,500
Estimated Construction Timeframe: 12 months

Alternative 2 provides containment of the identified AOCs to reduce the potential for direct-contact exposure to impacted materials and to reduce the potential for VOCs and radiological constituents to leach from subsurface soils or waste and disperse into groundwater. Containment would be effected by installing a soil-bentonite slurry cutoff wall around the perimeter of the impacted areas and constructing a multi-component low-permeability capping system over this area.

Site preparation activities would include relocating the Site fence as needed to maintain access restrictions but allow for consolidation of waste and soils and installing stormwater and erosion controls. Once these preliminary tasks were completed, impacted soil and waste from outside the perimeter would be consolidated within the area to be capped. Such materials include buried waste and impacted soils from the Red Room Roof Burial Area and Site Pond sediments. After waste, soil, and sediment removal and final status surveys to confirm the completeness of removal, the Red Room Roof Burial Area excavation would be backfilled, regraded to promote surface water drainage, and revegetated.

After wastes and soils from the remote areas were consolidated, a slurry wall would be constructed around the perimeter of the remaining waste management unit (10± acres) by trenching and filling the trench with a mixture of select soil and bentonite clay or similar low-permeability material. The slurry wall would be keyed as deep as practicable into the upper weathered bedrock. Pumping wells would be used to lower the groundwater table inside the containment area and reduce the potential for releases of impacted groundwater to

bedrock. The groundwater removed by these wells would be treated at an on-site treatment system and discharged to surface water. Management of migration of constituents in groundwater issues outside the containment area would be addressed under future response actions for groundwater.

Once the slurry wall was in place, a multi-component low-permeability capping system would be placed over the containment area. After capping, the surrounding area would be regraded and vegetated to divert any surface runoff away from the cover. Monitoring wells would then be installed immediately adjacent to the containment area to monitor for any lateral migration of contamination.

The containment area would be maintained and monitored to ensure its integrity, and physical access restrictions (i.e., fencing, warning signs) would provide security. Although institutional controls such as deed restrictions and restrictive covenants might also be emplaced, the active maintenance and monitoring are viewed as the primary means for protecting the integrity of the containment system.

Approval for the Alternative 2 in-place containment of waste would be obtained through the NRC license termination process and State approvals for chemical constituents. The justification for in-place containment of the waste would require a dose assessment to demonstrate compliance with the applicable NRC radiological release criteria and that residual on-site risks are ALARA. Because of the heterogeneity of the waste materials contained in buried waste, particularly the Burial Pits, the level of effort in terms of numbers of samples needed to generate the information required for an adequate dose assessment was deemed to be prohibitive, and Westinghouse believes that, even after obtaining such samples, the NRC would not approve an in-place containment approach.

Furthermore, in-situ containment would not comply with siting and design requirements for radioactive and hazardous waste land disposal facilities that comprise location- and action-specific ARARs and may not prove effective in adequately controlling VOC releases to groundwater.

For these reasons, this alternative does not meet the threshold criteria with regard to meeting ARARs. Accordingly, Alternative 2 was considered only as a limited, temporary action undertaken prior to final remediation. In the detailed evaluation of Alternative 2, it was assumed that an ultimate, permanent remedy would be implemented after a 30-year period. The permanent remedy was assumed to involve removal and off-site disposal of impacted solid wastes and soils.

2.11.3 Alternative 3: Removal, Treatment of VOC Waste, And Disposal of LLRW and Non-Hazardous Treatment Residues in an On-Site Facility

Estimated Capital Cost: $21,130,900
Estimated Annual O&M Cost: $586,300
Estimated Present Worth Cost: $30,143,800
Estimated Construction Timeframe: 36 months

Alternative 3 involves the removal of the waste and impacted soils from each of the areas of concern, including the Burial Pits, and placing the exhumed materials in a newly constructed on-site disposal facility. Approval for an on-site disposal facility would be obtained through the NRC license termination process. As part of the approval, a dose assessment would be conducted to determine the dose contribution from the LLRW placed in the facility to demonstrate compliance with the radiological release criterion of 25 mrem/yr.

Site preparation activities performed before starting waste or contaminated soil removal would include relocating the Site fence as needed to restrict access restrictions while allowing for on-site facility construction and exhumation of waste and contaminated soil. Engineering controls would be installed for stormwater management and erosion control. A water treatment system would also be installed to collect and treat water from precipitation, infiltration, and runoff. Other preparatory work (e.g., sheetpiling around planned Evaporation Pond excavation) would also be completed at this time.

The on-site landfill would be constructed in a selected portion of the property above the floodplain. Clean soil would be imported to raise the elevation of the cell area by approximately five feet to ensure adequate separation between the landfill liner system and the groundwater table. The multi-component landfill liner would be installed in accordance with regulatory requirements.

Removing the waste and impacted soils from each of the areas of concern would entail excavation, materials handling, and construction dewatering. Sediment removal would involve re-routing the inflows to and decanting the surface water from the Site Pond, and dewatering the sediments either by air drying or mechanical means (i.e., filter press).

After waste and contaminated soil were removed, and final status surveys completed to confirm the completeness of removal, the excavations would be backfilled with clean fill, regraded to promote surface water drainage, and revegetated. The exception would be the Site Pond, where after sediment removal, the inflow diversion would be disconnected and the site dam removed to allow natural drainage patterns to be re-established.

Excavated materials would be sorted to identify and segregate wastes not amenable to direct on-site disposal, including wastes exhibiting VOCs or other constituent concentrations above Land Disposal Restrictions (LDRs) or materials considered anomalous due to size or radiological contamination levels. VOC-containing materials would be treated on-site to reduce VOC concentrations to the extent practicable with the goal of rendering these materials non-hazardous and compliant with LDRs. After appropriate treatment, processing, and stabilization, materials amenable to on-site disposal, including those treated to meet LDRs, would be placed in the newly constructed landfill. Materials not suitable for on-site disposal would be sent off-site for further processing and disposal.

After the disposal facility was filled, the final capping system would be constructed. This cap would be comprised of a multilayered system compliant with RCRA performance standards.

The on-site land disposal facility would be maintained and monitored to ensure its long-term integrity. Physical access restrictions would include fencing and the maintenance of security service. Long-term institutional controls would be required to identify the existence of the on-site disposal facility and control Site land uses to be compatible with the on-site facility.

2.11.4 Alternative 4: Removal, Treatment of VOC Waste, and Off-Site Disposal of LLRW and Non-Hazardous Treatment Residues

Estimated Capital Cost: $47,765,400
Estimated Annual O&M Cost: $0
Estimated Present Worth Cost: $47,765,400
Estimated Construction Timeframe: 24 months

Alternative 4 is the selected alternative for OU1 and involves exhuming buried waste, impacted soil, and impacted sediment and disposing of these materials in licensed and permitted off-site facilities. To the extent practicable, Alternative 4 relies on the on-site sorting, segregation, and treatment of exhumed materials to reduce the quantities of materials requiring off-site disposal and to maximize the quantity of material deemed suitable for reuse as on-site backfill. Sorting and segregation procedures will be designed to properly classify the exhumed solid wastes and soils according to the material type, degree of radiological impacts, and the degree of VOC impacts:

- Radiologically impacted wastes and soils impacted above DCGLs would be packaged and sent off-site for disposal as LLRW.

- VOC-containing wastes and soils that are not radiologically impacted above DCGLs would be treated on-site. If the treated soils meet PRGs and backfill requirements after treatment, they would be used as backfill. The wastes and any treated soils that did not meet PRGs would be disposed of off-site.

- VOC-containing waste and soils that are also radiologically impacted above DCGLs would be treated on-site to reduce VOC concentrations to the extent practicable with the goal of rendering these materials non-RCRA-hazardous LLRW for off-site disposal (i.e., not characteristic waste and compliant with LDRs).

The primary treatment method for VOC wastes and soils would be by ex-situ vapor extraction. As noted, Alternative 4 is the Selected Remedy, with one modification, and is described in more detail in Section 2.14 below. That modification includes the option for the treatment of low-level mixed waste (LLMW) upon reaching the radiological waste disposal facility, in lieu of on-site treatment. The potential availability of this service was not discovered until after the Proposed Plan was prepared. If feasible, this option may be attractive based on cost and the reduction of on-site materials handling. This possible modification of Alternative 4 will be further reviewed as part of the design.

Removal of the buried waste and contaminated soil would entail excavation, materials handling, and construction dewatering. Removal of sediment from the Site Pond would involve re-routing the inflows, decanting the surface water, and dewatering the sediments.

After waste removal and final status surveys to confirm the completeness of removal, the excavations would be backfilled with clean imported fill, as needed, and regraded to promote surface water drainage. The disturbed area would then be revegetated. The exception would be the Site Pond. Following sediment removal at the Site Pond, the inflow diversion would be disconnected and the site dam removed to allow natural drainage patterns to be re-established.

2.11.5 Alternative 5: Removal and Off-Site Disposal

Estimated Capital Cost: $61,353,600
Estimated Annual O&M Cost: $0
Estimated Present Worth Cost: $61,353,600
Estimated Construction Timeframe: 18 months

Like Alternative 4, Alternative 5 involves removing the buried waste and contaminated soil and disposing of removed materials in licensed and permitted off-site facilities. The difference between these two alternatives is that, in Alternative 5, because the treatment of excavated materials on-site will be limited, the handling of exhumed waste materials and impacted soils is minimized.

On-site treatment is limited to the following:

- Initial segregation/sorting to separate waste containers and other large discrete objects not amenable to shredding or blending;
- Elimination of free liquids in the waste, as needed, by solidification; and
- Shredding/blending needed to facilitate packaging for off-site shipments.

Alternative 5 focuses on utilizing off-site disposal facilities for the various waste streams, including wastes that will require treatment prior to disposal. LLMW would be treated either at the disposal facility or at an alternate off-site facility to meet land disposal requirements before disposal.

Removal of the buried waste and contaminated soil would entail excavation, materials handling, and construction dewatering. Removal of sediment from the Site Pond would involve re-routing the inflows, decanting the surface water, and dewatering the sediments.

After waste removal and final status surveys to confirm the completeness of removal, the excavations would be backfilled with clean imported fill, as needed, and regraded to promote surface water drainage. The disturbed area would then be revegetated. The exception would be the Site Pond. Following sediment removal at the Site Pond, the inflow diversion would be disconnected and the site dam removed to allow natural drainage patterns to be re-established.

Off-site disposal would involve radiological and chemical characterization to ensure the materials comply with the disposal or processing facilities waste acceptance criteria prior to transport.

2.12 COMPARATIVE ANALYSIS OF THE ALTERNATIVES

2.12.1 Summary of the CERCLA Criteria

The five remedial alternatives described in Section 2.11 underwent detailed comparative analysis using the nine CERCLA criteria discussed in the following paragraphs. The comparative analysis provides a means by which remedial alternatives can be directly compared to one another with respect to the criteria defined in the NCP.

2.12.1.1 Threshold Criteria

Overall protection of human health and the environment and compliance with ARARs are "threshold criteria" that any remedial alternative must meet before being considered for implementation.

- ***Overall Protection of Human Health and the Environment*** – addresses whether an alternative provides adequate protection and describes how potential exposures to COPCs are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

- ***Compliance with ARARs*** – addresses whether a remedy would meet the site ARARs. Applicable requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal environmental or State environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site. Only those State standards that are identified by a state in a timely manner and that are more stringent than Federal requirements may be applicable. Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal environmental or State environmental or facility siting laws that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site. Only those State standards that are identified by a state in a timely manner and that are more stringent than Federal requirements may be relevant and appropriate.

2.12.1.2 Primary Balancing Criteria

Long-term effectiveness, reduction of toxicity, mobility, or volume through treatment, short-term effectiveness, implementability, and cost are referred to as "balancing criteria." These

represent the primary selection criteria for alternatives determined to be protective of human health and the environment and in compliance with ARARs.

- ***Long-Term Effectiveness and Permanence*** – addresses residual risk (i.e., risk remaining after implementation of the alternative) and the ability of an alternative to protect human health and the environment over time once remediation goals (RGs) have been met.

- ***Short-Term Effectiveness and Environmental Impacts*** – addresses 1) the impacts to the community and site workers during remediation including the amount of time required to achieve RGs; and 2) the environmental effects of implementing the remedial action.

- ***Reduction in Toxicity, Mobility, or Volume through Treatment*** – addresses 1) the ability of the alternative to reduce the toxicity, mobility, or volume of the waste; and 2) the irreversibility of the treatment process and the type and quantity of residuals remaining after treatment.

- ***Implementability*** – addresses the technical and administrative feasibility of an alternative, including the availability of materials and services required for remediation. Technical feasibility assesses the ability to construct and operate a technology, the reliability of the technology, the ease in undertaking additional remedial actions, and the ability to monitor the effectiveness of the alternative. Administrative feasibility is addressed in terms of the ability to obtain approval from Federal and State agencies and the degree of difficulty in implementation of land use controls and institutional controls.

- ***Cost*** – compares the differences in cost, including capital and operation and maintenance (O&M) costs.

2.12.1.3 Modifying Criteria

Finally, the remedial alternatives are evaluated against the two modifying criteria described below on the basis of comments received during the public comment period for the FS and Proposed Plan.

- ***State Acceptance*** – an evaluation of whether the State agrees with, opposes, or has no comment on the preferred alternative.

- ***Community Acceptance*** – addresses the issues and concerns the public has regarding each of the alternatives.

2.12.2 Comparison of the Alternatives Using the CERCLA Criteria

In the FS, the alternatives were evaluated against the two threshold criteria and the five primary balancing criteria. The results of this comparative analysis for the OU1 alternatives were presented in the FS in Table 2-11. The evaluation against the two modifying criteria

(State and community acceptance) was conducted at completion of the public comment period on the Proposed Plan and is summarized in Section 2.12.2.8.

2.12.2.1 Overall Protection of Human Health and the Environment

Alternatives 2 through 5 (the action alternatives) for OU1 would protect human health and the environment. All are designed to address the potentially unacceptable risks identified in the baseline HHRA by preventing human contact with radiologically and chemically impacted materials and reducing the effects of these materials as sources of groundwater contamination. In all cases, implementation of further response actions to address impacted groundwater will be necessary to fully address potential risks associated with groundwater. All of the action alternatives also address the potential ecological risks associated with the impacted sediments in the Site Pond. Alternative 1 ("no action alternative") does not address the risks identified in the baseline HHRA or the ecological risks related to the Site Pond sediments.

2.12.2.2 Compliance with ARARs

Section 121(d) of CERCLA and the NCP 300.430(f)(1)(ii)(B) require that remedial actions at CERCLA sites attain legally applicable or relevant and appropriate Federal and State requirements, standards, criteria, and limitations which are collectively referred to as "ARARs," unless such ARARS are waived under CERCLA §121(d)(4). (See Section 2.8 for additional explanation of ARARs.) The NCP threshold criterion for "compliance with ARARs" addresses whether a remedy will meet all of the applicable or relevant and appropriate requirements of other Federal and State environmental statutes or whether there is a basis for invoking a waiver.

Alternatives 4 and 5 satisfy the threshold criterion of meeting chemical-specific ARARs. Alternative 2 does not satisfy the NRC ARARs. The uncertainty regarding the ability to comply with radiological release criteria precludes selection of Alternative 2 as a final remedy. Therefore, the in situ containment approach is considered a limited, temporary action alternative designed to defer final remediation. Neither Alternative 2 nor Alternative 3 would achieve free release of the Site, and it is not assured that such on-site closure alternatives could be demonstrated to achieve residual radiological risks that are ALARA. Alternative 1 would not achieve chemical-specific ARARs for OU1.

Except for the no action alternative (Alternative l), all of the alternatives could be implemented to achieve location-specific ARARs. For those alternatives that involve removal of materials from environmentally sensitive areas (e.g., wetlands, floodplain) such removal would need to be conducted in a manner that minimizes long-term impacts. For alternatives that involve containment of contaminated materials on-site (i.e., Alternatives 2 and 3), the containment area would need to be situated and designed to avoid or minimize impacts to environmentally sensitive areas.

2.12.2.3 Long-Term Effectiveness and Permanence

Long-term effectiveness and permanence addresses the expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup levels have been met.

Alternatives 4 and 5 best achieve the balancing criterion of long-term effectiveness and permanence. Under these alternatives, radiologically and chemically impacted wastes, soil, and sediments would be disposed of in licensed off-site facilities. VOC-containing wastes would be treated either on-site (Alternative 4) or off-site (Alternative 5), with any impacted residuals also disposed of off-site.

The long-term effectiveness and permanence criterion is not achieved by Alternatives 2 or 3. Alternative 2 is an interim remedial action designed to delay final remediation. For Alternative 3, the isolation of impacted materials on-site relies on maintaining institutional and Site controls, the durability of which cannot be assured over the timeframes associated with the long-lived radionuclides found at the Hematite Site.

Alternative 1, No Action, does not meet the criterion of long-term effectiveness and permanence.

2.12.2.4 Reduction in Toxicity, Mobility, or Volume through Treatment

Reduction of toxicity, mobility, or volume through treatment refers to the anticipated performance of the treatment technologies that may be included as part of a remedy.

Alternatives 3 and 4 maximize the treatment of waste materials, and therefore, best satisfy this criterion. For Alternative 3, such on-site treatment focuses on minimizing the toxicity, mobility, and volume of wastes to be placed in the on-site landfill. For Alternative 4, treatment focuses primarily on reducing the volume of waste to be sent off-site for disposal and secondarily on the toxicity of the VOC wastes.

Alternative 2 relies on in situ containment to address waste and impacted soils and sediment at the Hematite Site, and this alternative does not provide for waste treatment. Alternative 2 does not decrease the toxicity, mobility, or volume of principal threat waste through treatment and does not achieve this criterion.

The criterion of reduction of toxicity, mobility, or volume through treatment is the principal discriminator between Alternatives 4 and 5. Alternative 4 reduces waste toxicity and minimizes off-site disposal by increased treatment. In contrast, Alternative 5 provides only for sorting and segregation of wastes and provides for waste treatment only to the extent needed to achieve waste acceptance criteria and land disposal regulations.

Alternative 1, No Action, does not meets the criterion of reduction of toxicity, mobility, or volume through treatment.

2.12.2.5 Short-Term Effectiveness

By minimizing on-site waste handling and largely relying on in situ containment, Alternative 2 presents the lowest levels of short-term risks to workers and the community. Implementation of Alternative 2 postpones the off-site transportation of wastes, thereby minimizing, in the short-term, the potential for project-related transportation and handling accidents.

While Alternative 3 also eliminates the off-site transportation of wastes, this alternative involves a substantial on-site construction project for new landfill construction and substantial truck traffic would be required for hauling lining and capping materials. Alternative 3 also relies on significant on-site waste treatment. By minimizing off-site transportation risks but maximizing the magnitude of the on-site construction and waste handling project, Alternative 3 is viewed as being a mid-range alternative with respect to short-term effectiveness and risks.

Alternative 4 presents somewhat higher potential short-term risks than Alternatives 2 and 3. This alternative involves a higher level of on-site waste handling, sorting, and treatment and off-site transportation of waste materials. Alternative 5 involves significantly less on-site waste handling, but, because off-site disposal options could be more limited and overall off-site transportation volumes increased, Alternative 5 could result in greater off-site transportation risks.

All of the action alternatives involve short-term environmental impacts associated with the removal of sediment from the Site Pond. These short-term impacts would be mitigated through pond restoration, and longer-term effects are not anticipated.

Under Alternative 1, No Action, short-term risks to human receptors are those defined under current land use conditions. The no action alternative does not address the current ecological risks associated with sediments in the Site Pond.

2.12.2.6 Implementability

Implementability addresses the technical and administrative feasibility of a remedy from design through construction and operation. Factors such as availability of services and materials, administrative feasibility, and coordination with other governmental entities are considered.

Alternatives 4 and 5 are both technically and institutionally implementable. The alternatives are in compliance with CERCLA and ARARs. The option chosen makes use of MRBCA default target levels to achieve a remedy for which residual concentrations of COPCs are suitable for unlimited use and unrestricted exposure (UUUE). Furthermore, a submittal will be made to NRC describing the decommissioning aspects of the upcoming actions under NRC's jurisdiction. That document will include DCGLs for radionuclides designed to achieve UUUE. The intent is that these actions will result in a protective remedial response to past releases and will allow eventual termination of the NRC license.

The institutional implementability of Alternative 2, even as an interim measure, is not assured. NRC policy favors decommissioning as quickly as possible and finality in such plans; therefore, Alternative 2 likely would be viewed as inconsistent with NRC regulations and precedents. Implementation of Alternative 2 would still require that an active license be maintained. Moreover, given that this alternative does not represent final decommissioning, the licensee would remain subject to any new or different requirements for decommissioning promulgated in the interim period.

The institutional implementability of Alternative 3 is also not assured, and this approach would only provide for a restricted release of the Hematite Site. Alternative 3 would also be technically and procedurally challenging given NRC regulations that allow restricted release only in limited instances. If this alternative were proposed, it would require significant additional NRC review of the design and construction of the containment cell. Continuing financial assurance requirements, additional input from affected parties regarding the proposed restricted release, and the high probability that an environmental impact statement would be prepared by the NRC would be additional review considerations for restricted release.

In addition to the issues under NRC regulations, Alternatives 2 and 3 do not compare favorably with respect to the implementability of Alternatives 4 and 5. The removal and off-site disposal approach represented by Alternatives 4 and 5 eliminates the need to ongoing maintenance, permitting, and access control at the Site.

For the Hematite Site, Alternative 1, No Action, is not implementable. NRC licensing requirements mandate that radiologically impacted buried waste and environmental media be addressed in decommissioning, and "no action" is not an acceptable alternative.

2.12.2.7 Cost

The No Action Alternative (Alternative l) involves no positive actions and results in no cost irrespective of affected material volumes and characteristics. The capital cost of the containment alternative (Alternative 2) depends to some degree on the volume of affected materials, but the costs of these types of alternatives are much less sensitive to volume changes than alternatives involving removal and either on-site or off-site waste management (Alternatives 3 through 5). The costs of alternatives that rely on removal and off-site disposal (Alternatives 4 and 5) are proportional to the quantity of affected material that requires remediation.

Containment (Alternative 2) and on-site disposal (Alternative 3) both require active controls (e.g., security, monitoring, and maintenance) to ensure the continued integrity and effectiveness of the remedy. For Alternative 2, the period of active controls is assumed to be 30 years, at which time a permanent remedy would be implemented. Because Alternative 2 is a temporary remedy, the total life-cycle cost of this alternative includes the cost of this eventual permanent remedy. For Alternative 3, the total life-cycle cost depends on the timeframe required for active controls (e.g., security, monitoring, and maintenance) needed to ensure the continued integrity of the containment system. Although a 30-year timeframe is used as the base case, for radiological contaminants remaining on site above regulatory

levels, this period of institutional control could extends for a much longer period of time (e.g., 1,000 years).

Capital and Present Worth Costs for OU1 Alternatives

Alternative	Capital	Present Worth
1. No Action	$0	$0
2. In-Situ Containment with Access Control as Interim Remedial Action to Defer Final Remediation	$7,185,300	$38,930,500
3. Removal, Treatment of VOC Waste, and Disposal of LLRW and Non-Hazardous Treatment Residues in an On-Site Facility	$21,130,900	$30,143,800
4. Removal, Treatment of VOC Waste, and Off-Site Disposal of LLRW and Non-Hazardous Treatment Residues	$47,765,400	$47,765,400
5. Removal and Off-Site Disposal	$61,353,600	$61,353,600

2.12.2.8 State and Community Acceptance

The evaluation of State and community acceptance was completed after the close of the public comment period on the Proposed Plan. Comments received from the State of Missouri in ongoing discussions and on previous documents were considered in the formulation of alternatives and the Selected Remedy.

As discussed in Section 2.3, a public meeting on the Proposed Plan was held on July 10, 2008 in Festus, Missouri. The meeting, which was conducted by Westinghouse in coordination with MDNR, included a presentation of the proposal, a group question and answer session (including an offer to allow attendees to make verbal statements for the record), and a one-on-one private question and answer session. Also, an offer was made to receive written or electronic comments. The initial offer was scheduled to expire on July 26, 2008, but, upon request, was subsequently extended to August 25, 2008. No adverse public comments were received that required a modification to the Proposed Plan, and, based on the lack of adverse comments from the local community, Westinghouse believes the community supports the Selected Remedy.

The sole submittal of comments was by mail from legal counsel for past owners of the Hematite operations. A summary of the submitted comments and responses are contained in the Responsiveness Summary (Section 3.0 of this document).

2.12.3 Summary of Comparative Analysis

Based on the information available at this time, Westinghouse has chosen Alternative 4 as the Selected Remedy. The Selected Remedy will be protective of human health and the environment, will comply with ARARs, will be cost effective, and will utilize permanent solutions and alternative treatment technologies to the maximum extent practicable. Because it will treat the source materials constituting a principal threat, the remedy also will meet the

CERCLA statutory preference for the selection of a remedy that involves treatment as a principal element.

2.13 PRINCIPAL THREAT WASTES

Based on available information, the waste contained in the Burial Pits constitutes "principal threat" waste, as defined in EPA (November 1991) guidance and acts as an ongoing source of COPCs migrating to groundwater. The remedial action objective calls for active remediation of these wastes. There is, however, no available technology to render radiological waste non-radioactive. Treatment of the principal threat wastes is, therefore, limited to treatment to remove VOCs.

2.14 SELECTED REMEDY

2.14.1 Rationale for the Selected Remedy

Based on information currently available, Westinghouse concludes the Selected Remedy (Alternative 4) meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing criteria. The objective of the remedy is to achieve a cleanup of buried wastes, soils, and sediments that is consistent with an unrestricted release. The selected remedy satisfies the statutory requirements of CERCLA §121:

- Be protective of human health and the environment through removal of contaminated soil and sediment and use of institutional controls to prevent exposure to humans or the environment;
- Comply with ARARs;
- Be cost-effective; and
- Utilize permanent solutions to the extent practicable.

2.14.2 Description of the Selected Remedy

Major Components of the Selected Remedy
• Site Preparation and Controls
• Excavation
• Removal of Impacted Sediments
• Treatment of VOC-Impacted Soils
• On-Site Water Treatment and Discharge
• Off-Site Disposal of Contaminated Soil, Waste, and Debris

Major Components of the Selected Remedy
• Site Restoration

The details of the selected remedy are further explained in the following subsections.

2.14.2.1 Site Preparation and Controls

Site preparation activities will be performed to mark the location of the areas to be excavated and establish Site support facilities. Site preparation is anticipated to include the following:

- Installing, as necessary, Site support facilities and establish access control in accordance with the site and material security requirements, as well as safety and radiation protection requirements;
- Installing environmental monitoring to support the remediation;
- Performing civil surveys to establish baseline conditions and facilitating the marking of the excavation areas;
- Designing and constructing materials staging areas;
- Identifying monitoring and characterization wells to be properly abandoned within the excavation areas; and
- Installing surface and stormwater control measures in accordance with the Storm-water Pollution Prevention Plan and applicable regulations.

2.14.2.2 Excavation

Removing the buried waste and contaminated soil will entail excavation, materials handling, and construction dewatering. The excavation will consist of three steps of removals as follows:

- The removal of overburden, which, if it meets regulatory requirements, may be reusable as backfill. This soil will be screened and removed in thin lifts and placed in a stockpile.
- The removal of impacted soils and sediments.
- Removal of waste and impacted debris from excavations.

The following paragraphs describe these excavation steps for the Burial Pit Area, the Site AOC for which excavation requirements are most complicated. The excavation plans for other AOCs will be adjusted to fit the specific conditions required for safe and cost-effective removal.

Removal of Overburden

The excavation and removal of clean overburden soils will be performed in the Burial Pit areas where a layer of clean cover material exists. Anticipated tasks to address the excavation and removal of clean overburden soils include the following:

- Performing visual inspection and a gamma walkover survey of marked surfaces and surrounding vicinity of the selected Burial Pit. Surveys and inspections are repeated throughout the excavation and supplemented with VOC monitoring.

- Excavating and removing clean overburden in thin lifts and stockpiling soils adjacent to the excavation.

- Repeat scanning, excavation, and removal steps until gamma walkover surveys or VOC monitoring results exceed screening limits.

- Loading clean materials into a transport truck for screening through the GAmma Radiation Detection and In-Container ANalysis (GARDIAN) Box Counting System (GBCS) and transporting overburden materials directly to the backfill storage area. Material exceeding the GBCS screening limits will be sent to the waste accumulation area for handling as impacted waste.

Excavation and Removal of Wastes and Impacted Soils

The exhumation of impacted soils and waste will be performed using the following techniques and methods:

- Performing visual inspections, gamma walkover surveys, and VOC monitoring of the excavation. Surveys and inspections are repeated throughout the excavation and supplemented with VOC monitoring. These activities continue until visual inspections indicate the wastes and impacted soils have been removed, and surveys and screening instrument responses indicate levels below the DCGLs and RGs. These remediation support surveys and screening will be supplemented with confirmatory laboratory samples. For those constituents for which no field screening tool can sufficiently determine whether RGs are met, the primary means of determining compliance will be field sampling with laboratory analysis.

- Excavating, removing, and segregating impacted soils and waste when gamma walkover surveys or VOC monitoring exceed the DCGLs and RGs. Exhumed soils and waste may be stockpiled adjacent to the excavation or placed directly into trucks for transport to the waste accumulation area.

If stockpiles of materials that contain RCRA hazardous waste or materials that have not yet been characterized are located outside the designated area of contamination, as that concept is defined in EPA guidance, such stockpiles will be designed and operated to meet the requirements for staging piles under 40 CFR 264.554.

2.14.2.3 Removal of Contaminated Sediments

The objective of the Site Pond remediation is to remove the PAHs and radiological contaminants deposited in the sediments to meet the Site RGs and DCGLs. A water diversion system will first be installed to manage the water that normally flows into the Site Pond from the spring and Outfall No. 3. Most of the water in the pond will then be drained by controlled lowering of the dam weir level; the final water removal will be accomplished by pumping.

The pond will then be allowed to dry naturally followed by the excavation and removal of the sediments. Excavation will then proceed until the RGs and DCGLs have been met. Once remediation excavation activities commence, the surface and ground water collected within the pond excavation will be collected in a filtered sump and processed through the an on-site water treatment system (Section 2.14.2.5) for subsequent discharge under the Water Pollution Control Program permit. At the conclusion of pond remediation, the water diversion will be removed, and the Site Pond will be allowed to reestablish to pre-excavation conditions. The decision to restore this area as a pond or to remove the dam and allow this drainageway to reestablish as an unimpounded stream will be made during remedial design.

2.14.2.4 Treatment of VOC-Contaminated Soils

Excavated materials with VOCs will be treated as needed using vapor extraction technologies. The treatment goals will vary depending upon whether the material is destined for off-site disposal, due to radiological or other chemical contaminants, or on-site reuse as backfill. The criteria used for the latter will be the project RGs defined in Table 6 of this ROD.

VOC treatment will be accomplished in accumulation units that are specifically designed to meet the regulatory definition of a tank as a condition of the exemptions under 40 CFR 266.230 for LLMW and under 40 CFR 262.34 for hazardous waste. The VOC accumulation/treatment units will be designed, constructed, and operated to meet the applicable requirements for tanks and tank systems under 40 CFR 265 or, if appropriate, alternative requirements approved under 40 CFR 264.553. Figure 4 shows an example of a treatment cell. Not all required details are depicted. Following demolition of the Site buildings, the tanks will be installed atop the remaining concrete building slabs. Concrete barriers will be used to form the sidewalls, and impermeable polyethylene liner will be used to line and cover the materials placed in the cell.

VOC treatment will be conducted by ex situ soil vapor extraction (SVE) by which a vacuum is induced by a mechanical blower and the VOCs are stripped and volatilized into the air stream. The exhaust air is then treated to remove particulates and VOCs before it is emitted to the atmosphere. Provisions will be made to detect potential leakage from below the liner,

and Site procedures will require daily inspections to ensure the integrity of the cover is maintained. A network of perforated pipes will be placed inside the tank and connected to a blower that will induce air flow. The air flow will volatilize and extract the VOCs from the material. Emissions from the blower exhaust will be treated through high-efficiency particulate filters and activated carbon to remove potential airborne contaminants. The VOC treatment will be designed to comply with the air emissions standards for process vents at 40 CFR 265.1032(a), requiring total VOC emissions of no more than 3 pounds per hour or emissions control of greater than 95 percent efficiency

For materials being treated under 40 CFR 262.34, the material in that unit will be accumulated, treated, and, if not rendered and confirmed to be non-hazardous, removed from the site within 90 days. For units containing exempt LLMW under 40 CFR 266.230, the accumulation and treatment time will be as short as necessary to achieve the required degree of treatment, but may extend longer than 90 days. Also, once it is determined that material within a specific treatment unit treating soils with radiologic impacts below DCGLs no longer exhibits the characteristic of a RCRA hazardous waste, subsequent treatment of that soil may involve the addition of heat if needed to reduce VOC concentrations in the soil to below RGs. Such heat addition could be through the use of heated air injection or addition of organic material that provides a heat source as it degrades (i.e., "composting").

The Selected Remedy includes the option for the treatment of LLMW for VOCs upon reaching the radiological waste disposal facility, in lieu of on-site treatment. If proven to be feasible, this approach may be attractive based on cost and the reduction of on-site materials handling. This option will be further reviewed as part of the remedial design.

2.14.2.5 On-Site Water Treatment and Discharge

Contaminated Water

The following tasks summarize the process and control measures for the handling of surface water and groundwater from Site areas where contamination levels in exposed soils area greater than the Site cleanup criteria:

- Grading the areas so that water drains to collection points. The collection points will convey water to sumps. That water will then be pumped into settling and holding tanks.
- Collecting water from contaminated areas and pumping collected water to an on-site treatment system.
- Processing the collected water through the remediation water treatment system.
- Discharging collected water in accordance with the requirements of the NRC license, the effluent limitations and other requirements of the Water Pollution Control Program permit issued by the MDNR and 40 CFR Part 122.

- Managing any entrained solids that may be collected. Any solids captured in filtration media or settled in collection tanks will be surveyed and sampled for chemical COPCs and radiological constituents prior to removal and placement in limited volume containers. These extracted materials and packaged materials will then be managed in accordance with the applicable regulatory requirements and implementing plans and procedures.

Further information regarding the collection and treatment of contaminated water will be provided for agency review through the submittal of treatment system design documents, water management plans, and other permit forms under MDNR discharge permitting requirements and the Decommissioning Plan submitted to NRC.

Uncontaminated Water

Managing uncontaminated surface and subsurface water is primarily focused on diverting such water around work areas and controlling soil erosion and sedimentation. Best management practices to be used throughout the remediation include land contouring and grading, installation of sediment traps and basins, surface water diversions, and stream bypasses. Specific water management actions may include diverting Northeast Site Creek. Management and off-site discharges of uncontaminated water will be conducted in accordance with the requirements of the NRC license and implementing procedures and with applicable requirements of MDNR.

It may also be necessary to manage any sanitary wastewater generated during the remediation of the former Leach Field. It is envisioned that, after screening to confirm that it is not radiologically contaminated, such sanitary wastewater would be collected for treatment at the existing wastewater treatment facility with treated wastewater discharged under the Water Pollution Control Program permit.

2.14.2.6 Off-Site Transportation and Disposal of Contaminated Soil and Waste

Handling, stockpiling, packaging, shipping, and other activities specific to radioactive materials will be described in more detail within the upcoming work plans and submittals to the NRC for the decommissioning aspects of this project.

The primary means of transportation of radioactive waste from the Hematite Site will be by rail service. A rail line, owned by Union Pacific Railroad, bisects the site. A spur will be constructed adjoining this line for loading railcars. A secondary means of transportation of radioactive waste will be by truck/trailer. Pre-transportation checklists will be used to ensure compliance with applicable United States Department of Transportation (DOT) and NRC regulations.

LLRW will be shipped for processing and/or disposal to one of the following locations or other appropriate out-of-state facilities:

- Studsvik-RACE, LLC., Memphis, Tennessee;
- Energy Solutions, Inc., Oak Ridge, Tennessee;

- Energy Solutions, Inc., Clive, Utah; and
- US Ecology, Grandview, Idaho.

If LLMW is encountered, it may be shipped for processing and/or disposal to the following locations or other appropriate out-of-state facilities:

- Permafix of Florida, Inc., Gainesville, Florida;
- Energy Solutions, Inc., Oak Ridge, Tennessee;
- NSSI, Houston, Texas;
- Energy Solutions, Inc. Clive, Utah; and
- US Ecology, Grandview, Idaho.

In addition to LLRW and LLMW, non-radiologically impacted materials to be transported and disposed of off-site include solid wastes, soils that do not achieve RGs through treatment, and other soils found to be chemically impacted but not amenable to on-site treatment (e.g., elevated PAHs). These materials will be shipped to permitted out-of-state disposal facilities.

Regardless of the sites selected for processing and disposal, wastes will be prepared for transport to the facilities in accordance with the receiving site waste acceptance criteria, disposal site license, and DOT and applicable hazardous and solid waste regulations.

2.14.2.7 Site Restoration

Site restoration activities will be conducted upon completion of final Site status surveys that confirm the completeness of removal of buried waste, impacted soils, and impacted sediments. Such Site restoration activities include backfilling the excavated areas, spreading topsoil, reseeding and removing temporary features. Soil excavated and determined to be suitable for backfill must meet the RGs as specified in Table 6 and other conditions to be established as part of the NRC decommissioning. Additional backfill material will be imported from an approved off-site source(s). The material will be a fine-grained soil (i.e., clay or silt); coarse-grain soils (e.g., sand and gravel) will not be used. To confirm that the imported materials is clean, the backfill material will be tested and compared to Site COPCs using criteria from Table 6 and the DCGLs.

Topsoil will be placed above the backfill material in areas to be seeded. The topsoil will be cultivated and graded to ensure a smooth, uniform grade with positive drainage. The disturbed area will then be seeded with an appropriate grass seed mixture as needed to minimize wind and water erosion.

The run-on containment berms around the excavation areas will be flattened and the silt fence removed. Erosion control devices will be maintained until adequate vegetation cover has developed. Temporary facilities will be removed and the perimeter fence secured. The Site will be surveyed to document restored conditions.

2.14.3 Expected Outcome of the Selected Remedy

The expected outcome of the Selected Remedy is UUUE in those areas where wastes, impacted soils, and impacted sediment are removed.

2.15 STATUTORY DETERMINATIONS

Remedies selected under CERCLA and the NCP should be protective of human health and the environment, comply with ARARs, be cost-effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduces the toxicity, mobility, or volume of hazardous wastes as a principal element and a bias against off-site disposal of untreated wastes. The following sections discuss how the Selected Remedy meets these statutory requirements.

2.15.1 Protection of Human Health and the Environment

The Selected Remedy will protect human health and the environment through the removal of buried waste, impacted soil and impacted sediments contaminated with COPCs above site RGs followed by disposal in properly permitted disposal facilities.

Soil and sediment removal will reduce or eliminate the potential risks due to exposure to external gamma radiation; inhalation or ingestion of contaminated soil or sediment; dermal contact with contaminated soil and sediment; radon gas emissions; and wind dispersal of fugitive dust.

Removal of the source material will prevent the leaching of contaminants from soil, wastes, and sediment to ground water and surface water. This action will reduce potential risks due to dermal contact, inhalation, or ingestion of surface water and ground water.

The removal of materials to RGs and application of institutional controls (if necessary, at limited inaccessible areas) will achieve a total residual site risk that is within the CERCLA risk range (10^{-6} to 10^{-4}) and an HI of less than 1.0. Those areas where soils and sediment are removed to achieve the RGs specified in this ROD will meet the unlimited use and unrestricted exposure requirements.

In general, the long-term protectiveness is high and commensurately reliable.

The remedy does not pose unacceptable short-term risks. Because the remedy involves excavation and disposal of contaminated materials off-site, it has short-term risks to the community associated with construction and transportation activities, but the risks are small and can be controlled through environmental monitoring, use of covered rail cars and enclosed containers, and proper emergency response management.

Achievement of DCGLs will be fully documented using final status surveys that are compatible with the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM). MARSSIM will be used to develop final status survey plans for the Hematite

Site that will, in turn, be used to demonstrate compliance with radiological criteria. Non-radiological COPCs will be evaluated through verification sampling to confirm that risk and hazard criteria are fully protective under CERCLA and have been satisfied.

2.15.2 Compliance with Applicable or Relevant and Appropriate Requirements

The Selected Remedy is fully compliant with ARARs. Under the Selected Remedy, accessible soil and sediment will be remediated to the RGs. The RGs were developed pursuant to ARARs and TBC guidance for vadose zone soils. The RGs are fully protective of human health and the environment and achieve residual conditions consistent with unrestricted use. The Selected Remedy will meet the chemical-specific and action-specific ARARs defined by NRC regulations, including the attainment of DCGLs.

2.15.3 Cost Effectiveness

The Selected Remedy is cost-effective. The NCP notes that "[a] remedy shall be cost-effective if its costs are proportional to its overall effectiveness." (40 CFR. 300.430 (f)(1)(ii)(D). This was accomplished by evaluating the "overall effectiveness" of those alternatives that satisfied the threshold criteria (i.e., were both protective of human health and the environment and ARAR-compliant). Overall effectiveness was evaluated by assessing three of the five balancing criteria in combination (long-term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; and short-term effectiveness). Overall effectiveness was evaluated by assessing three of the five balancing criteria in combination. They include long-term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; and short-term effectiveness. The other two balancing criteria are cost, which is described here, and implementability, described in 2.12.2.6. The relationship of the overall effectiveness of this Selected Remedy was determined to be proportional to its costs.

The estimated total cost of the Selected Remedy is $47.8M.

Although more expensive than Alternatives 2 ($38.9M) and 3 ($30.1M), the Selected Remedy achieves significantly greater long-term effectiveness and permanence than either alternative that relied on long-term on-site management of wastes and impacted soils.

2.15.4 Utilization of Permanent Solutions and Alternative Treatment Technology to the Maximum Extent Possible

Westinghouse has determined that the Selected Remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a practicable manner at the Site. Of those alternatives that are protective of human health and the environment and comply with ARARs, Westinghouse has determined that the Selected Remedy provides the best balance of trade-offs in terms of the five balancing criteria, while also considering the statutory preference for treatment as a principal element to the maximum extent possible and considering State and community acceptance. The Selected Remedy satisfies the CERCLA Section 121 (b) statutory preference for using permanent solutions to the extent practicable.

The Selected Remedy uses treatment technologies to the extent possible given the nature of the COPCs (VOCs are the most amenable to treatment, versus the radiological contaminants.) Treatment of soil and sediment was found to be impracticable for the radiological contaminants at the Hematite Site.

There are no special implementability issues associated with the Selected Remedy. It is technically and administratively feasible.

2.15.5 Preference for Treatment as a Principal Element

The remedy satisfies the statutory preference for treatment as a principal element of the remedy (NCP at 40 CFR §300.430(f)(5)(ii)(F)) by treating the VOCs in the impacted wastes and soils.

2.15.6 Five-Year Review Requirements

The NCP (40 CFR §300.430(f)(4)(ii)) states that if the Selected Remedy "results in hazardous substances, pollutants, or contaminations remaining on-site above levels that allow for unlimited use and unrestricted exposure" a five-year review is required. OU1 is intended to achieve UUUE, so that future periodic reviews of OU1 will be not be required.

2.16 DOCUMENTATION OF SIGNIFICANT AND OTHER CHANGES FROM THE PREFERRED ALTERNATIVE OF THE PROPOSED PLAN

The Proposed Plan was released for public comment on June 25, 2008. It identified Alternative 4 as the preferred alternative for remediation of OU1 at the Hematite Site. All written comments submitted during the public comment period were reviewed and considered as set forth in the attached Responsiveness Summary. After considering these comments, it was determined that no significant changes to the remedy, as originally identified in the Proposed Plan, were necessary or appropriate.

As an expansion to the description of the Proposed Plan, the Selected Remedy includes the option for the treatment of LLMW for VOCs upon reaching the radiological waste disposal facility, in lieu of on-site treatment. If feasible, this option may be attractive based on cost and the reduction of on-site materials handling. This modification of Alternative 4 will be further reviewed as part of the design.

If this document, through description of the remedy, is found in conflict with the Decommissioning Plan ultimately approved by the NRC, then amendments to this ROD or explanations of significant differences will be issued.

TABLES

TABLE 1. IDENTIFIED AREAS OF CONCERN, OPERABLE UNIT 1
Westinghouse Electric Co., Hematite Site

AOC No.[1]	Description	Buried Waste Present?	COPCs in Soil[2]	Potential Source Area for Groundwater Impacts[3]		Comments
				Radiological	VOCs	
3	Burial Pits	Yes	Uranium isotopes, VOCs	Yes	Yes	Principal threat waste; radiologically and VOC wastes and impacted soils appear to be at least partially co-located
4	Evaporation Ponds	No	^{99}Tc, Uranium isotopes, VOCs	Yes	Yes	Radiologically and VOC-impacted soils are partially co-located.
5	Former Septic System Leach Field	No	Uranium isotopes, VOCs	Yes	Yes	
6	Soils Beneath Buildings	No	^{99}Tc, VOCs	Yes	Yes	Radiologically and VOC-impacted soils generally not co-located.
7	Limestone Storage and Limestone Fill Areas	Yes	^{99}Tc	Yes	No	
8	Outdoor and Shallow Surface Areas	No	^{99}Tc, Uranium isotopes	Yes	No	
11	Red Room Roof Burial Area[4]	Yes	Uranium isotopes	No	No	Buried waste may contain RACM.
--	Site Pond	No	PAHs	No	No	

[1] *AOC numbers as assigned in the RI/FS Work Plan and used in the RI.*

[2] *^{99}Tc and the uranium isotopes are the primary radiological contaminant; other radiological contaminants are present in some AOCs.*

[3] *Evaluation based on results of groundwater monitoring in the RI.*

[4] *The Cistern Burn Pit, identified as AOC No. 14 in the RI, was not found to contain elevated concentrations of radiological contaminants. This area is, however, adjacent to the Red Room Roof Burial Area and, because of this proximity, remediation of the Red Room Roof Burial Area will address the Cistern Burn Pit as well.*

TABLE 2. SELECTION OF CONSTITUENTS OF POTENTIAL CONCERN[1,2]
Westinghouse Electric Co., Hematite Site

Medium	CAS Number	Analyte	Minimum Concentration[3]	Maximum Concentration[3]	Units	Location of Maximum Concentration	Detection Frequency	Concentration Used for Screening	Frequency (<5%) (Y/N)	Essential Nutrient (Y/N)	Selected as COPC (Y/N)
Surface Soil	56-55-3	Benzo(a)anthracene	18 J	6,400	ppb	BD-10-00-SL	82/121	6,400	N	N	Y
	50-32-8	Benzo(a)pyrene	16 J	6,600	ppb	BD-10-00-SL	81/121	6,600	N	N	Y
	205-99-2	Benzo(b)fluoranthene	20 J	7,800	ppb	BD-10-00-SL	87/121	7,800	N	N	Y
	193-39-5	Indeno(1,2,3-cd)pyrene	29 J	5,800 E	ppb	OA-16-00-SL	48/121	5,800	N	N	Y
	11097-69-1	PCB Aroclor 1254	21 J	540 J	ppb	RR-01-00-SL	15/121	540	N	N	Y
	11096-82-5	PCB Aroclor 1260	3.6 J	560	ppb	LF-01-00-SL	27/121	560	N	N	Y
Surface Soil	7440-38-2	Arsenic	1.1	160	ppm	EP-06-00-SL	121/121	160	N	N	Y
	7440-47-3	Chromium Total	4.9	280	ppm	BD-10-00-SL	121/121	280	N	N	Y
	7439-89-6	Iron	1,600	61,000	ppm	BD-10-00-SL	121/121	61,000	N	Y	N
	7439-92-1	Lead	3.7	1400	ppm	OA-13-00-SL	121/121	1,400	N	N	Y
	7439-96-5	Manganese	41	4400 J	ppm	SW-02-00-SL	121/121	4,400	N	Y	N
Subsurface Soil	7440-38-2	Arsenic	1.1	24	ppm	BP-18-25-SL	428/428	24	N	N	Y
	7439-89-6	Iron	2,100	35,000	ppm	BD-15-17-SL	428/428	35,000	N	Y	N
	7439-92-1	Lead	3.8	680	ppm	NB-75-19-SL	428/428	680	N	N	Y
	127-18-4	Tetrachloroethene	1.1 J	6,600,000	ppb	BLD253-02-21	127/428	6,600,000	N	N	Y
	79-01-6	Trichloroethene	1.2 J	1,600	ppb	BLD255-08-24	98/428	1,600	N	N	Y

[1] *Reference: Integrated Environmental Management, Inc., et al., January 2007.*
[2] *Potential exposure scenario timeframes are both current and future .*
[3] *"J" and "E" qualifiers indicate estimated concentrations.*

TABLE 3. CALCULATED CARCINOGENIC AND NON-CARCINOGENIC RISKS, EXPOSURE TO SITE-RELATED COPCs[1]
Westinghouse Electric Co., Hematite Site

Receptor Population	Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Exposure Route	Carcinogenic Risk			Hazardous Index		
						Child	Adult	Composite Adult	Child	Adult	Composite Adult
Resident	Current/ Future	Groundwater from overburden wells	Groundwater	Tap Water/Shower	Dermal	5.66E-03	1.16E-02	1.73E-02	1.15E+02	5.89E+01	1.74E+02
			Groundwater	Tap Water	Ingestion	1.80E-02	3.08E-02	4.88E-02	7.52E+02	3.22E+02	1.07E+03
			Indoor Air - Vapors	Showerhead/Bath	Inhalation	9.16E-01	9.26E-01	1.84E+00	6.97E+03	1.76E+03	8.73E+03
		Groundwater from bedrock wells	Groundwater	Tap Water/Shower	Dermal	2.43E-03	4.99E-03	7.42E-03	8.14E+01	4.17E+01	1.23E+02
			Groundwater	Tap Water	Ingestion	9.61E-03	1.65E-02	2.61E-02	5.48E+02	2.35E+02	7.83E+02
			Indoor Air - Vapors	Showerhead/Bath	Inhalation	6.53E-01	6.60E-01	1.31E+00	3.55E+03	8.96E+02	4.44E+03
		Groundwater	Indoor Air - Vapors	Foundation Cracks	Inhalation	1.50E-03	2.96E-03	4.46E-03	1.06E+01	5.23E+00	1.59E+01
			Outdoor Air - Vapors	Outdoors	Inhalation	8.80E-06	6.22E-06	1.50E-05	6.22E-02	1.10E-02	7.32E-02
		Surface Water/ Sediment	Surface Water/ Sediment	Stream or Pond	Dermal	3.51E-07	2.85E-07	6.35E-07	3.73E-02	2.99E-03	4.03E-02
				Stream or Pond	Ingestion	3.32E-07	8.19E-07	1.15E-06	1.42E-02	2.15E-02	3.57E-02
			Outdoor Air - Vapors	Stream or Pond	Inhalation	--	--	--	--	--	--
		Surface Soil	Surface Soil	Outdoors	Dermal	7.70E-06	4.70E-06	1.24E-05	2.70E-01	4.13E-02	3.12E-01
			Surface Soil	Outdoors	Ingestion	5.32E-05	2.28E-05	7.60E-05	1.27E+00	1.36E-01	1.40E+00
			Surface Soil	Outdoors	External	--	--	--	--	--	--
			Outdoor Air - Vapors	Outdoors	Inhalation	2.91E-09	2.06E-09	4.97E-09	0.00E+00	0.00E+00	0.00E+00
			Outdoor Air - Particulates	Outdoors	Inhalation	1.53E-08	1.08E-08	2.61E-08	1.53E-03	2.70E-04	1.80E-03
			Indoor Air - Vapors	Foundation Cracks	Inhalation	1.94E-07	1.37E-07	3.31E-07	0.00E+00	0.00E+00	0.00E+00
		Subsurface Soil	Indoor Air - Vapors	Foundation Cracks	Inhalation	3.19E-05	6.29E-05	9.49E-05	2.29E-01	1.13E-01	3.42E-01
			Outdoor Air - Vapors	Outdoors	Inhalation	1.67E-07	7.80E-08	2.45E-07	2.02E-03	2.35E-04	2.25E-03
		Totals				**1.61E+00**	**1.65E+00**	**3.26E+00**	**1.20E+04**	**3.32E+03**	**1.53E+04**

TABLE 3. CALCULATED CARCINOGENIC AND NON-CARCINOGENIC RISKS, EXPOSURE TO SITE-RELATED COPCs[1]
Westinghouse Electric Co., Hematite Site

Receptor Population	Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Exposure Route	Carcinogenic Risk			Hazardous Index		
						Child	Adult	Composite Adult	Child	Adult	Composite Adult
Commercial/ Industrial Worker	Current/ Future	Groundwater from overburden wells	Groundwater	Tap Water	Dermal	--	4.71E-04	--	--	2.32E+00	--
			Groundwater	Tap Water	Ingestion	--	1.08E-02	--	--	1.15E+02	--
			Groundwater	Tap Water	Dermal	--	2.02E-04	--	--	1.64E+00	--
			Groundwater	Tap Water	Ingestion	--	5.80E-03	--	--	8.39E+01	--
		Groundwater	Indoor Air - Vapors	Foundation Cracks	Inhalation	--	1.07E-03	--	--	1.82E+00	--
			Outdoor Air - Vapors	Outdoors	Inhalation	--	3.46E-06	--	--	5.90E-03	--
		Surface Water/Sediment	Surface Water/Sediment	Stream or Pond	Dermal	--	2.06E-07	--	--	2.08E-03	--
			Surface Water/Sediment	Stream or Pond	Ingestion	--	4.20E-07	--	--	6.63E-03	--
			Outdoor Air - Vapors	Stream or Pond	Inhalation	--	--	--	--	--	--
		Surface Soil	Surface Soil	Outdoors	Dermal	--	5.79E-06	--	--	4.88E-02	--
			Surface Soil	Outdoors	Ingestion	--	1.70E-05	--	--	9.71E-02	--
			Outdoor Air - Vapors	Outdoors	Inhalation	--	1.15E-09	--	--	0.00E+00	--
			Surface Soil	Outdoors	External	--	--	--	--	--	--
			Outdoor Air - Particulates	Outdoors	Inhalation	--	6.04E-09	--	--	1.45E-04	--
			Indoor Air - Vapors	Foundation Cracks	Inhalation	--	7.65E-08	--	--	0.00E+00	--
		Subsurface Soil	Indoor Air - Vapors	Foundation Cracks	Inhalation	--	8.35E-06	--	--	1.44E-02	--
			Outdoor Air - Vapors	Outdoors	Inhalation	--	4.35E-08	--	--	1.26E-04	--
		Totals					**1.84E-02**			**2.05E+02**	

TABLE 3. CALCULATED CARCINOGENIC AND NON-CARCINOGENIC RISKS, EXPOSURE TO SITE-RELATED COPCs[1]
Westinghouse Electric Co., Hematite Site

Receptor Population	Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Exposure Route	Carcinogenic Risk			Hazardous Index		
						Child	Adult	Composite Adult	Child	Adult	Composite Adult
Construction Worker	Current/ Future	Groundwater	Groundwater	Outdoors	Dermal	--	7.00E-05	--	--	8.51E+00	--
			Outdoor Air - Vapors	Outdoors	Inhalation	--	1.31E-06	--	--	4.98E-02	--
		Surface Water/Sediment	Surface Water/Sediment	Stream or Pond	Dermal	--	6.23E-08	--	--	2.46E-02	--
			Surface Water/Sediment	Stream or Pond	Ingestion	--	7.42E-09	--	--	1.87E-03	--
			Outdoor Air - Vapors	Stream or Pond	Inhalation	--	--	--	--	--	--
		Subsurface Soil	Subsurface Soil	Outdoors	Dermal	--	3.74E-10	--	--	6.11E-03	--
			Subsurface Soil	Outdoors	Ingestion	--	4.40E-07	--	--	6.79E-02	--
			Outdoor Air - Vapors	Outdoors	Inhalation	--	2.78E-08	--	--	1.67E-03	--
			Outdoor Air - Particulates	Outdoors	Inhalation	--	1.44E-10	--	--	3.88E-09	--
		Surface Soil	Surface Soil	Outdoors	Dermal	--	2.73E-07	--	--	2.64E-02	--
			Surface Soil	Outdoors	Ingestion	--	1.78E-06	--	--	2.26E-01	--
			Outdoor Air - Vapors	Outdoors	Inhalation	--	4.38E-10	--	--	0.00E+00	--
			Outdoor Air - Particulates	Outdoors	Inhalation	--	2.34E-09	--	--	1.40E-03	--
		Totals					**7.39E-05**			**8.91E+00**	
Recreational	Future	Groundwater	Outdoor Air - Vapors	Outdoors	Inhalation	6.40E-07	2.10E-06	2.74E-06	4.04E-03	3.32E-03	7.36E-03
		Surface Water/Sediment	Surface Water/Sediment	Stream or Pond	Dermal	3.51E-07	2.85E-07	6.35E-07	3.73E-02	2.99E-03	4.03E-02
			Surface Water/Sediment	Stream or Pond	Ingestion	3.32E-07	8.19E-07	1.15E-06	1.42E-02	2.15E-02	3.57E-02
			Outdoor Air - Vapors	Stream or Pond	Inhalation	--	--	--	--	--	--
		Subsurface Soil	Outdoor Air - Vapors	Outdoors	Inhalation	1.35E-08	4.45E-08	5.80E-08	1.36E-04	1.11E-04	2.47E-04
		Surface Soil	Surface Soil	Outdoors	Dermal	3.74E-06	2.29E-06	6.03E-06	1.35E-01	2.06E-02	1.55E-01
			Surface Soil	Outdoors	Ingestion	1.40E-06	1.40E-06	2.80E-06	8.41E-03	8.41E-03	1.68E-02
			Outdoor Air - Vapors	Outdoors	Inhalation	2.13E-10	7.01E-10	9.14E-10	0.00E+00	0.00E+00	0.00E+00
			Outdoor Air - Particulates	Outdoors	Inhalation	1.14E-09	3.74E-09	4.88E-09	1.14E-04	9.34E-05	2.07E-04
		Totals				**6.48E-06**	**6.94E-06**	**1.34E-05**	**1.99E-01**	**5.70E-02**	**2.56E-01**

TABLE 3. CALCULATED CARCINOGENIC AND NON-CARCINOGENIC RISKS, EXPOSURE TO SITE-RELATED COPCs[1]
Westinghouse Electric Co., Hematite Site

Receptor Population	Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Exposure Route	Carcinogenic Risk			Hazardous Index		
						Child	Adult	Composite Adult	Child	Adult	Composite Adult
Visitor/ Trespasser	Current/ Future	Groundwater	Outdoor Air - Vapors	Outdoors	Inhalation	--	3.74E-07	--	--	5.90E-04	--
		Surface Water/Sediment	Surface Water/Sediment	Stream or Pond	Dermal	--	2.85E-07	--	--	2.99E-03	--
		Surface Water/Sediment	Surface Water/Sediment	Stream or Pond	Ingestion	--	8.19E-07	--	--	2.15E-02	--
			Outdoor Air - Vapors	Stream or Pond	Inhalation	--	--	--	--	--	--
		Subsurface Soil	Outdoor Air - Vapors	Outdoors	Inhalation	--	7.90E-09	--	--	1.98E-05	--
		Surface Soil	Surface Soil	Outdoors	Dermal	--	2.81E-07	--	--	2.53E-03	--
			Surface Soil	Outdoors	Ingestion	--	1.72E-07	--	--	1.03E-03	--
			Outdoor Air - Vapors	Outdoors	Inhalation	--	1.25E-10	--	--	0.00E+00	--
			Outdoor Air - Particulates	Outdoors	Inhalation	--	6.65E-10	--	--	1.66E-05	--
		Totals					**1.94E-06**			**2.87E-02**	
Agricultural Worker	Current/ Future	Groundwater	Outdoor Air - Vapors	Outdoors	Inhalation	--	3.93E-05	--	--	4.98E-02	--
		Surface Water/Sediment	Surface Water/Sediment	Stream or Pond	Dermal	--	1.87E-06	--	--	2.46E-02	--
			Surface Water/Sediment	Stream or Pond	Ingestion	--	2.23E-07	--	--	1.87E-03	--
			Outdoor Air - Vapors	Stream or Pond	Inhalation	--	--	--	--	--	--
		Subsurface Soil	Outdoor Air - Vapors	Outdoors	Inhalation	--	8.34E-07	--	--	1.67E-03	--
			Outdoor Air - Particulates	Outdoors	Inhalation	--	4.32E-09	--	--	3.88E-09	--
		Surface Soil	Surface Soil	Outdoors	Dermal	--	8.18E-06	--	--	5.89E-02	--
			Surface Soil	Outdoors	Ingestion	--	5.02E-05	--	--	2.41E-01	--
			Outdoor Air - Vapors	Outdoors	Inhalation	--	1.31E-08	--	--	0.00E+00	--
			Outdoor Air - Particulates	Outdoors	Inhalation	--	7.02E-08	--	--	1.40E-03	--
		Totals					**1.01E-04**			**3.80E-01**	

[1] *Reference: Integrated Environmental Management, Inc., et al., January 2007.*

TABLE 4. CALCULATED RADIOLOGICAL CARCINOGENIC RISKS AND TOTAL RADIOLOGICAL DOSE[1]
Westinghouse Electric Co., Hematite Site

Receptor Population	Scenario Timeframe	Medium	Exposure Medium	Exposure Route	Carcinogenic Risk Radioactive Materials			Radiation TEDE (mrem/yr)		
					Child	Adult	Composite Adult	Child	Adult	Composite Adult
Resident	Current/ Future	Surface Soil	Surface Soil	External	7.77E-04	2.57E-03	3.35E-03	1.84E+02	1.74E+02	3.58E+02
			Outdoor Air - Particulates	Inhalation	1.25E-06	7.74E-06	8.98E-06	2.92E+00	5.61E+00	8.53E+00
Commercial/ Industrial Worker	Current/ Future	Surface Soil	Surface Soil	Ingestion	--	6.50E-06	6.50E-06	--	6.40E-01	6.40E-01
			Surface Soil	External	--	1.78E-04	--	--	9.99E+00	--
			Outdoor Air - Particulates	Inhalation	--	2.00E-07	--	--	1.24E-01	--
Construction Worker	Current/ Future	Surface Soil	Surface Soil	Ingestion	--	7.72E-07	7.72E-07		1.90E+00	1.90E+00
			Outdoor Air - Vapors	Inhalation	--	2.25E-06			1.63E+00	
		Subsurface Soil to Depth of 15 Feet	Subsurface Soil	Ingestion		9.15E-07			6.72E+00	
Recreational	Future	Surface Soil	Surface Soil	Ingestion	2.41E-05	4.87E-06	2.90E-05	1.90E+00	4.99E-01	2.40E+00
			Outdoor Air - Particulates	Inhalation		1.15E-08			8.35E-03	
Agricultural Worker	Current/ Future	Surface Soil	Surface Soil	Ingestion		1.40E-05	1.40E-05		1.15E+00	1.15E+00

[1] *Reference: Integrated Environmental Management, Inc., et al., January 2007.*

TABLE 5. OU1 ARARs AND TBC GUIDANCE
Westinghouse Electric Co., Hematite Site

Chemical-Specific ARARs and TBC Guidance

Medium	Authority	Requirement	Status	Requirement Synopsis
Soil	Federal	NRC Standards for Protection Against Radiation, 10 CFR 20, Subpart E Radiological Criteria for License Termination	Applicable	This NRC rule establishes requirements for termination of license and release of a site. Specifically, this NRC rule requires the residual radioactivity levels do not result in a total dose to an individual exceeding the specified standards set forth in this NRC rule.
	State	Missouri Hazardous Waste Management Law (RSMo 260) and Regulation 10 CSR 25-7.268	Applicable	Incorporates 40 CFR Part 263 by reference, and contains the land disposal restrictions of hazardous substances generated during remediation.
Groundwater	Federal	Safe Drinking Water Act, Maximum Contaminant Levels (MCLs) and non-zero Maximum Contaminant Level Goals (MCLGs) (40 CFR 141.11 – 141.16)	TBC guidance	MCLs and MCLGs have been promulgated for a number of common organic and inorganic contaminants. These levels regulate the concentration of contaminants in public drinking water supplies based on health effects and technical capabilities. MCLs are also used in defining cleanup requirements for groundwater potentially used as a potable water supply. For Operable Unit 1, MCLs are used to derive PRGs for soils.
	State	Missouri Safe Drinking Water Law MCLs (10 CSR 60-4)	TBC guidance	State of Missouri MCLs that generally track those promulgated on the Federal level.
Surface Water	Federal	Clean Water Act, National Pollutant Discharge Elimination System (NPDES) (40 CFR 122 – 125)	Applicable	Discharges to navigable waters are regulated by permit, with effluent limitations and/or monitoring requirements applied to specific constituents. Permitting is required for point-source discharges and for stormwater discharges associated with industrial activity, including waste disposal areas.
	State	Missouri Clean Water Law, Storm-water Regulations (10 CSR 20-6)	Applicable	Stormwater point sources and land disturbances that would result in a stormwater point source discharge are required to receive a permit from MDNR.
		Missouri Clean Water Law, Water Quality Standards (10 CSR 20-7)	Applicable	Defines criteria to protect surface waters of the state and defines the state anti-degradation policy.
Air	Federal	Clean Air Act, National Primary and Secondary Ambient Air Quality Standards (40 CFR 50)	Relevant and Appropriate	These standards are not source-specific, but rather are national limitations on ambient air intended to protect public health and welfare. They define acceptable airborne concentrations of conventional air pollutants.
		Clean Air Act, National Emission Standards for Hazardous Air Pollutants (40 CFR 61 and 63)	Applicable; Relevant and Appropriate	These regulations develop emission standards for source types that emit hazardous air pollutants. Parts of NESHAPS may be relevant and appropriate based on proposed remedial alternative for onsite treatment of VOCs and parts may be applicable to handling waste materials containing RACM.
	State	Missouri Air Conservation Law (RSMo 643) and Regulations (10 CSR 6.180, 6.080, 6.241 and 6.250)	Relevant and Appropriate	These regulations implement the Federal standards and incorporate Federal NESHAPS requirements and are relevant and appropriate to any site remedial action. Specific regulations may be applicable as action-specific ARARs depending on the technologies employed for remediation.

TABLE 5. OU1 ARARs AND TBC GUIDANCE
Westinghouse Electric Co., Hematite Site

Location-Specific ARARs and TBC Guidance

Topic	Authority	Requirement	Status	Requirement Synopsis
Floodplains and Wetlands	Federal	Executive Order 11988: Floodplain Management (40 CFR 6.302(b))	Not an ARAR	Any adverse impacts associated with direct or indirect development of a floodplain should be avoided, to the maximum extent possible. No AOCs are within the 100 year floodplain.
		Executive Order 11990: Protection of Wetlands (40 CFR 6, Appendix A)	Not an ARAR	Federal agencies are required to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands. No wetlands will be impacted by the proposed remedial actions.
		Clean Water Act Section 404 (40 CFR 230.10 and 33 CFR 320)	Applicable	A permit is required for discharging dredged or other fill materials into waters of the United States, including jurisdictional wetlands, navigable streams (including the floodway), and certain lakes. Applicable to the remediation of Site Pond sediments.
	State	Missouri Clean Water Law, Water Quality Certification	Applicable	Missouri requires a water quality certification for any fill activities that require a Clean Water Act Section 404 permit. Applicable for the remediation of Site Pond sediments.
Historic Places	Federal	Section 106 of the National Historic Preservation Act	Not an ARAR	Requires the preservation and protection of structures and locations designated as being of historic significance. No such sites are associated with the OU1 AOCs.
	State	State Historic Preservation Act (RSMo 253.408 to 253.412)	Not an ARAR	Requires the preservation and protection of structures and locations designated as being of historic significance. No such sites are associated with OU1 AOCs.
Sensitive Ecosystems and Habitats	Federal	Endangered Species Act (40 CFR Part 502)	Not an ARAR	This law requires that Federal agencies take action to conserve endangered or threatened species and ensure that Federal actions do not destroy or adversely modify critical habitat.
		Fish and Wildlife Coordination Act (16 USC 661 *et seq*., 40 CFR 6.302)	Relevant and Appropriate	Actions that will impact fish and wildlife must include action to protect affected fish and wildlife resources. This law prohibits diversion, channeling, or other activity that modifies a stream or river and affects fish or wildlife. Consultations may be required for remediation of Site Pond.
		Migratory Bird Treaty Act (16 USC 703 *et seq.*)	Relevant and Appropriate	Actions taken or funded by Federal agencies that result in the killing, hunting, taking, or capturing or any migratory birds, part, nest, or egg are unlawful. Consultations may be required for remediation of Site Pond.
Groundwater Protection	State	Missouri Clean Water Law, (644.051)	ARAR	Section 644.051 makes it unlawful for any person to cause pollution of any water of the state (including subsurface waters) or to place or permit to be placed any water contaminant in a location where it is reasonably certain to cause pollution of any water of the state.

TABLE 5. OU1 ARARs AND TBC GUIDANCE
Westinghouse Electric Co., Hematite Site

Action-Specific ARARs and TBC Guidance

Authority	Requirement	Requirement Synopsis
Federal	NRC Requirement to Decommission (10 CFR 70)	The basic requirement to decommission an NRC licensed site that contains special nuclear material is given in 10 CFR 70.38(h)(2). This regulation also contains the requirements for contents of a decommissioning plan and references the radiological criteria for decommissioning contained in 10 CFR Part 20, Subpart E.
	NRC Standards for Protection Against Radiation, Subpart I Storage and Control of Licensed Material (10 CFR 20)	Establishes requirements for secured access and surveillance of licensed materials stored within a controlled area.
	NRC Standards for Protection Against Radiation, Subpart K Waste Disposal (10 CFR 20)	Establishes requirements for disposal of licensed material during operations.
	NRC 10 CFR 61 Licensing Requirements for Land Disposal of Radioactive Waste	Provides siting and design criteria for commercial land disposal facilities. (Not an ARAR.)
	Uranium Mill Tailings Radiation Control Act (UMTRA) (40 CFR 92)	Provides that disposal cells are designed to be effective for 1,000 years or at least 200 years, with no more than custodial maintenance.
	NRC Packaging and Transportation of Radioactive Materials (10 CFR 71)	Establishes requirements for packaging, preparation for shipment and transportation of licensed material.
	RCRA Criteria for Municipal Solid Waste Landfills (40 CFR 258)	Establishes minimum national criteria for management of non-hazardous waste. Applicable to remedial alternatives that involve generation of non-hazardous waste. Non-hazardous waste must be hauled and disposed of in accordance with these RCRA regulations.
	RCRA Hazardous Waste Management System - General (40 CFR 260)	Provides definition of terms and general standards applicable to 40 CFR 260 - 265, 268. Applicable to remedial alternatives that involve generation of a hazardous waste. Hazardous waste must be handled and disposed of in accordance with RCRA.
	RCRA - Identification and Listing of Hazardous Waste (40 CFR 261)	Identifies solid wastes that are subject to regulation as hazardous wastes.
	RCRA - Standards Applicable to Generators of Hazardous Waste (40 CFR 262)	These regulations establish requirements for the on-site management of any hazardous wastes that may be generated in the course of the remedial action.
	RCRA - Standards Applicable to Transporters of Hazardous Waste (40 CFR 263)	These regulations establish requirements for the off-site transportation of any hazardous wastes that may be generated in the course of the remedial action.
	RCRA - Standards Applicable to Owners and Operators of Treatment, Storage, and Disposal Facilities (40 CFR 264)	Establishes the minimum national standards that define acceptable management of hazardous waste. Applicable to construction of on site hazardous waste disposal or treatment facility and to any off-site treatment/disposal of generated hazardous waste.
	Resource Conservation and Recovery Act (RCRA) – Location Standards (40 CFR 264.18)	This regulation outlines the requirements for constructing a RCRA facility on a 100-year floodplain and specifies that a disposal facility must not be located within 200 feet of a fault which has had displacement in Holocene time.
	RCRA – Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities (40 CFR 265)	These regulations establish interim status requirements for operating hazardous waste treatment, storage, and disposal facilities, including requirements for closure and post-closure care of landfills.

TABLE 5. OU1 ARARs AND TBC GUIDANCE
Westinghouse Electric Co., Hematite Site

Action-Specific ARARs and TBC Guidance

Authority	Requirement	Requirement Synopsis
Federal	RCRA-Conditional Exemption for Low-Level Mixed Waste Storage and Disposal (40 CFR 266, Subpart N)	This regulation provides an exemption of low level mixed waste from the definition of hazardous waste if the waste meets certain eligibility requirements and the site operator meets certain conditions.
	RCRA Land Disposal Restrictions (40 CFR 268 Subpart C)	These regulations set prohibitions on the land disposal of hazardous wastes and would be relevant and appropriate to remedial alternatives encompassing waste exhumation, in the event that hazardous wastes were determined to be present.
	RCRA Treatment Standards (40 CFR 268 Subpart D)	These regulations set treatment standards for types of hazardous waste that must be met prior to land disposal and would be relevant and appropriate to remedial alternatives encompassing waste exhumation, in the event that hazardous wastes were determined
State	Missouri Hazardous Substance Rules (10 CSR 24)	Established state-wide emergency telephone number to notify Missouri if a hazardous substance emergency occurs. Also specifies requirements for emergency notification and follow-up written notices in the event of a hazardous substance emergency.
	Missouri Hazardous Waste Management Law (RSMo.260) and Regulations (10 CSR 25)	Provides regulatory framework for identification, storage, transportation and disposal of hazardous wastes. Missouri requirements generally mirror Federal requirements at 40 CFR 260 through 265 and 268 (with some modifications and enhancements).
	RSMo. 260.200(4)	Contains Missouri Hazardous Waste Management Law definitions, including the definition for clean fill material.
	RSMo. 260.200(34)	Contains Missouri Hazardous Waste Management Law definitions, including the definition for solid waste.
	RSMo. 260.210.1(1)	Missouri Hazardous Waste Management Law that restricts illegal dumping activities. This would govern the disposal method chosen during the remedial activities.
	RSMo. 260.210.9(1)	Missouri Hazardous Waste Management Law that regulates clean fill. This is applicable to alternatives with contain on-site fill operations.
	10 CSR 25-3.260	Contains definitions for terms used throughout this rule.
	10 CSR 25-4-260.475 to 260.479	This regulation sets forth characteristics and lists to be used to determine if a solid wasted is a hazardous waste. This regulation incorporates 40 CFR Part 261 by reference.
	10 CSR 25-4.261	Incorporates 40 CFR Part 261 by reference, and regulates containerized or bulk wastes that are removed for off-site disposal.
	10 CSR 25-5.262	Incorporates 40 CFR Part 262 by reference, and requires that hazardous wastes shipped off-site be handled in accordance with the applicable generator regulations.
	10 CSR 25-6.263	Incorporates 40 CFR Part 263 by reference, and regulates the transportation of hazardous waste for off-site disposal.
	10 CSR 25-7.264(2)(F)	Incorporates 40 CFR Part 264 Subpart F by reference, and governs the monitoring and management of contaminated groundwater that originate for releases from solid waste management units.
	10 CSR 25-7.264(2)(G)	Incorporates 40 CFR Part 264 Subpart G by reference, and governs the closure and post-closure care of hazardous waste management facilities.
	10 CSR 25-7.264(2)(I)	Incorporates 40 CFR Part 264 Subpart I by reference, and governs the use and management of containers for hazardous waste.
	10 CSR 25-7.264(2)(J)	Incorporates 40 CFR Part 264 Subpart J by reference, and governs tank use management and closure of hazardous waste.

TABLE 5. OU1 ARARs AND TBC GUIDANCE
Westinghouse Electric Co., Hematite Site

Action-Specific ARARs and TBC Guidance

Authority	Requirement	Requirement Synopsis
State	10 CSR 25-7.264(2)(N)	Incorporates 40 CFR Part 264 Subpart N by reference, and governs land disposal and/or capping of past disposal areas.
	10 CSR 25-7.264(2)(CC)	Incorporates 40 CFR Part 264 Subpart CC by reference, and contains the air emissions standards for tanks and containers that are used to store hazardous waste.
	Missouri Water Well Driller's Law (RSMo 256.600 to 256.670) and Regulations (10 CSR 23)	These regulations govern the well, monitoring well and pump installation industry.
	10 CSR 23-3.110	This rule regulates the abandonment of unused domestic supply wells.
	10 CSR 23-4	This rule governs the construction, registration and abandonment of monitoring well is Missouri.
	10 CSR 23-6	This rule regulates the installation and abandonment of test holes installed to provide geologic or mineral data.
	Missouri Solid Waste Management Law (RSMo.260.200 to 260.245) and Regulations (10 CSR 80)	These regulations generally mirror Federal requirements at 40 CFR 258. They govern disposal of solid waste and specify the types of solid waste excluded from disposal in a sanitary landfill, including regulated quantities of hazardous waste and certain radioactive wastes.
	10 CSR 80-2.020(9)	This regulation allows for permit exemptions, including those for beneficial use of solid waste.
	10 CSR 80-3.010(3)	The rule regulates sanitary landfill waste streams.
	10 CSR 80-4.010(3)	The rule regulates demolition landfill waste streams.
	Missouri Hazardous Waste Management Law (RSMo.260.350 to 260.552) and Regulations (10 CSR 25-7.264 Subpart N)	These regulations set forth standards for landfill site suitability demonstrations, design and operating requirements. The standards modify or add to those found in RCRA 40 CFR 264.
Federal	Clean Water Act, Section 402, National Pollutant Discharge Elimination System (NPDES) (40 CFR 122 – 125)	Requires a permit for every discharge of pollutants form a point source to waters of the United States. Permit gives right to discharge specified pollutants from specified outfalls, normally for a period of five years.
State	Missouri Clean Water Law (RSMo 644) and Regulations (10 CSR 20)	These regulations provide a regulatory framework for treatment of wastes discharged into waters of the State and sets forth limits for various pollutants which are discharged into waters of the State. Establishes permitting requirements and effluent limitations.
	10 CSR 20-2	Contains the definitions of terms used in regulations pursuant to the Missouri Clean Water Law.
	10 CSR 20-6.010	This regulation contains the permitting requirements for construction and operation of a wastewater treatment facility.
	10 CSR 20-6.060	This regulation contains the permitting requirements for placing fill material in navigable waters of the State.
	10 CSR 20-6.200	This rule contains the stormwater management regulations and permit requirements.
	10 CSR 20-15	This regulation specifies the technical and administrative requirements for above-ground storage tanks.
	10 CSR 20-15.010	This regulation specifies which above-ground storage tanks must comply with the technical requirements of 10 CSR 20-15 and defines the terms used.

TABLE 5. OU1 ARARs AND TBC GUIDANCE
Westinghouse Electric Co., Hematite Site

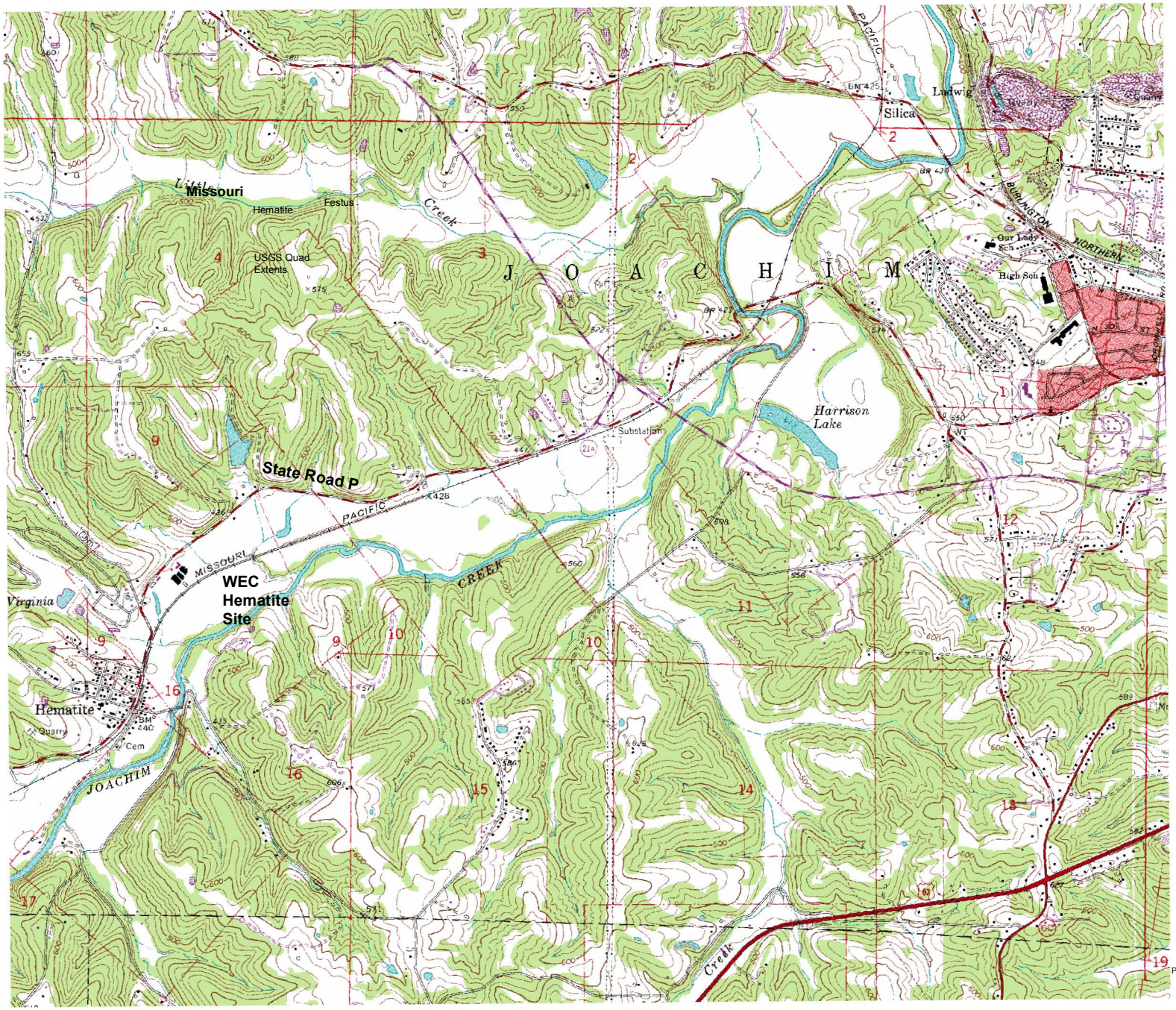
Action-Specific ARARs and TBC Guidance

Authority	Requirement	Requirement Synopsis
Federal	Clean Air Act, National Primary and Secondary Ambient Air Quality Standards (40 CFR 50)	These standards are not source-specific, but rather are national limitations on ambient air intended to protect public health and welfare. They define acceptable airborne concentrations of conventional air pollutants.
	Clean Air Act, National Emission Standards for Hazardous Air Pollutants (40 CFR 61 and 63)	These regulations develop emission standards for source types that emit hazardous air pollutants. Parts of NESHAPS maybe applicable or relevant and appropriate, based on the potential for the remedial alternative to emit Haps (e.g., radionuclides, VOCs, and RACM).
State	Missouri Air Conservation Law (RSMo 643) and Regulations (10 CSR 10)	Places restrictions on particulate matter beyond premises of origin Applicable for reference methods for total suspended particulates and PM10 monitoring, general emissions from remediation activities.
	10 CSR 10-6.080	These regulations incorporate Federal NESHAPS requirements.
	10 CSR 10-6.170	Restricts the emission of particulate matter to the ambient air beyond the premise of origin.
	10 CSR 10-6.180	This regulation provides the conditions for testing of emissions.
	10 CSR 10-6.241	This rule regulates registration, notification and performance requirements for asbestos abatement projects.
	10 CSR 10-6.250	This rule regulates certification, accreditation, and business exemption requirements for asbestos abatement projects.
Federal	Occupational Safety & Health Administration (29 CFR 1910)	These regulations specify requirements for health and safety protection for workers potentially exposed to contaminants in hazardous waste site remediation. Also includes employee "Right-to-Know" regulations.
	Occupational Safety & Health Administration (29 CFR 1926)	These regulations specify the type of safety equipment and procedures to be followed during construction activities, including earthwork construction.
Federal	Hazardous Materials Transportation Regulations (49 CFR 173, Subpart I)	These regulations set forth the U.S. Department of Transportation (DOT) requirements for packaging and transportation of radioactive material. These requirements are prescribed in addition to, not in place of, NCR regulations under 10 CFR 71.
	Hazardous Materials Transportation Regulations (49 CFR 171-179)	These regulation establish definitions and provisions for transporting hazardous materials; marking, labeling and placarding requirements; as well as general requirements for shipments rand packaging.

TABLE 6. CHEMICAL REMEDIATION GOALS FOR SOILS AND SEDIMENTS[1]
Westinghouse Electric Co., Hematite Site

Constituent of Potential Concern	Remediation Goals for OU1 (mg/kg)			Basis of Remediation Goal
	Surface Soil	Subsurface Soil	Sediment	MRBCA Table B-1 Lowest Default target Levels
Volatile Organic Compounds (VOCs)				
Cis-1,2 dichloroethylene	0.521	0.521	--	Groundwater Protection Pathway
Trans-1,2 dichloroethylene	1.10	1.10	--	Groundwater Protection Pathway
Trichloroethylene (TCE)	0.141	0.141	--	Groundwater Protection Pathway
Perchloroethylene (PCE)	0.141	0.141	--	Groundwater Protection Pathway
Vinyl Chloride	0.0192	0.0192	--	Groundwater Protection Pathway
Polynuclear Aromatic Hydrocarbons (PAHs)				
Benzo(a)Anthracene	6.12	--	--	Groundwater Protection Pathway
Benzo(a)Pyrene	0.62	--	--	Soil Direct Contact Pathway
Benzo(b)Fluoranthene	6.19	--	--	Soil Direct Contact Pathway
Indeno (1,2,3-cd)Pyrene	3.77	--	--	Soil Direct Contact Pathway
Total PAHs[2]	--	--	2.0	
Metals				
Arsenic	9.6	--	--	Calculated from background data

[1] *All concentrations in units of milligram per kilogram (mg/kg) or parts per million (ppm).*
[2] *Total PAHs is the sum of the concentrations of 13 specific polynuclear aromatic hydrocarbons.*



NAD 83, East
Missouri State Plane

0 1,400 2,800 Feet

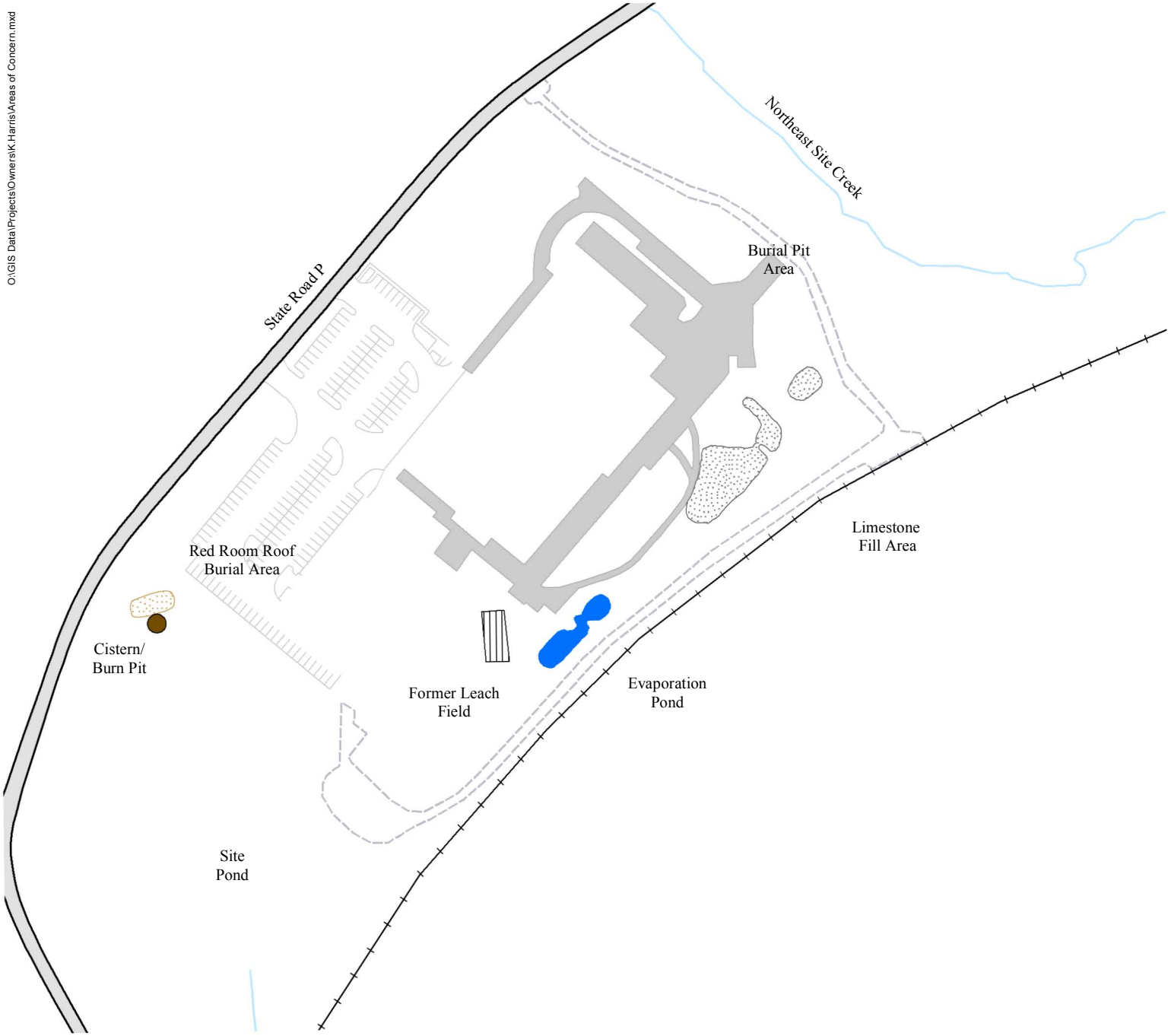
Hematite Decommissioning Project
Jefferson County
Hematite, MO

Westinghouse

Prepared By:	Rev:	Date:
JAL	0	02-07-08

Figure 1.

O:\GIS Data\Projects\Owners\K.Harris\Areas of Concern.mxd



LEGEND:

- Areas of Concern
- Buildings
- Property Boundary
- Burial Pit Area
- Former Leach Fields
- Cistern / Burn Pit
- Red Room Roof Burial Area
- Evaporation Ponds
- Surface Water
- Streams
- Road
- Concrete Driveway
- Gravel Road
- Parking Area
- Railroad

0 100 200 Feet

Requested By: Kevin Harris

Document/Reason: Record of Decision

Hematite Decommissioning Project
Jefferson County
Hematite, MO

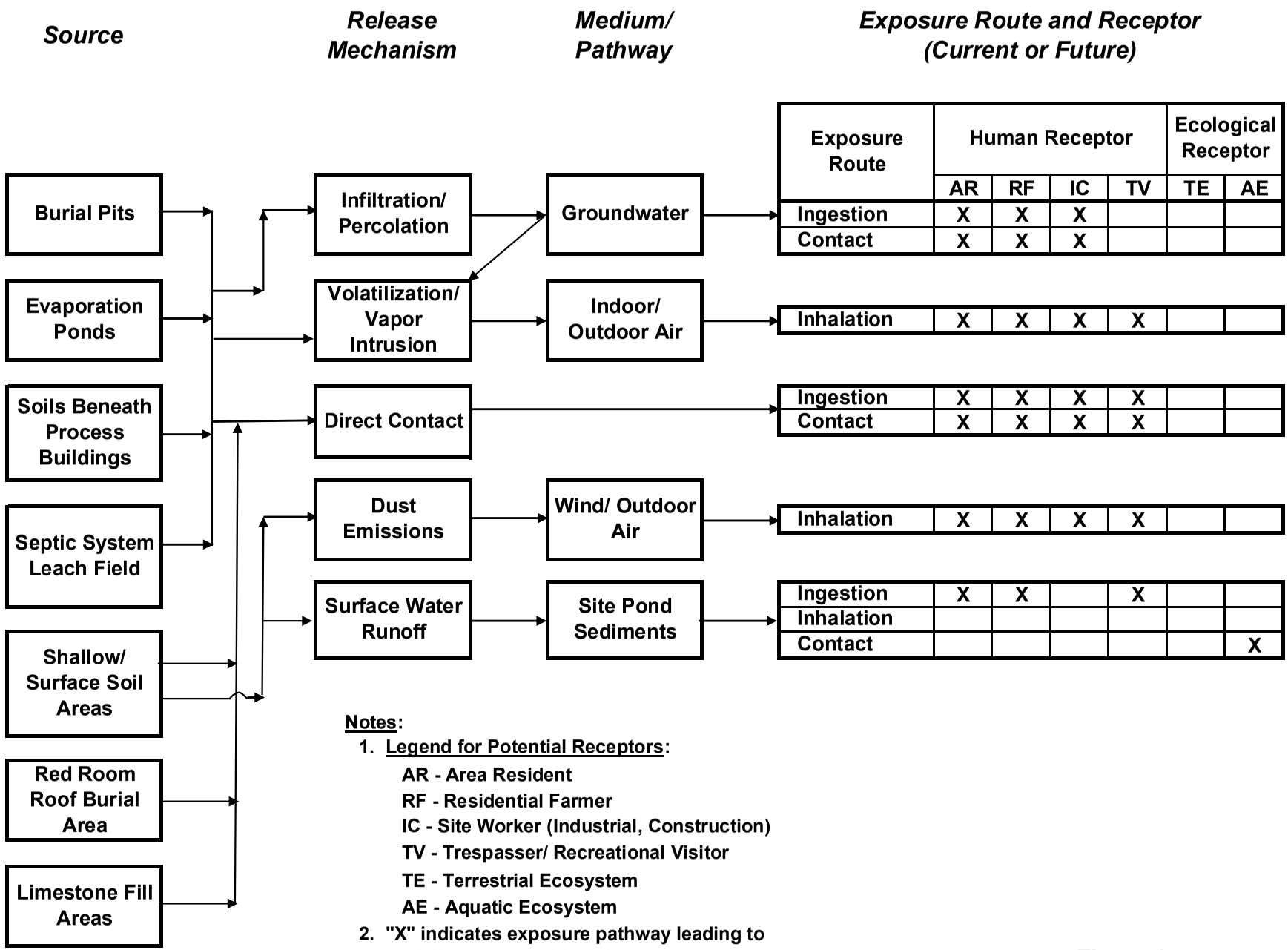
Westinghouse

Prepared By: JAL, DJH

Rev: 2

Date: 05-14-09

Figure 2. Site Plan

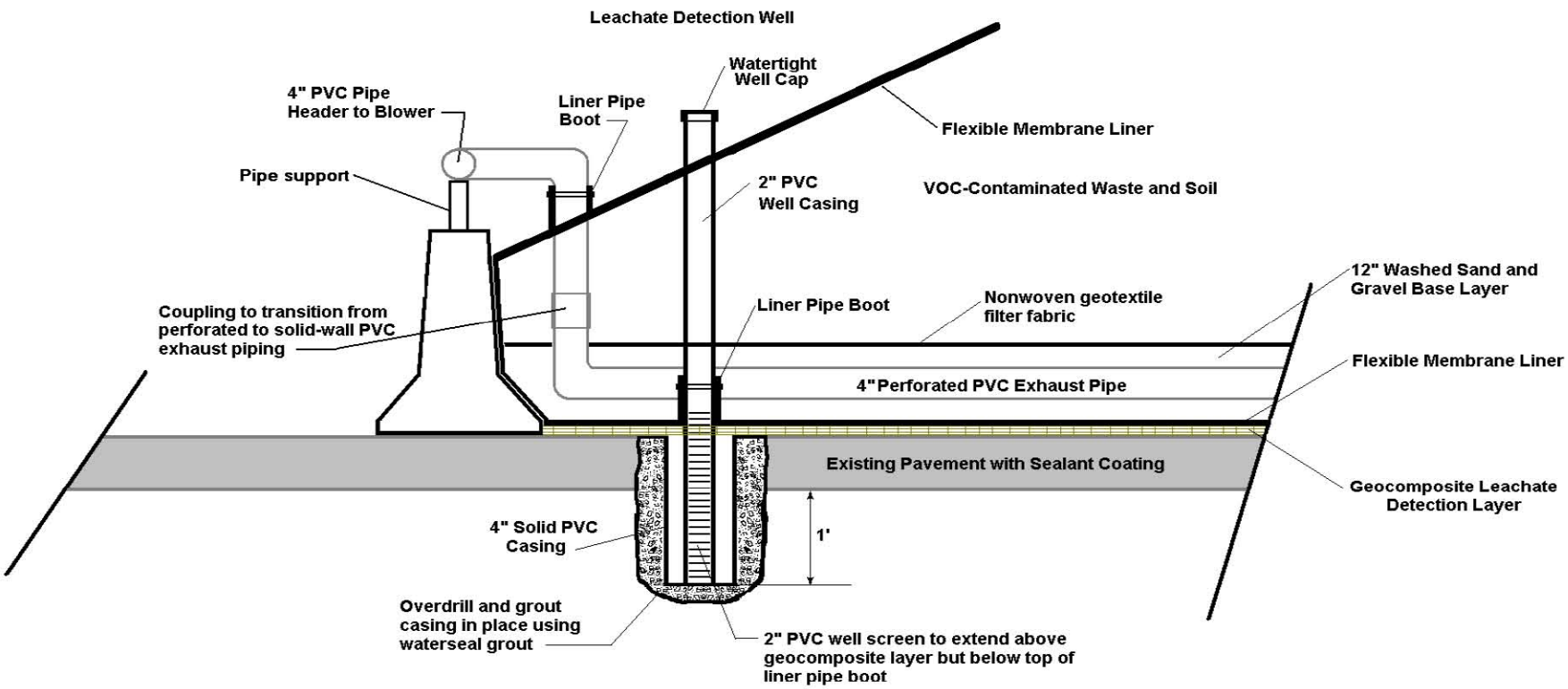


Exposure Route	Human Receptor				Ecological Receptor	
	AR	RF	IC	TV	TE	AE
Ingestion	X	X	X			
Contact	X	X	X			
Inhalation	X	X	X	X		
Ingestion	X	X	X	X		
Contact	X	X	X	X		
Inhalation	X	X	X	X		
Ingestion	X	X		X		
Inhalation						
Contact						X

Notes:

1. Legend for Potential Receptors:
   - AR - Area Resident
   - RF - Residential Farmer
   - IC - Site Worker (Industrial, Construction)
   - TV - Trespasser/ Recreational Visitor
   - TE - Terrestrial Ecosystem
   - AE - Aquatic Ecosystem
2. "X" indicates exposure pathway leading to potentially unacceptable risk.
3. "Contact" exposure route includes both dermal contact and external radiation.

Figure 3
Conceptual Site Model
Hematite Site



No scale

Figure 4. Conceptual Design
VOC Material Treatment Tanks

PART 3

THE RESPONSIVENESS SUMMARY

3.0 THE RESPONSIVENESS SUMMARY

3.1 OVERVIEW

This Responsiveness Summary has been prepared to summarize the community involvement process undertaken to date relating to the Westinghouse Hematite Site in Festus, Missouri and to provide responses to the comments that were received during the recent public comment period on the Proposed Plan for OU1. This Responsiveness Summary is organized as follows:

- Background on Community Involvement (Section 3.2);
- Summary of Comments and Responses (Section 3.3):
    - Westinghouse Responses (Section 3.3.2), and
    - MDNR Responses (Section 3.3.3);
- Remedial Design/Remedial Action (Section 3.4); and
- Appendix A (Attachments).

3.2 BACKGROUND ON COMMUNITY INVOLVEMENT

A Proposed Plan was released on June 25, 2008 describing Westinghouse's preferred alternative for the OU1 remediation of the Hematite Site. On that day, Westinghouse made the Proposed Plan and other documents comprising the Administrative Record for this ROD available at the Festus Public Library, 300 N. Mill Street in Festus, Missouri. A letter announcing the publication and availability of the Proposed Plan as well as the public meeting on the Proposed Plan and the public comment period was sent to residents on the Site mailing list, including local elected officials. Legal advertisements announcing the availability of the Proposed Plan, public meeting, and public comment period were published in the *Jefferson County Leader* on June 26, 2008 and in the *St. Louis Post Dispatch Suburban Journal* on June 28, 2008.

The public meeting was held on July 10, 2008 at the National Guard Armory on State Road P in Festus, Missouri. The meeting, which was conducted by Westinghouse in coordination with MDNR, included a presentation of the proposal, a group question and answer session (including an offer to allow attendees to make verbal statements for the record), and a one-on-one private question and answer session. In addition, attendees were reminded that written comments were welcome as well. The public comment period subsequently was extended to August 25, 2008.

No adverse public comments were received that required a modification to the Proposed Plan, and, based on the lack of adverse comments from the local community, Westinghouse believes the community supports the Selected Remedy. The sole submittal of comments by mail was from the law firm of Husch Blackwell Sanders LLP on behalf of United Nuclear Corporation, one of the former owners/operators of the Hematite facility. Both Westinghouse and the State of Missouri have reviewed and considered these written

comments and, pursuant to Section 113(k)(2)(B)(iv) of CERCLA, 42 U.S.C. §9613(k)(2)(B)(iv), have prepared responses as set forth in this Responsiveness Summary. Westinghouse's responses are set forth in Section 3.3.2. MDNR's responses to these written comments are set forth in Section 3.3.3. The referenced comment letter also transmitted prior comments from February 2007 and May 2008 that had been provided to MDNR and which addressed the RI and other prior documents. Appendix A to this ROD also addresses these previously received comments.

3.3 SUMMARY OF COMMENTS AND RESPONSES

3.3.1 Introduction

As noted above, the only written comments received during the public comment period were submitted by the law firm of Husch Blackwell Sanders LLP on behalf of United Nuclear Corporation, one of the former owners/operators of the Hematite facility (hereinafter the "Commenter"). These comments were divided into two broad sections: (1) general comments applicable to the Proposed Plan as a whole, and (2) comments addressing specific portions of the Proposed Plan. As noted above, Westinghouse's responses to these comments are set forth in Section 3.3.2. MDNR's responses to Commenter's comments are set forth in Section 3.3.3.

3.3.2 Westinghouse Responses to Comments

As noted above, Commenter provided both "general" comments as well as more "specific" comments.[1] Given the length and complexity of Commenter's "general" comments, Westinghouse has chosen to address each one in narrative form in Section 3.3.2.1 below. Westinghouse's responses to the Commenter's specific comments are set forth in tabular form in Section 3.3.2.2.

3.3.2.1 Westinghouse's Responses to General Comments

Commenter raises three general issues that focus on legal issues that it believes are supportive of its position in pending litigation.[2] In particular, Commenter appears to be focused more on collateral issues relating to the State's authority (or purported lack thereof) to oversee the Proposed Plan and related documents than it is on the merits of the proposed remediation itself. However, Commenter's litigation focus ignores two central and over-riding considerations. First, irrespective of whether MDNR has authority to oversee Site activities, the steps taken to date and discussed in the Proposed Plan are required to protect

[1] The referenced comments are lengthy and not easily summarized. The subject matter of Commenter's comments will be briefly summarized here, but the complete comments are attached to this Responsiveness Summary as an Appendix.

[2] In 2003, Westinghouse commenced litigation against Commenter and several other parties, including the United States government, in order to recover and be reimbursed for the substantial costs it has incurred in undertaking the remediation at this Site.

human health and the environment, and are consistent with the NCP. Second, as will be explained in detail below, the importance and validity of the work announced in the Proposed Plan do not rise or fall based on the jurisdictional issues raised by Commenter. Although Westinghouse and MDNR believe that MDNR's involvement at the Site is indeed authorized, whether the State ultimately has authority over the Proposed Plan and its underlying documentation simply has no impact on the validity and legitimacy of the work described therein.

General Comment I: NRC Has Exclusive Jurisdiction over Radioactive Materials at the Site

In an effort to support the points raised in its first General Comment, Commenter oversimplifies the regulatory complexities of this Site, and stretches the facts to fit its simplistic views. In reading Commenter's letter (see Appendix A), one is left with the impression that both Westinghouse and MDNR have somehow ignored and excluded the NRCfrom Site cleanup activities. In fact, nothing could be further from the truth. From the initiation of the license termination process in 2000, Westinghouse has worked extensively with NRC in connection with the decommissioning of the Hematite facility pursuant to NRC's regulations and requirements. Westinghouse is currently following the NRC decommissioning process and is submitting all necessary documentation to NRC to fulfill those regulatory requirements. At all times during this process, Westinghouse has recognized NRC's primacy on issues relating to radiological health and safety.[3] At no time has Westinghouse treated the Site as though it were under the exclusive jurisdiction of MDNR, contrary to Commenter's contention (page 2, Comments).

However, the Site is also impacted by non-radiological contamination – ironically, much of which was caused by Commenter – and there is no question that MDNR has the authority to regulate these materials. *See e.g.*, January 1, 2007 Order of Court, *State of Missouri v. Westinghouse*, Case No. 4:05-CV-0315 SNL, page 18. Moreover, many of these non-radiological contaminants (and mixtures of radiological and non-radiological contaminants) are co-located throughout the Site – again, caused largely by Commenter. Yet, Commenter has declined several invitations to participate in funding the remediation of this Site – leaving it up to Westinghouse, as the party remediating the Site, to chart a course through this regulatory thicket in a manner that satisfies both regulatory authorities. Following the dual and sometimes overlapping paths of license termination (with oversight from NRC) and NCP compliance (with oversight from MDNR) is the most effective approach to dealing with this complex matter.

Through its extensive efforts in working with both MDNR and NRC to date, Westinghouse is hopeful and confident that the remediation will proceed smoothly and without jurisdictional conflicts. However, as noted above, Westinghouse recognizes NRC's primacy on issues relating to radiological health and safety, and, as a result, Site documents expressly provide

[3] Indeed, as discussed below, the Proposed Plan and other site documents make it clear that nothing under MDNR's control will interfere with NRC's exclusive jurisdiction, and in the case of a conflict on issues within the exclusive jurisdiction of the NRC, the NRC's views will be controlling.

that nothing under MDNR's control will interfere with NRC's exclusive jurisdiction. Moreover, as noted above, in the case of a conflict between MDNR and NRC on issues within the exclusive jurisdiction of the NRC, NRC's views will be controlling. *See e.g.*, Consent Decree, Section I.E. Thus, Westinghouse and MDNR have gone to great lengths to ensure that the potential conflicts raised by Commenter do not, in fact, occur.

Further, to ensure that a careful balance between NRC and MDNR processes is maintained throughout this project, the work proposed in the Proposed Plan and defined in this ROD will not be implemented in the field until all necessary regulatory approvals are received from NRC. As noted, Westinghouse believes that the remedial approach in the Proposed Plan and ROD will be consistent with the approach that will be contained in the Decommissioning Plan approved by the NRC. However, in the unlikely event that there is a significant difference between the two approaches such that a change in the selected remedy is required by the Decommissioning Plan as approved by NRC, this would be addressed through the issuance of an Explanation of Significant Differences (ESD) or an Amended ROD, with appropriate input from the public during that process. *See* 40 CFR 300.435(c).

Commenter also argues that the RI and FS are "illegal and invalid, *ab initio*" because MDNR lacked the authority to direct and oversee work related to radioactive materials. Comments, page 3. However, this argument ignores two important points. First, the RI and FS addressed more than just radiological materials, and even the broadest reading of the judicial opinion referenced by the Commenter would not invalidate MDNR's oversight of the remediation of the non-radiological contamination at the Site. Second, and more importantly, even if MDNR's involvement in the process is completely preempted – which we do not believe to be the case – such preemption relates only to <u>MDNR's involvement</u> in the process, and does not in any way affect the legality or validity of the underlying studies that have been conducted by Westinghouse, the documents Westinghouse has prepared, or the response actions that Westinghouse has and will take to address conditions at the Site. The bottom line is that hazardous substances, including radiological and non-radiological materials, are present at the Site and require response activities as defined under CERCLA in order to protect human health and the environment. The Proposed Plan and ROD identify the remedial activities selected to address an "operable unit" of the Site (OU1), and is based on extensive information that has been gathered about the Site over a number of years (with input from both NRC and MDNR). Thus, even if MDNR's involvement in the radiological aspects of this complex project is preempted by the Atomic Energy Act, it is only MDNR's <u>involvement</u> on those issues that is preempted, and not the underlying activities themselves (*i.e.*, the RI, the FS, the Proposed Plan, the ROD and other response actions taken and to be taken at the Site). That work is valid and supportable, irrespective of any governmental involvement.[4]

[4] As discussed in greater detail below, neither federal nor state governmental involvement is considered to be a prerequisite in order for NCP compliant documents like the RI, FS, Proposed Plan and ROD to be valid. *See* discussion in Section 3.3.2.1.2 below.

General Comment II: MDNR Lacks CERCLA Authority to Select or Oversee the Response Actions

In its second "General Comment," Commenter asserts that MDNR has no authority to oversee or direct the work at the Site because it was not delegated authority under CERCLA by EPA. According to the Commenter, in the absence of this delegated authority to MDNR, the entire Proposed Plan is somehow rendered invalid.

Commenter's arguments are without merit. First, Commenter's delegation argument has been specifically rejected by the United States Department of Justice as well as several federal district courts, including the district court that has jurisdiction over Westinghouse's cost recovery lawsuit against Commenter and other responsible parties. In particular, United States District Judge Catherine Perry recently held that states in fact do have authority under CERCLA, even in the absence of delegated authority from EPA. *See Westinghouse Electric Company v. United States*, Case No. 4:03CV861 CDP, page 14 (Opinion March 30, 2009).

Moreover, there is no dispute that MDNR has authority under its own state laws to engage in and oversee cleanup activities within its borders relating to non-radiological contamination. Thus, even in the absence of delegated CERCLA authority to MDNR, the State is authorized to oversee and enforce its own laws and to do so in any manner that it believes to be appropriate. Here, the State is monitoring the Hematite cleanup using the process established by EPA under CERCLA (*i.e.*, the NCP).

Finally, Commenter's argument ignores the fact that the State's involvement simply is not a prerequisite for the remedy selection process undertaken by Westinghouse under the NCP to be valid. *See Spectrum International Holdings, Inc. v. Universal Cooperatives, Inc.*, 2006 WL 2033377 (D. Minn. 2006), citing cases.[5] As such, even if the State was not authorized to oversee and/or direct Westinghouse's work as Commenter argues, this lack of authority in no way invalidates the extensive investigatory work and remedy selection process that Westinghouse has engaged in under the NCP.

Commenter also expresses its concern that MDNR cannot dictate the schedule for the remedial work identified in the Proposed Plan because much of that work must be approved by NRC. As noted above, the parties are keenly aware of the need to coordinate the work being preformed pursuant to the regulatory authority of both agencies – including the schedules for such work – in connection with implementing this complex remedial project. As noted, Westinghouse will not begin to implement the selected remedy until all necessary approvals have been received from NRC. Moreover, to the extent that there is a conflict between the schedule identified in the Proposed Plan and the NRC approved Decommissioning Plan, the schedule in the Decommissioning Plan will control. Thus, Commenter's alleged concerns about potential scheduling conflicts are unwarranted.

[5] It should be noted that in the preamble to the proposed NCP, EPA made it "absolutely clear" that no governmental approval of any kind is required under the NCP process to support a cost recovery action under CERCLA. 53 Fed. Reg. 51394, 51462 (December 21, 1988).

General Comment III: The Proposed Plan is Inconsistent with CERCLA and the NCP

Finally, Commenter complains that the Proposed Plan is inconsistent with CERCLA and the NCP because it is redundant, not prepared in accordance with NCP and based upon an RI and FS that are similarly flawed. As shown below, Commenter's claims are without merit.

Commenter suggests that the Proposed Plan is "redundant" and "unnecessary" because some of the remedial activities contemplated by the Proposed Plan will also be described in documents prepared for and ultimately approved by the NRC. However, Commenter misses the point. First, as noted above, the Hematite remediation project is extremely complex, involving the investigation and ultimate remediation of radiological and chemical impacts resulting from decades of plant operations. When enacting CERCLA, Congress tasked EPA with developing a regulatory framework – a blueprint – for conducting complex remediation at sites like the Hematite Site. 42 U.S.C. § 9605. The resulting regulatory program – the NCP – establishes a logical and technically sound process by which to systematically investigate and ultimately remediate environmental impacts from releases of hazardous substances. The NCP includes specific guidelines for investigating site conditions (40 CFR 300.430), for evaluating and selecting remedial approaches (40 CFR 430(e) and (f)), and for designing and implementing the selected remedy (40 CFR 300.435). The NCP also provides several opportunities for the public to provide meaningful input into the remedial project (*see e.g.*, 40 CFR 300.155, 300.415(n), 300.430(c), 300.430(f)(2), (3) and (6) and 300.435(c)). These fundamental steps are necessary and common to any complex site remediation project, irrespective of the regulatory authority that may apply. Indeed, the same general tasks (*e.g.*, site investigation, analysis of alternatives, design and implementation, etc.) are required in connection with the decommissioning process established under the auspices of the NRC. Thus, the investigatory and remedial steps taken and to be taken by Westinghouse under the NCP are not redundant, but instead are at the core of an organized approach to understanding site impacts and adequately addressing them.

Moreover, as noted above, documents to be submitted to the MDNR under its oversight are to be prepared consistent with the NCP process. *See e.g.*, Consent Decree, Paragraph 17. Thus, for any cleanup issues to be presented to MDNR under these authorities, it is necessary that those documents be prepared using the NCP process.

Even if MDNR has no authority at this Site whatsoever (as Commenter apparently claims), the Proposed Plan and underlying documentation would nonetheless still be "necessary," if for no other reason than the Commenter's and the other responsible parties' refusal to participate in funding the cleanup work, thereby forcing site cleanup work to be consistent with the NCP. Certainly, Commenter should not be heard to complain of "duplicative" work when its own recalcitrance is at least one of the factors making NCP compliance necessary.

EPA has made it clear that recovery of response costs under CERCLA is possible when performing the remedial work under another regulatory program. As noted by EPA, "even if a party takes a cleanup action under an authority other than CERCLA (*e.g.*, RCRA corrective action), it may have a right of cost recovery under CERCLA section 107 if the action was a necessary response to a release of hazardous substances, and was performed consistent with the NCP." 55 Fed. Reg. 8665, 8796 (March 8, 1990). Thus, contrary to Commenter's

contention, performing work under another regulatory program does not render the effort to conduct the work consistent with the NCP unnecessary or duplicative. Not only is such work an appropriate technical approach for the work, it is necessary to ensure that the parties responsible for conditions at the Site (*e.g.*, Commenter) help pay for the remediation as provided by CERCLA.

Commenter also complains that Westinghouse is not the proper entity to have issued the Proposed Plan or to solicit comments on it, citing to several provisions of the NCP and EPA guidance in an effort to support its position. However, Commenter ignores other provisions of the same regulations that make it clear that Westinghouse's actions are wholly appropriate, and in fact mandated by the NCP. Commenter based its argument on Sections 300.430(f)(2) and 300.430(f)(3)(i) of the NCP, which indicate that the "lead agency" at a site is charged with preparing the proposed plan and providing it to the public for review and comment. However, the Commenter ignores the fact (of which it should be well aware) that these sections generally apply when the government is conducting the response action. However, the NCP also specifically contemplates a situation, like here, where a private party is actually the one that is carrying out the response action.[6] In those situations, the NCP makes it clear that the private party will be the one to perform the role of the "lead agency" in taking steps under the NCP.[7] Thus, pursuant to Section 300.700(c)(5)(viii) of the NCP, the private party (Westinghouse) is the one who is responsible for conducting the RI/FS and issuing the Proposed Plan. Similarly, pursuant to Section 300.700(c)(6)(iv) of the NCP, the private party (Westinghouse) is the one to communicate with the public on such issues and to solicit their input. Thus, contrary to Commenter's contention, Westinghouse is indeed the proper party to have issued the Proposed Plan and to coordinate the current public participation process.

Finally, Commenter expresses its apparent concern that the Proposed Plan is driven not by an objective to protect human health and the environment, but instead by Westinghouse's cost recovery litigation against Commenter and other recalcitrant parties. Comments at page 5. Again, Commenter is simply raising legal arguments to support its litigation position, but has raised no legitimate concern about the technical aspects of the Proposed Plan itself. Indeed, the primary purpose of the response actions identified in the Proposed Plan is the protection of human health and the environment from historic contamination at the Site. The fact that Westinghouse has been forced to commence litigation against Commenter and others to pay their share of this cleanup is indeed unfortunate, but it no way detracts from the fact that the response work identified in the Proposed Plan and ROD, as implemented, is necessary and will be protective of human health and the environment.

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[6] In recognition of a private party's right under CERCLA to recover the costs it incurs in cleaning up a site, EPA amended the NCP in 1990 to clarify the steps these parties should take to comply with the NCP. As explained by EPA, Subpart H of the NCP "set[s] out a list of those NCP provisions for which compliance would be required in order for a response action by 'other persons' (*i.e.*, persons who are not the federal government, a state, or an Indian tribe) to be considered 'consistent with the NCP' for purposes of cost recovery actions under CERCLA section 107." 55 Fed. Reg. 8665, 8792 (March 8, 1990). Those are the steps that Westinghouse has been following, culminating in the issuance of the Proposed Plan and this ROD.

[7] *See* 40 CFR Section 300.700(c)(8) ("any action to be taken by the lead agency listed in paragraphs (c)(5) through (c)(7) may be taken by the person carrying out the response action").

3.3.2.2 Westinghouse's Responses to Specific Comments

Specific Comments received: Husch, Blackwell, Sanders LLP			
Comment No.	**Pp/§/¶**	**Comment**	**Response**
1	Page 1-2	The Proposed Plan states: "*Several CERCLA studies and investigations have preceded this Proposed Plan. Beginning in 2004, Westinghouse, with oversight by MDNR, prepared an RI, a Human Health Risk Assessment (HHRA) . . . MDNR approved these reports as they relate to Operable Unit 1 on July 19,2007...MDNR approved the FS on December 21, 2007.*" <u>Comment</u>: Judge Limbaugh expressly ruled that MDNR's jurisdiction over these activities and reports is preempted by the Atomic Energy Act. Therefore, MDNR had no authority to oversee or approve these reports. We previously commented to MDNR that the Westinghouse RI and the FS efforts were unauthorized by federal law and inconsistent with CERCLA and the NCP. The reports, therefore, cannot form the basis for a Proposed Plan that is consistent with CERCLA or the NCP.	In this comment, Commenter largely reiterates the objection it raised in its General Comment I discussed above. Westinghouse refers the reader to its discussion in Section 3.3.2.1.1 above. As noted in that response, Commenter's objections related to MDNR's authority, even if completely valid, do not in any way alter the legitimacy, authority, or validity of the Proposed Plan itself, which has been prepared in accordance with the requirements of CERCLA and the NCP, and which announces proposed response activities to address contamination caused by releases of hazardous substances, including both radiological and non-radiological materials, at the Hematite Site.

Specific Comments received: Husch, Blackwell, Sanders LLP			
Comment No.	**Pp/§/¶**	**Comment**	**Response**
2	Page 2	The Proposed Plan states: "*MDNR has provided oversight of this CERCLA process, which in turn has been coordinated with the license termination process being conducted under NRC's jurisdiction.*" <u>Comment</u>: For the reasons mentioned above, MDNR has no legal authority to oversee the CERCLA process. And the NRC license termination process is what drives the cleanup of the site, not the CERCLA process.	Commenter reiterates the arguments made in its General Comment II. See response to that comment in Section 3.3.2.1.2 above. As noted in that response, Westinghouse intends to comply with the NRC license termination process and to coordinate the remedy proposed in the Proposed Plan with the NRC approved Decommissioning Plan.
3	Page 3	The Proposed Plan states: "*Groundwater in the upper Jefferson City - Cotter Dolomite flows radially from the Hematite Facility toward the northeast along bedding planes and toward the southeast in a more permeable zone in the rock.*" <u>Comment</u>: The underlined phrase is merely a theory carried through from the RI/FS. Westinghouse offers no technical support or other justification for this statement.	Commenter asserts that there is no technical support for the statement in the Proposed Plan that the Jefferson City-Cotter Dolomite flows radially from the Site toward the southeast in a more-permeable zone in the rock. Westinghouse disagrees with this comment. The groundwater flow directions were determined in the RI based on the hydraulic heads measured in more than 80 wells. The flow directions and gradients are well documented and confirmed by data collected during the IGMP.

Specific Comments received: Husch, Blackwell, Sanders LLP			
Comment No.	**Pp/§/¶**	**Comment**	**Response**
4	Pages 3 and 4	The Proposed Plan states: "*Vertical gradients also tend to be upward between the Jefferson City Cotter Dolomite and the Roubidoux Formation. Until 2004, however, this gradient was reversed (i.e., downward) as a result of lowered hydraulic heads in the Roubidoux Formation, possibly caused by pumping of the Roubidoux by the City of Festus water supply wells.*" <u>Comment</u>: This is conjecture rather than fact, also carried through from the RI/FS. Data from shallow bedrock wells generally indicate an upward gradient into the alluvium near Joachim Creek collected prior to 2004.	Commenter questions the technical basis for the vertical gradients discussed in the Proposed Plan, asserting that data from shallow bedrock wells show upward gradient into alluvium near Joachim Creek. Westinghouse disagrees with this comment. The RI is clear in that only groundwater flow in the overburden is intercepted by Joachim Creek. Bedrock groundwater flow, especially under pumping (withdrawal) conditions, continues below Joachim Creek. Joachim Creek intercepts the shallow groundwater in the overburden, and this stream has scoured most of the sediments from atop the bedrock surface. The bedrock face is evident on the south side of Joachim Creek, and there is little question where the overburden terminates and groundwater flow within that unit ceases. The bedrock units beneath Joachim Creek extend to greater depths. The uppermost bedrock unit, the Jefferson City-Cotter formation, extends approximately 150 feet beneath Joachim Creek. Groundwater measurements in this unit did not indicate a strong vertical gradient, thus groundwater flow is expected to be primarily down the regional dip of the unit, i.e., to the east-southeast, unless there is a hydraulic influence on the system. The data on which the RI was based was obtained after the private wells in the subdivision to the south of the site were disconnected and/or abandoned. Any hydraulic impact of groundwater withdrawal from these wells, in addition to any regional pumping impacts, had already ceased by that time.

Specific Comments received: Husch, Blackwell, Sanders LLP			
Comment No.	**Pp/§/¶**	**Comment**	**Response**
5	Page 4	The Proposed Plan states: "*Removal actions from 2002 through 2005 were implemented to address . . . removal of uranium impacted soils from an on-site area known as Deul's Mountain, and the removal of radiologically contaminated and other equipment from the property. Each of these actions was conducted in accordance with the NCP, including provisions for documentation and public comment, and was approved by MDNR*". <u>Comment</u>: Judge Limbaugh expressly ruled that MDNR's purported exercise of jurisdiction over these removal actions is preempted by the Atomic Energy Act. Therefore, MDNR had no authority to oversee or approve these activities. Moreover, preparing an Engineering Evaluation/Cost Analysis ("EE/CA") for each of these removal actions was not necessary. Those removals were required as part of Westinghouse's obligations under its NRC license, and the NRC does not require EE/CAs.	The Commenter merely reiterates the objections it raised in General Comment I, and thus, the response in Section 3.3.2.1.1 above is incorporated here. Whether MDNR had authority to oversee the earlier removal activities undertaken at the Site (i.e., the development and implementation of the EE/CAs for Duel's Mountain and the Equipment and Buildings) has no impact on the legitimacy or necessity of these response actions. Although this work may also be required as part of Westinghouse's NRC license, doing such work under an EE/CA was also required to ensure that the work was done in a manner consistent with the NCP.

Specific Comments received: Husch, Blackwell, Sanders LLP			
Comment No.	**Pp/§/¶**	**Comment**	**Response**
6	Page 5	The Proposed Plan states: "*Nearly all the calculated risk results from [non-radiological] exposures related to the assumed use of bedrock groundwater for drinking water and similar use.*" <u>Comment</u>: The Proposed Plan does not explain why this discussion of health risks related to groundwater is relevant to OU-1, which is limited to soils and sediments. The non-radiological risks from groundwater appear to relate to dense, non-aqueous phase liquid ("DNAPL")-like conditions at the Site, which are unaffected by an OU-1 remedy.	Commenter questions why potential health risks presented by groundwater are discussed in the Proposed Plan because the Selected Remedy is focused on OU1 (i.e., buried waste, soils, and sediments). Although groundwater issues will be evaluated in the context of future groundwater response actions as well, it is recognized that, at the Hematite Site, sources of VOCs in groundwater include materials both in the vadose and saturated zones and may include dense non-aqueous phased liquid (DNAPL). Source abatement is an essential first step in the overall Site remediation and groundwater remediation cannot be successfully completed until such sources are addressed. The Selected Remedy for OU1 will address potential source areas in the vadose zone.

Specific Comments received: Husch, Blackwell, Sanders LLP			
Comment No.	**Pp/§/¶**	**Comment**	**Response**
7	Page 7	The Proposed Plan states: "*It is Westinghouse's and MDNR 's current judgment that the preferred alternative identified in this Proposed Plan (or one of the other active measures considered in the FS), is necessary to protect public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.*" <u>Comment</u>: Judge Limbaugh expressly ruled that MDNR's jurisdiction over the radioactive materials at the Site is preempted by the Atomic Energy Act. Because the FS identifies that all but one of the AOCs are contaminated with radioactive materials, MDNR had no authority to oversee or approve these activities as part of the FS, and has no authority to make health and safety decisions regarding their remediation.	Commenter merely reiterates the objections it raised in its General Comment I, and thus, the response in Section 3.3.2.1.1 is incorporated here. The work leading up to and culminating in the response action proposed in the Proposed Plan has been conducted in a manner consistent with the NCP. As noted in the Proposed Plan and the ROD, the selected alternative is necessary to protect public health, welfare or the environment from actual or threatened releases of hazardous substances into the environment, and Commenter's objections relating to preemption do not alter that conclusion.

Specific Comments received: Husch, Blackwell, Sanders LLP			
Comment No.	**Pp/§/¶**	**Comment**	**Response**
8	Page 9	The Proposed Plan states: "*Pursuant to these NRC requirements, Westinghouse is developing [Derived Concentration Guideline Levels] for soil, groundwater, and building surfaces. These DCGLs will be specified in the [NRC Decommissioning Plan] that will undergo NRC review and approval prior to commencing remediation.*" <u>Comment</u>: Even if it was necessary for Westinghouse to prepare a Proposed Plan under CERCLA (which it is not), and even if MDNR had jurisdiction over radioactive materials (which it does not), we do not understand how Westinghouse could finalize a Proposed Plan or MDNR could endorse it, when the DCGLs themselves have not been finalized or approved. This further confirms that the Proposed Plan is a litigation device, and that it is not necessary in light of the NRC's oversight of the decommissioning of the Site.	The Commenter questions how a final remedy for OU1 can be proposed or finalized in advance of DCGLs being approved for the Site by NRC. As noted above, Westinghouse is developing DCGLs for the Site, which are subject to approval by NRC. If the final DCGLs are different from those currently envisioned in developing the Proposed Plan and ROD, Westinghouse does not anticipate that such difference will have a material impact upon the Selected Remedy. Given the nature of contaminants identified at the Site during the RI and related investigatory work, the response actions, remedial alternatives, and methodologies identified and evaluated in the FS are not dependent in any material way to these numeric values. Accordingly, although a change in DCGLs could affect the absolute cost and scope of remedy implementation (i.e., the amount of material that may need to be excavated and/or treated), such changes should not affect the relative ranking of the various remedial alternatives considered in the FS, the Proposed Plan and the ROD. Again, in the unlikely event that a change in DCGL values results in a significant difference in the remedial approach at the Site, such change would be addressed through the issuance of an ESD or an Amended ROD, with appropriate input from the pubic during that process, in accordance with the NCP (40 CFR 300.435(c)).

Specific Comments received: Husch, Blackwell, Sanders LLP			
Comment No.	**Pp/§/¶**	**Comment**	**Response**
9	Page 9	The Proposed Plan states: "*In the FS, Westinghouse evaluated a wide variety of potential remedial technologies and processes with the potential to achieve the RAOs and meet the Site-specific cleanup levels given as the PRGs and DCGLs.*" <u>Comment</u>: The FS would appear invalid if it evaluates remedial technologies against DCGLs, when DCGLs have not been finalized.	Commenter questions the validity of the FS in the absence of finalized DCGLs. As set forth in response to Comment 8 above, Westinghouse does not anticipate that NRC's approval of DCGLs will materially affect the evaluation of remedial alternatives considered in the FS or selected in the ROD. In the unlikely event that a change in DCGL values results in a significant difference in the remedial approach at the Site, such change would be addressed through the issuance of an ESD or an Amended ROD, with appropriate input from the pubic during that process, in accordance with the NCP (40 CFR 300.435(c)).

Specific Comments received: Husch, Blackwell, Sanders LLP			
Comment No.	**Pp/§/¶**	**Comment**	**Response**
10	Page 10 alternative 2	The Proposed Plan states: "*The slurry wall would be keyed as deep as practicable into the upper weathered bedrock.*" <u>Comment</u>: The slurry wall should be keyed into one of the lower permeability units within the overburden alleged to lie beneath the facility such as the "Fat Clay," discussed in earlier Site reports. Keying into "weathered bedrock" would be an unnecessary costly and technically inappropriate solution. The cost estimate should be modified to reflect this change in approach so that a valid comparison of the alternatives can be performed.	Commenter asserts that the slurry wall identified in Alternative 2 should be keyed into lower permeability units within the overburden, and not weathered bedrock, which, in Commenter's view, would be unnecessarily costly and technically inappropriate. Commenter also suggests that cost estimates should be redone to reflect this change so that a valid comparison of alternatives can be done. Westinghouse does not agree with this comment. The lower permeability soils, such as the fat clay, overlie the basal sand and gravel unit, which is the transmissive zone within the overburden. Accordingly, keying the slurry wall into the "fat clay" would not cut off transport of contaminants within the overburden groundwater, and would thereby be rendered ineffective. Keying the slurry wall into the weathered bedrock achieves the objective of containing the source area groundwater in the overburden. Because no change to Alternative 2 is necessary or appropriate, no change needs to be made to the cost estimates.

Specific Comments received: Husch, Blackwell, Sanders LLP			
Comment No.	**Pp/§/¶**	**Comment**	**Response**
11	Page 10, Page 11, and Page 19	The Proposed Plan states: "*Approval for the Alternative 2 in-place containment of waste would be obtained through the NRC license termination process and State approvals for chemical constituents.* *Approval for an on-site disposal facility would be obtained through the NRC license termination process.* *NRC licensing requirements mandate that radiologically impacted buried waste and environmental media be addressed in decommissioning.*" <u>Comment</u>: We are pleased to see Westinghouse's acknowledgement in these portions of the Proposed Plan of the NRC's exclusive jurisdiction over radioactive materials. But that does not cure the fatal defect that the Proposed Plan is itself entirely unnecessary and almost entirely duplicative of the NRC's decommissioning process. This language only further supports the fact that the Proposed Plan is inconsistent with CERCLA and the NCP.	Commenter cites to selected passages of the Proposed Plan that acknowledge that NRC licensing requirements apply to the Site, and then wrongly concludes that the applicability of such requirements somehow render the Proposed Plan "entirely unnecessary," duplicative of the NRC's decommissioning process, and inconsistent with CERCLA and the NCP. As noted above, the Proposed Plan and the ROD appropriately makes repeated reference to the interplay between the NRC decommissioning process and the NCP process that is being followed at the Site. Indeed, NRC recognizes the interplay of these regulatory programs as well. See e.g., MARSSIM, Appendix F (The Relationship between the Radiation Survey and Site Investigation Process, the CERCLA Remedial or Removal Process, and the RCRA Corrective Action Process). As noted above, the Proposed Plan, the ROD and other NCP documents developed in connection with this Site are indeed necessary both to satisfy MDNR's requirements as well as to perfect Westinghouse's claims against Commenter and the other parties who are responsible for the significant remedial costs that are being incurred at the Site.

3.3.3 Comments on the Proposed Plan for the Hematite Site with Responses Prepared by MDNR

As noted above, MDNR has also reviewed the Comments submitted by Husch, Blackwell, Sanders LLP. MDNR's responses are set forth below.

General Comment From Husch, Blackwell, Sanders LLP: "I. The NRC has Exclusive Jurisdiction Over Radioactive Materials at the Site."			
Comment No.	**Pp/**	**Comment**	**Response**
General I. A.		Comment: Westinghouse acquired the Hematite Site, and the U.S. Nuclear Regulatory Commission ("NRC") license to possess and use radioactive materials at the Site, in April 2000. Shortly thereafter, Westinghouse voluntarily decided to permanently cease its nuclear fuel fabrication activities at the site. NRC regulations mandate that upon ceasing principal nuclear activities, the holder of the NRC license must begin to fulfill its obligation to decontaminate and decommission ("D&D") the site. See 10 C.F.R. 70.38(d). In recognition of its obligations, Westinghouse submitted a Decommissioning Plan ("DP") to the NRC in April 2004. The NRC has yet to approve the DP, primarily because Westinghouse submitted initial versions of a DP that the NRC found unacceptable.	We have found that the generation of several iterations of a plan is not uncommon in developing remedies for our review, and we suspect the same to be true of decommissioning plan submittals to NRC. However, we the department, can not answer comments or questions based on suppositions concerning another agency's opinions of the quality of plans submitted to it. Therefore, if you have suggestions or comments regarding the decommissioning plan, these should be directed to NRC.

General Comment From Husch, Blackwell, Sanders LLP: "I. The NRC has Exclusive Jurisdiction Over Radioactive Materials at the Site."			
Comment No.	**Pp/**	**Comment**	**Response**
General I. B.		Only after the NRC approve Westinghouse's approach to remediating the radioactive contamination at the Site, and issues a license amendment memorializing its approval, can Westinghouse begin to remediate the soils and sediments at the Site that are the subject of the Proposed Plan.	The nature of this site the license do indeed require that NRC approval is be obtained before any intrusive activities (such as excavation) occur.
General I. C.		Despite Westinghouse's clear obligation to remediate radioactive material under NRC's oversight. Westinghouse continues to treat the Hematite Site as though it were under the exclusive jurisdiction of the Missouri Department of Natural Resources ("MDNR"), which it is not. For example, Westinghouse, with MDNR approval and oversight, prepared various reports, including a Remedial Investigation ("RI") for the whole site and a Feasibility Study ("FS") for soils and sediments (i.e., OU-1). Yet MDNR lacked authority to require Westinghouse to perform those investigations and studies and to generate those reports, because those activities involved radioactive materials. The Proposed Plan, which is based on the RI and FS, necessarily suffers this same legal defect.	1. Accusations of treating this site as being under the exclusive control of MDNR is contradictory to the first comment listed above (General Comment I.A.). It references efforts made by Westinghouse to seek approval from NRC for decommissioning. Furthermore, your final comment also confirms this effort by saying "We are pleased to see Westinghouse's acknowledgement in these portions of the Proposed Plan of the NRC's exclusive jurisdiction over radioactive materials...." 2 MDNR did demand that Westinghouse address non-radiological contamination. This is based on our regulatory authority over volatile organic compounds and the hazardous waste portion of the mixed wastes under the State law (Chapter 644, RSMo and sections 260.500-260.552, RSMo) and federal law (Section 107(a) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), 42 U.S.C. section 9607(a).)

General Comment From Husch, Blackwell, Sanders LLP: "I. The NRC has Exclusive Jurisdiction Over Radioactive Materials at the Site."			
Comment No.	**Pp/**	**Comment**	**Response**
General I.C. (cont'd)			3 Investigations and feasibility studies are integral parts of developing a remedy for the VOC's and hazardous waste portion of the mixed wastes. Westinghouse will be conducting a comprehensive clean up pursuant to this ROD for OU 1. It is consequently appropriate for the ROD to address both radiological and non-radiological contaminants. Because the MDNR is aware of the jurisdictional issues, the ultimate interpretation of extent of potential radiological contamination and the decisions regarding subsequent actions will be decided by NRC in subsequent documents submitted to it. Though both agencies (NRC and MDNR) have ultimate authority within their realms of regulatory oversight, we do work cooperatively. 4. Please note, our agency also has authority over the issuance of Water Pollution Control Program Permits. This has impacts on both the site water treatment system and stormwater runoff. At times, other activities (such as well drilling and abandonment) will be regulated by our agency.

General Comment From Husch, Blackwell, Sanders LLP: "I. The NRC has Exclusive Jurisdiction Over Radioactive Materials at the Site."			
Comment No.	**Pp/**	**Comment**	**Response**
General I. D.		According to the Proposed Plan, the site is contaminated by both radioactive and non-radioactive materials. Judge Limbaugh of the U.S. District Court for the Eastern District of Missouri unambiguously ruled on January 22, 2007, that MDNR is preempted from regulating radionuclides. He ruled that regulating radioactive materials—whether by themselves, or mixed with other material—remains solely within the jurisdiction of the NRC. See Missouri vs. Westinghouse Electric Co., LLC, 487 f. Supp. 2d 1076 (E.D. Mo. 2007).	NRC has and will be the agency responsible for regulating radiological contaminants or materials, and the related work plans and procedures. MDNR's efforts pertain to establishing chemical remediation goals, removal of solid waste, permitting wastewater and storm water releases and other similar efforts. MDNR has not requested remediation goals for radionuclides. The ROD does include remediation goals for radionuclides, which will be reviewed and approved by the NRC's decommissioning plan approval process.

General Comment From Husch, Blackwell, Sanders LLP: "I. The NRC has Exclusive Jurisdiction Over Radioactive Materials at the Site."			
Comment No.	**Pp/**	**Comment**	**Response**
General I. E.		Due to the presence of radioactive materials in all but one area of the Site, see FS, Table 1-1, MDNR can only implement the Alternatives identified in the Proposed Plan by necessarily regulating the cleanup of radioactive materials. For example, the Preferred Alternative (i.e., Alternative 4) would require MDNR to oversee the excavation of buried waste and contaminated soil all of which contain radioactive materials. See e.g. Proposed Plan at 13-14, 20; FS Table 1-1. This is consistent with MDNR's administrative designation for the Site: the "Hematite Radioactive Site." Because there is no way for Westinghouse and MDNR to conduct these activities without also affecting the radioactive materials at the Site, those actions are plainly preempted under Judge Limbaugh's January 22, 2007 ruling.	1. Concurrent oversight of the excavated wastes by MDNR and NRC will be done whenever there is a comingling of radiological and hazardous contaminants. The remediation and decommissioning goals and the means by which it is determined that those goals are met are decided by the individual agencies having authority. Efforts to demonstrate compliance with regulatory authority, should not be misconstrued as one agency usurping the authority of another. 2. Your suggestion that "Hematite Radioactive Site" is an administrative designation is correct. An administrative designation is merely a placeholder and is not a complete description of a project, our role, or our authority. 3. Judge Limbaugh's January 22, 2007 Order is no longer precedent and is not binding on the State or Westinghouse as a result of the voluntary dismissal of the case. Furthermore, the Proposal acknowledges that both MDNR and the NRC have a role at this Site.

General Comment From Husch, Blackwell, Sanders LLP: "I. The NRC has Exclusive Jurisdiction Over Radioactive Materials at the Site."			
Comment No.	**Pp/**	**Comment**	**Response**
General I. F.		In the proposed Consent Decree that Judge Limbaugh struck down, MDNR was attempting to "oversee the proper and complete implementation" of Westinghouse's RI/FS Activities, which address radioactive materials at the Hematite Site. See Proposed Consent Decree ¶¶ 9, 51. Yet those are the very same "activities" that Westinghouse describes in the Proposed Plan. Judge Limbaugh confirmed that MDNR's oversight here is preempted by the Atomic Energy Act.	Again, Judge Limbaugh's January 22, 2007 Order is no longer precedent and is not binding on the State or Westinghouse as a result of the voluntary dismissal of the case. Also the Judge did not rule that the State's authority is preempted by the Atomic Energy Act. What he did say was that the consent decree which he was reviewing could not be approved because it was squarely addressing the State's health and safety concerns from radiological contamination. Furthermore, the Judge also said "There is no dispute that Missouri retains jurisdiction over the non-radiological components of mixed wastes." Though we still believe we weren't attempting to regulate radioactive materials, we have since modified our approach to clearly state the bounds of regulatory authority within subsequent documents. (See consent judgment entered on July 3, 2008 in State v. Westinghouse, Case No. 08JE-CC00856JJ.) This does not meant we won't provide comments to NRC related to the upcoming decommissioning plans. However, it does mean that MDNR's review of the Record of Decision and related plans will focus on remediation goals for the hazardous constituents. Also, please note that our agency also has authority over the issuance of Water Pollution Control Program Permits. This has impacts on both the site water treatment system and stormwater runoff. At times, other activities (such as well drilling and abandonment) may also be regulated by our agency.

General Comment From Husch, Blackwell, Sanders LLP: "I. The NRC has Exclusive Jurisdiction Over Radioactive Materials at the Site."			
Comment No.	**Pp/**	**Comment**	**Response**
General I. G.		MDNR's letter of June 18, 2008 to Westinghouse regarding the Proposed Plan appears to acknowledge the federally-preempted field of radiological health and safety. MDNR's acknowledgment of the preempted field, however, comes too late. Judge Limbaugh ruled that MDNR lacked the authority to direct and oversee the RI and FS, which involved the investigation and analysis of radioactive materials. The RI and FS, therefore, are illegal and invalid, ab initio. The RI and FS form the basis of the Proposed Plan, making the Proposed Plan illegal and invalid, ab initio. These invalid documents cannot, therefore, form the basis of a future remediation decision by MDNR through a Record of Decision.	There is no ruling that specifies MDNR lacks the authority to direct and oversee the RI and FS. We recognize NRC's authority to make the final determination on all matters related to the radioactive constituents within the soils and sediments.

General Comment From Husch, Blackwell, Sanders LLP "II. MDNR Lacks CERCLA Authority to Select or Oversee the Response Actions."			
Comment No.	**Pp/**	**Comment**	**Response**
General II. A.		Missouri has no authority under CERCLA to require a private company to perform work unless the U.S. Environmental Protection Agency ("EPA") delegates that authority to Missouri. Under CERCLA, only the President or his delegates can compel of enter into an agreement with a party to perform response actions, which include investigation and removal activities. 42 U.S.C. §§ 9606(a). 9622. By Executive Order, the President has delegated this authority to the EPA. See Note to 42 U.S.C. § 9615. Although CERCLA provides a mechanism through which a State may seek delegation from EPA of such authority, Missouri has neither sought nor obtained authority to require or oversee Westinghouse's performance of an RI or an FS, or to require Westinghouse's preparation of a Proposed Plan, or to issue a Record of Decision selecting a remedy for the Hematite Site.	1. The U.S. Environmental Protection Agency ("EPA") has been notified of this project and the State's role. 2. The State does have authority under CERCLA to recover costs and to settle with PRPs. (Sections 107(a) and 113(f)(2) of CERCLA, 42 U.S.C. sections 9607(a) and 9613(f)(2).) Additionally, the Eighth Circuit Court has held that a clean up conducted under state authority may meet the requirements of the National Contingency Plan, 42 CFR Part 300. (General Elec. Co. v. Litton Indus. Automation Sys., Inc. 920 F.2d. 1415 (8th Cir. 1990).

General Comment From Husch, Blackwell, Sanders LLP "II. MDNR Lacks CERCLA Authority to Select or Oversee the Response Actions."			
Comment No.	**Pp/**	**Comment**	**Response**
General II. B.		Nor can MDNR dictate the schedule for the remedial work described in the Proposed Plan, because it is the NRC that must approve the work related to the D&D of the Site. Westinghouse is obligated to perform the D&D as the holder of an NRC license. Accordingly, the work that Westinghouse is required to perform under its NRC license to ensure protection of the public and the environment is necessarily unaffected by the Proposed Plan.	1. We understand NRC's authority to direct the schedule for conducting a decommissioning. The remedy to be conducted under the Record of Decision will have to be done cooperatively with the decommissioning. The only schedules so far dictated by MDNR have been the development of a draft Record of Decision for OU1, the Interim Groundwater Monitoring Plan, and the establishment of alternate potable water sources for residents with wells impacted by VOCs. 2. Both agencies need each others involvement and jurisdictional authority to completely and comprehensively address cleanup at this site. It is our goal to work cooperatively with NRC such that we don't make requirements regarding schedules or otherwise that impede the ability of Westinghouse to comply with NRC expectations.
General II. C.		Similarly, the next step in the CERCLA process after a Proposed Plan would be for the supervision agency to issue a Record of Decision ("ROD"). Yet MDNR cannot issue a ROD for OU-1 because it lacks authority over the very radioactive materials that are driving the remediation. Only the NRC's approval of Westinghouse's DP Plan can trigger and drive the remediation.	Irrespective of the radiological impacts, the presence of volatile organic compounds and other hazardous materials in the soils and sediments present risks that must be addressed. Furthermore, their presence in the soils and sediments present on-going potential impacts to the groundwater. The ROD recognizes NRC must approve the remediation goals for radiological materials and recognizes clean up must not begin until NRC does approve those goals.

General Comment From Husch, Blackwell, Sanders LLP "III. The Proposed Plan Is Inconsistent with CERCLA and the NCP."			
Comment No.	**Pp/**	**Comment**	**Response**
General III. A.		Westinghouse alleges that the Proposed Plan is being prepared under CERCLA and that is, and all work performed supporting it, are consistent with the National Contingency Plan ("NCP"). See Proposed Plan at 1-2. This is not the case. The Proposed Plan itself is inconsistent with the NCP because it is redundant was not prepared in accordance with the NCP, and is based on an RI and FS that were equally redundant and inconsistent with the NCP. Thus, even if MDNR had authority under CERCLA to select a remedy for the Hematite Site, and even if the Proposed Plan now out for public comment were not preempted by the Atomic Energy Act, the Proposed Plan would still be fatally flawed.	All remediation goals for the radioactive constituents and subsequent procedures and work plans will be developed under the authority of NRC. Please remember, the site is regulated by both the NRC and the State. Nothing in federal or state law mandates that only one regulatory agency may be active at a particular site. In fact, the law is quite the opposite. Each agency needs the technical expertise and jurisdictional authority of the other to completely and comprehensively address cleanup at this site. In reality, conducting two separate clean ups would be both inefficient and redundant.

General Comment From Husch, Blackwell, Sanders LLP "III. The Proposed Plan Is Inconsistent with CERCLA and the NCP."			
Comment No.	**Pp/**	**Comment**	**Response**
General III. B.		The Proposed Plan is a redundant report. It represents duplicative work that is not necessary" under CERCLA. It is therefore inconsistent with the NCP. For example, the Proposed Plan presents options for remediating numerous "Area of Concern" at the Site, all but one of which-the Site Pond-are reported to be contaminated with radioactive materials. Regardless of whether MDNR has jurisdiction over the non-radioactive materials commingled with these radioactive materials, MDNR cannot direct remediation of the non-radioactive materials without affecting the co-mingled radioactive materials over which it lacks jurisdiction. The remediation of radioactive materials is required to be described in the DP that Westinghouse submitted to the NRC. Therefore, the Proposed Plan simply is not necessary.	Again, MDNR does not establish remediation goals for radionuclides just as NRC does not establish remediation goals for volatile organic compounds. Sites having contaminants commingled require joint regulatory authority to address the cleanup. The Proposed Plan had to be developed to address the non-radiological constituents. It is neither redundant nor is it duplicative. It is necessary under CERCLA and is consistent with the NCP. Please remember that radioactive materials are hazardous substances under CERCLA.

General Comment From Husch, Blackwell, Sanders LLP "III. The Proposed Plan Is Inconsistent with CERCLA and the NCP."			
Comment No.	**Pp/**	**Comment**	**Response**
General III. C.		Moreover, Westinghouse is not the proper entity to have issued this Proposed Plan or to be receiving public comments on it. The Proposed Plan purports to be issued pursuant to CERCLA. Proposed Plans issued Pursuant to CERCLA, however, must be issued by the lead agency. See e.g. 40 C.F.R. § 300.430(f) (2) ("the lead agency…shall present that alternative to the public in a proposed plan"); id. § 300.430(f) (3) (i) ("The lead agency, after preparation of the proposed plan, …shall provide a reasonable opportunity for [public comments]"); U.S. EPA, "A Guide To Preparing Superfund Proposed Plans, Records of Decision, And Other Remedy Selection Decision Documents," at 1-4 (July 1999) ("PRPs may participate in the remedy selection process by submitting comments on the Proposed Plan or other information contained in the Administrative Record file during the formal public comment period held before the final selection of a remedy for a site. However, PRPs generally should not be permitted to write Pro-posed Plans, RODs or any amendments to those documents."). Westinghouse defies this directive. Westinghouse is a Potentially Party for the Hematite Site because, inter alia, it is the current owner and operator of the site, and the holder of the NRC license to possess and use special nuclear material, pursuant to 10 C.F.R. Part 70.	The EPA statement that "PRPs generally should not be permitted to write proposed plans…" is part of a guidance document, not a regulation. Additionally, the statement "generally should not be permitted" does not mean that the guidance dictates it is never permitted. Our actions, in-this-case, may be considered outside the norm, but are not inconsistent with CERCLA. Westinghouse and their contractors did draft the proposal and presented it to the public, but did so under our direction. Further, this site is clearly not the general or average superfund site. As noted previously, this site is subject to two regulatory agencies' jurisdiction. Given that complex reality, the generally accepted practice couldn't be followed.

General Comment From Husch, Blackwell, Sanders LLP "III. The Proposed Plan Is Inconsistent with CERCLA and the NCP."			
Comment No.	**Pp/**	**Comment**	**Response**
General III. D.		The Proposed Plan appears to be driven, not by protection of human health and the environment, but by litigation, that Westinghouse has voluntarily brought against the United States and others, to recover its cleanup costs. This rationale is not consistent with the NCP, and makes these costs unrecoverable.	The remediation goals specified within the Proposed Plan were developed using human health risk based methods. Our expectations for the site are that the contamination is remedied to meet those goals. Those expectations are consistent with the NCP.

Specific Comments From Husch, Blackwell, Sanders LLP: They state, "For each of our specific comments, we reproduce the text of the Proposed Plan in italics, and provide our comment."			
Comment No.	**Pp/**	**Comment**	**Response**
Specific A.		The Proposed Plan states: *Several CERCLA studies and investigations have preceded this Proposed Plan. Beginning in 2004, Westinghouse, with oversight by MDNR, prepared an RI, a Human Health Risk Assessment (HHRA) ...MDNR, approved these reports as they relate to Operable Unit 1 on July 19, 2007....MDNR approved the FS on December 21, 2007. (page 1-2).* <u>Comment</u>: Judge Limbaugh expressly ruled that MDNR's jurisdiction over these activities and reports is preempted by the Atomic Energy Act. Therefore, MDNR had no authority to oversee or approve these reports. We previously commented to MDNR that the Westinghouse RI and the FS efforts were unauthorized by federal law and inconsistent with CERCLA and the NCP. The reports, therefore, cannot form the basis for a Proposed Plan that is consistent with CERCLA or the NCP.	Again, Judge Limbaugh's January 22, 2007 Order is no longer precedent and is not binding on the State or Westinghouse as a result of the voluntary dismissal of the case. What Judge Limbaugh said was that the consent decree which he was reviewing could not be approved because it was squarely addressing the State's health and safety concerns from radiological contamination. Furthermore, the Judge also said "There is no dispute that Missouri retains jurisdiction over the non-radiological components of mixed wastes." Though we still believe we weren't attempting to regulate radioactive materials, we have since modified our approach to clearly state the bounds of regulatory authority within the Consent Decree entered by the Jefferson County Circuit Court. The RI and FS as prepared are still in effect and usable for development of a Proposed Plan and subsequently the Record of Decision.

Specific Comments From Husch, Blackwell, Sanders LLP: They state, "For each of our specific comments, we reproduce the text of the Proposed Plan in italics, and provide our comment."			
Comment No.	**Pp/**	**Comment**	**Response**
Specific B.		The Proposed Plan states: *MDNR has provided oversight of this CERCLA process, which in turn has been coordinated with the license termination process being conducted under NRC.'s jurisdiction. (page2).* Comment: For the reasons mentioned above, MDNR has no legal authority to oversee the CERCLA process. And the NRC license termination process is what drives the cleanup of the site, not the CERCLA process.	As mentioned above, the State still maintains jurisdiction over hazardous constituents whether or not they are commingled with radionuclides. Also, neither the radiological contamination, nor license termination are the drivers for MDNR's review or selection of the cleanup. Rather, the presence of hazardous substances has prompted this action by MDNR. And again, radiological materials are hazardous substances under CERCLA. 42 USC § 9601(14).
Specific C.		The Proposed Plan states: *Groundwater in the upper Jefferson City – Cotter Dolomite Flows radially from the Hematite facility toward the northeast along bedding planes and towards the southeast in a more-permeable zone in the rock. (page 3).* Comment: The underlined phrase is merely a theory carried through from the RI/FS Westinghouse offers not technical support or other justification for this statement.	Data related to groundwater flows does exist, has been presented, but is still being evaluated. Therefore, any further reference made within the ROD for OU1 to groundwater will be accompanied by statements that specify investigations are on-going and development of a remedy will be conducted in the future.

Specific Comments From Husch, Blackwell, Sanders LLP: They state, "For each of our specific comments, we reproduce the text of the Proposed Plan in italics, and provide our comment."			
Comment No.	**Pp/**	**Comment**	**Response**
Specific D.		The Proposed Plan states: *Vertical gradients also tend to be upward between the Jefferson City-Cotter Dolomite and the Roubidoux Formation. Until 2004 however, this gradient was reversed (i.e., downward) as a result of lowered hydraulic heads in the Roubidoux Formation, possibly caused by pumping of the Roubidoux by the City of Festus water supply wells. (pages 3-4).* <u>Comment</u>: This is conjecture rather than fact, also carried through from the RI/FS. Data from shallow bedrock wells generally indicate an upward gradient into the alluvium near Joachim Creek collected prior to 2004.	We will not currently argue the reasons for a reversal in gradient. The Record of Decision for OU1 will refrain from this discussion. There will be further opportunities to both address this question and make further comments after the groundwater investigation is completed.

Specific Comments From Husch, Blackwell, Sanders LLP: They state, "For each of our specific comments, we reproduce the text of the Proposed Plan in italics, and provide our comment."			
Comment No.	**Pp/**	**Comment**	**Response**
Specific E.		The Proposed Plan states: *Removal actions from 2002 through 2005 were implemented to address…removal of uranium-impacted soils from an on-site area known as Deul's Mountain, and the removal of radiologically contaminated and other equipment from the property. Each of these actions was conducted in accordance with the NCP, including provisions for documentation and public comment, and was approved by MDN R. (page 4).* <u>Comment</u>: Judge Limbaugh expressly ruled that MDNR's purported exercise of jurisdiction over these removal actions is preempted by Atomic Energy Act. Therefore, MDNR had no authority to oversee or approve these activities. Moreover, preparing and Engineering Evaluation/Cost Analysis ("EE/CA") for each of these removal actions was not necessary. Those removal were required as part of Westinghouse's obligations under its NRC license, and the NRC does not require EE/CASs.	The entire quote is this: "Removal actions from 2002 through 2005 were implemented to address offsite groundwater impacts (i.e., provision of alternative water supplies) removal of uranium-impacted soils from an on-site area known as Deul's Mountain, and the removal of radiologically contaminated and other equipment from the property. Each of these action was conducted in accordance with the NCP, including provisions for documentation and public comment, and was approved by MDNR." Verbiage will be contained with the upcoming Record of Decision that gives a corrected description of statements MDNR made in regards to document reviews and approvals. Also, for further explanation regarding the State's authority pertaining to the remedy, refer to responses regarding Specific Comments A, B, and K.

Specific Comments From Husch, Blackwell, Sanders LLP: They state, "For each of our specific comments, we reproduce the text of the Proposed Plan in italics, and provide our comment."			
Comment No.	**Pp/**	**Comment**	**Response**
Specific F.		The Proposed Plan states: *Nearly all the calculated risk results from [non-radiological] exposures related to the assumed use of bedrock groundwater for drinking water an similar use. (page 5).* <u>Comment:</u> The Proposed Plan does not explain why this discussion of health risks related to groundwater is relevant to OU-1, which is limited to soils and sediments. The non-radiological risks from groundwater appear to relate to dense, non-aqueous phase liquid ("DNAPL")-like conditions at the Site, which are unaffected by an OU-1 remedy.	The continued presence of DNAPL within soil and sediment presents an on-going contaminant source to groundwater. This is one of the many factors that must be considered when selecting remediation goals.

Specific Comments From Husch, Blackwell, Sanders LLP: They state, "For each of our specific comments, we reproduce the text of the Proposed Plan in italics, and provide our comment."			
Comment No.	**Pp/**	**Comment**	**Response**
Specific G.		The Proposed Plan states: *It is Westinghouse's and MDNR's current judgment that the preferred alternative identified in this Proposed Plan (or one of the other active measures considered in the FS),is necessary to protect public health or welfare or the environment form actual or threatened releases of hazardous substances into the environment. (page 7).* Comment: Judge Limbaugh expressly ruled that MDNR's jurisdiction over the radioactive materials at the Site is preempted by the Atomic Energy Act. Because the FS identifies that all but one of the AOCs are contaminated with radioactive materials, MDNR had no authority to oversee or approve these activities as part of the FS, and has no authority to make health and safety decisions regarding their remediation.	As stated in responses above, MDNR has jurisdiction over the hazardous constituents regardless of whether they are commingled with radionuclides. The statement from the Proposed Plan you reference is consistent with this stance.

Specific Comments From Husch, Blackwell, Sanders LLP: They state, "For each of our specific comments, we reproduce the text of the Proposed Plan in italics, and provide our comment."			
Comment No.	**Pp/**	**Comment**	**Response**
Specific H.		The Proposed Plan states: *Pursuant to these NRC requirements, Westinghouse is developing [Derived Concentration Guideline Levels] for soil, groundwater, and building surfaces. These DCGLs will be specified in the [NRC Decommissioning Plan] that will undergo NRC review and approval prior to commencing remediation. (page9).* <u>Comment</u>: Even if it was necessary for Westinghouse to prepare a Proposed Plan under CERCLA (which it is not), and even if MDNR had jurisdiction over radioactive materials (which it does not), we do not understand how Westinghouse could finalize a Proposed Plan or MDNR could endorse it, when the DCGLs themselves have not been finalized or approved. This further confirms that the Proposed Plan is a litigation device, and that is not necessary in light of the NRC's oversight of the decommissioning of the Site.	DCGLs (Derived Concentration Guideline Levels) pertain to computed limits for allowable radionuclide concentrations within the soil and sediment. The Proposed Plan is meant to address the radionuclides and to specify remediation goals and methods for non-radiological constituents. The final remedy will have to comply with both the remediation goals for non-radiological constituents and the DCGLs (to be developed under the authority of NRC).

Specific Comments From Husch, Blackwell, Sanders LLP: They state, "For each of our specific comments, we reproduce the text of the Proposed Plan in italics, and provide our comment."			
Comment No.	**Pp/**	**Comment**	**Response**
Specific I.		The Proposed Plan states: *In the FS, Westinghouse evaluated a wide variety of potential remedial technologies and processes with the potential to achieve the RAOs and meet the Site-specific cleanup levels given as the PRGs and DCGLs. (page 9).* <u>Comment</u>: The FS would appear invalid if it evaluates remedial technologies against DCGLs, when DCGLs have not been finalized.	For MDNR, its key focus is to identify preferred solutions for addressing the non-radiological contaminants. We currently expect the remedy for soils and sediments impacted by non-radiological contaminants (whether commingled with radionuclides or not) will remain unchanged no matter whether the DCGLs vary dramatically. Please note though, if some situation does arise during the development of the DP or later that would alter the preferred choice of remedy, then the Record of Decision will be readdressed. CERCLA does provide a means for revision should alternative technologies, market changes, or other conditions arise that change the preferred solution.
Specific J.		The Proposed Plan states: *The slurry wall would be keyed as deep as practicable into the upper weathered bedrock. (page10)(Alternative 2).* <u>Comment</u>: The slurry wall should be keyed into one of the lower permeability units within the overburden alleged to lie beneath the facility such as the "Fat Clay," discussed in earlier Site reports. Keying into "weathered bedrock" would be an unnecessary costly and technically inappropriate solution. The cost estimate should be modified to reflect this change in approach so that a valid comparison of the alternatives can be performed.	Alternative 2 was not rejected because of costs. It was rejected due to lack of technical feasibility and non-compliance with ARARs for VOCs. Altering the depth of the slurry wall to save money would not alter the outcome of the analysis.

Specific Comments From Husch, Blackwell, Sanders LLP: They state, "For each of our specific comments, we reproduce the text of the Proposed Plan in italics, and provide our comment."			
Comment No.	**Pp/**	**Comment**	**Response**
Specific K.		The Proposed Plan states: *Approval for the Alternative 2 in-place containment of waste would be obtained through the NRC license termination process and State approvals for chemical constituents. (page 10). Approval for an on-site disposal facility would be obtained through the NRC license termination process. (page 11). NRC licensing requirements mandate that radiologically impacted buried waste and environmental media be addressed in decommissioning …(page19).* <u>Comment:</u> We are pleased to see Westinghouse's acknowledgement in these portions of the Proposed Plan of the NRC's exclusive jurisdiction over radioactive materials. But that does not cure the fatal defect that the Proposed Plan is itself entirely unnecessary and almost entirely duplicative of the NRC's decommissioning process. This language only further supports the fact that the Proposed Plan is inconsistent with CERCLA and the NCP.	Acknowledgement of NRC's jurisdiction over radioactive materials does not absolve Westinghouse of the obligation to comply with other laws. Nothing in federal or state law mandates that only one regulatory agency may be active at a particular site. In fact, the law is quite the opposite. Each agency needs the technical expertise and jurisdictional authority of the other to completely and comprehensively address cleanup at this site.

3.4 REMEDIAL DESIGN AND REMEDIAL ACTION

Westinghouse and MDNR will continue to keep the community apprised of developments throughout the design and implementation of the remedy set forth in this ROD.

APPENDIX A

WESTINGHOUSE RESPONSES TO COMMENTS ON RI

AND OTHER PRIOR DOCUMENTS

RESPONSES TO COMMENTS
SUBMITTED BY MICHAEL WETMORE
HUSCH & EPPENBERGER LLC
VIA LETTER TO MDNR DATED FEBRUARY 16, 2007

Specific Comments on the RI

1. The RI appears to have been based on a single round of groundwater elevation measurements and chemical analyses. However, several rounds of measurements and analyses are required to confirm the observations and the conclusions of the RI.

Response: ***This and subsequent comments reflect a misunderstanding of the status of the Hematite Site Remedial Investigation (RI). The scope of the RI submitted to the Missouri Department of Natural Resources (MDNR) in January 2007 included all areas of contamination identified at the Site, including soils, sediments and groundwater. As noted above, the Feasibility Study, Proposed Plan and the Record of Decision address only Operable Unit (OU1) at the Site, and MDNR's July 21, 2008 approval of the Hematite Site RI was similarly limited to Operable Unit 1. The investigations related to groundwater are not completed, and Westinghouse is continuing to gather additional Site data, including multiple rounds of groundwater level measurements and groundwater sampling and monitoring, through its Interim Groundwater Monitoring Program (IGMP). Significant additional data regarding sources, relative contributions to groundwater conditions, the potential presence of dense non-aqueous-phase liquids (DNAPL) and other Site conditions will also become available through the implementation of OU1. However, none of this information would change the selection of the remedy for OU1.***

2. Although addressed as if all data were derived from a concurrent period of time, in actuality Westinghouse used groundwater elevation data and water quality data from two distinct periods, 1999 and 2005. Yet Westinghouse depicts the data from these two periods on the same site maps giving the impression that the data were collected from a single time period. It is misleading and inaccurate to depict water level or analytical data from two distinct periods on the same map.

Response: ***No specific figure is referenced in the comment, and Westinghouse can find no basis for this assertion. In fact, the source of data presented on the RI Report figures is generally identified in the title block of the document. The potentiometric surface presentations for hydrostratigraphic units (see Figures 3.17 through 3.24) are all based on the RI data collected in December 2004. Similarly, the presentation of TCE and PCE concentrations in groundwater (see RI Figures 5.7 through 5.16) use the December 2004 data. Figures 5.17 and 5.18 use data collected at different***

times during the RI to present cross-sections of TCE and PCE concentrations in bedrock. These data include the following:

- ***Packer test sampling (discrete depth intervals) – June 2004;***
- ***Diffusion bag sampling (varying depths at former residential wells) – July 2004; and***
- ***Groundwater sampling (screed intervals) – December 2004;***

The timing of the data-collection activities are near enough to allow use of all three data sets in presenting the characterization of VOC concentration conditions.

As noted above, additional information regarding Site groundwater will be generated through the IGMP and studies to support future groundwater response actions at the Site. The issues raised by Commenter do not affect the Selected Remedy for OU1.

3. On the figure depicting the Potentiometric Surface of Deeper Overburden Wells (December 2004) several data points are ignored in the potentiometric contouring. These include, but are not limited to, RB-05 (431.2); NB-56 (421.4); B8-01 (426.4); EP-20 (425.9); and NB-51 (418.4). Westinghouse never discusses why these data were not considered, nor was there any commentary as to why these anomalous data points exist.

Response: ***Figure 3.18 of the RI Report provides the interpretation of the potentiometric surface of the deep overburden based on water levels recorded at more than 80 wells. With this large database, it is common for individual wells to, at times, reflect groundwater levels that are not consistent with the overall pattern. This is particularly true for areas such as the Hematite Facility where variable surface conditions (i.e., impermeable pavement, permeable grass areas) provide for locally varying recharge rates. In such cases, the professional judgment of experienced hydrogeologists is used to provide the "best fit" of the data. With respect to the specific wells identified in the comment, Westinghouse notes the following:***

- ***There is no well "RB-05." If the comment is referring to well RR-05, this well (water level elevation 431.2 ft-msl) is appropriately shown as upgradient of the 420 ft-msl contour, the highest contour included on the map.***
- ***Well NB-51 (water level elevation 421.4 ft-msl) is appropriately shown as upgradient of the 420 ft-msl contour, the highest contour included on the map.***

- ***There is no well "B8-01." If the comment is referring to well BD-01, this well (water level elevation 426.4 ft-msl) is appropriately shown as upgradient of the 420 ft-msl contour, the highest contour included on the map.***

- ***Well EP-20 (water level elevation 425.9 ft-msl) shows a localized high surrounded by a group of at least six wells all showing groundwater levels in the range of 413.1 to 419.6 ft-msl. The localized high may be due to the proximity of well EP-20 to the Evaporation Ponds.***

- ***There is no well "NB-51." If the comment is referring to well NB-61, this well (water level 418.4 ft-msl) is appropriately shown between the potentiometric contours of 415 and 420 ft-msl.***

As noted above, additional information regarding Site groundwater will be generated through the IGMP and studies to support future groundwater response actions at the Site. The issues raised by Commenter do not affect the Selected Remedy.

4. The map of the Potentiometric Surface of the Jefferson City - Cotter Wells (December, 2004) has the 410 foot elevation contour crossing Joachim Creek three times. However, the data in the RI indicate groundwater from the Jefferson City-Cotter Hydrostratigraphic Unit (HSU) discharges to Joachim Creek. Therefore, the contour lines should be changed to properly depict Joachim Creek as a discharge point for this HSU. This is a glaring defect that has the effect of discounting all potential off site sources north of Joachim Creek. The elevation of Joachim Creek is approximately 4l2 feet AMSL at the bridge (west side of the area of investigation) and less than 409 feet near the east end of the study area (due north of PW-5). The available potentiometric data for the overburden, Jefferson City - Cotter formation, and the Roubidoux formation, indicate that each unit discharges to Joachim Creek, based on the fact that groundwater flows from higher potentiometric elevations to lower elevations. Therefore, any contamination originating from the Hematite Site would discharge to Joachim Creek rather than flow under it to the residential wells.

Response: ***Figure 3.19 of the RI Report shows the potentiometric surface of the Jefferson City-Cotter wells based on the December 2004 water level data. The 410 feet above mean sel level (ft-msl) contour location is defined by the observed water levels in the six wells finished in the Jefferson City-Cotter Formation that are northwest of and nearest to Joachim Creek (i.e., BR-02JC, BR-03JC, BR-08JC, BR-09JC, BR-10JC, and BR-11JC). In all six wells, the recorded water level was higher than 410 ft-msl, reflecting flow from the northwest toward Joachim Creek. The 410 ft-msl roughly parallels Joachim Creek, but because the hydraulic gradient is rather flat and the contour is drawn as a smooth line near the meandering stream, this graphically shows the contour "crossing" the creek three times.***

It should also be noted that the RI Report described the geology/hydrogeology of the Site as interpreted primarily from data gathered in late 2004 and early 2005. As described therein, the data on which the Report were based were obtained after pumping of the private wells in the Rivers Bend Subdivision to the south of the Site was disconnected. Any hydraulic impact of groundwater withdrawal from these wells, in addition to any regional pumping impacts, had already ceased by that time.

As noted above, additional information regarding Site groundwater will be generated through the IGMP and studies to support future groundwater response actions at the Site. The issues raised by Commenter do not affect the Selected Remedy for OU1.

5. There is no data from Site wells that show that the Jefferson City - Roubidoux Contact Zone HSU was affected by the shut down of the City of Festus water supply wells. The only well used to indicate the Roubidoux aquifer may have been affected by the shut down is greater than three miles east of the Site and should not have been used to draw any conclusions regarding the potentiometric surface of the Jefferson City -Roubidoux Contact Zone HSU.

Response: ***Figure 3.26 in the RI Report presents a time-series plot of groundwater level data from well BR-08RB that shows the influence of the pumping the City of Festus production wells, from both the shutdown in early 2004 and the resumption of pumping in July 2005. BR-08RB was installed during the RI and is located approximately 1,200 feet south-southeast of the center of the Hematite Facility. Well BR-08RB is finished in the Jefferson City - Roubidoux Contact Zone HSU.***

Figure 3.27 in the RI Report provides a time-series plot of water levels in the Roubidoux Formation for four Site wells located both east and west of the Hematite Facility (i.e., BR-01RB, BR-02RB, BR-03RB, and BR-04RB. This time-series plot graphically illustrates the impact of pumping the City of Festus production wells, both from the shutdown in early 2004 and the resumption of pumping in July 2005.

6. There are citations in several documents that TCE was used for cleaning UF6 casks, manufacturing equipment, and surfaces of walls and floors within the process buildings. The RI should address these uses and discuss their implications as to different onsite source areas of TCE.

Response: ***At the Hematite plant, chlorinated volatile organic compounds (VOCs) were used in a variety of production and other plant applications, including those identified in the RI and other Site documents. This information provides a sufficient foundation to focus the Selected Remedy for OU1 relating to buried wastes, soils and sediments at the Site. Additional information***

regarding potential source areas of TCE may be developed through the IGMP and implementation of the OU1 remedy, and, as necessary, future groundwater response actions. Documentation will reflect these source areas of TCE contamination as it relates to any future groundwater remedy.

There are chlorinated solvent concentrations that would indicate the presence of a Dense Non-Aqueous Phase Liquid (DNAPL) near the southern edge of the process buildings, but this is neither discussed, nor its potential impacts on the CSM addressed.

Response: ***The evaluation of the potential for DNAPL at the Hematite Site is presented in Section 5.4 of the RI Report, and the potential for DNAPL occurrence is show graphically in Figure 5.16. The RI Report concludes that DNAPL is likely present near the southern edge of the process buildings based on the tetrachloroethylene (PCE) concentration observed at temporary well BD-02. The Conceptual Site Model presented in Section 5.5 of the RI Report was prepared in consideration of the suspect DNAPL occurrence. The potential for DNAPL occurrence will be further evaluated through implementation of the IGMP and response actions, but this issue does not affect the Selected Remedy for OU1.***

7. Appropriately installed monitoring wells should have been installed south of Joachim Creek to collect groundwater data, rather than Westinghouse having modified existing residential wells for groundwater monitoring purposes.

Response: ***Westinghouse disagrees. The practice of reconstructing existing residential wells for groundwater monitoring purposes is widely accepted as a cost-effective means of locating monitoring points where contamination has been previously identified. The reconstruction of residential wells was performed to provide additional groundwater monitoring data in this area, without having to bore another hole in the bedrock units. This approach was approved by MDNR.***

8. Elevated concentrations of arsenic in groundwater may indicate that it should be listed as a contaminant of concern (COC). The presence of arsenic may not only impact the groundwater remedy, but may demonstrate that significant contamination may emanate from locations other than the Burial Pit Area.

Response: ***The comment misinterprets the RI data and makes inferences that are contrary to the data. The RI findings do not show significant arsenic concentrations in groundwater and, where detected, the arsenic is likely naturally occurring. To the extent arsenic levels could be influenced by Hematite Site activities, such affects appear most notable in the Burial Pit Area. Based on these findings, arsenic will not affect the groundwater remedy and is not indicative of "significant contamination" emanating from locations other than the Burial Pit Area.***

As shown in the data presented in Appendix H of the RI Report, dissolved arsenic was detected in groundwater at only one of the 17 wells at which dissolved arsenic was analyzed. This one location was the background groundwater water sample from the Roubidoux Formation collected at well BR-01RB. Total arsenic was detected in groundwater at 13 of the 115 wells at which total arsenic was analyzed, with the three highest values recorded at the wells WS23 and WS25 proximal to the Burial Pit Area and at the background sample from the Roubidoux Formation (BR-01RB).

9. There are numerous QA/QC shortcomings with the RI that call into question whether the RI can be used in the future to support any remedial conclusions. Only a handful of shortcomings are discussed below to exemplify the types of QA/QC concerns that should be addressed.

Response: ***Westinghouse strongly disagrees with the suggestion that quality assurance and quality control (QA/QC) issues in any way compromise the validity of the RI or the conclusions drawn from that investigation. As discussed below, the cited QA/QC "shortcomings" are either inconsequential or nonexistent.***

10. Monitoring wells PZ-03, PZ-04, and WS-30 are described as Jefferson City - Cotter wells. However, they are not screened at the same stratigraphic elevations as other Jefferson City - Cotter wells, which raises an issue with comparing data from these wells with other wells screened in that HSU. The use of these wells is evident in the inconsistencies of the data with other wells completed in the Jefferson City-Cotter HSU.

Response: ***Monitoring wells PZ-03, PZ-04, and WS-30, which were installed prior to the RI, are all finished in the upper portion of the Jefferson City – Cotter Formation. The relationship of these wells to the hydrostratigraphic units (HSUs) and the other wells used in defining such HSUs are most clearly shown in Figure 3.13 of the RI Report. The RI discussion of these wells is accurate and there is no "QA/QC shortcoming" associated with the interpretation of the HSU or the data from these three wells.***

11. MDNR points out that there may be a question regarding pH data due to a questionable pH meter calibration method. For example, a groundwater sample was found to have a pH of 5.l, but when MDNR used their meter it was 7.1. Given the nature of groundwater in this geologic setting, a reading of 7.1 would be more reasonable.

Response: ***A field pH meter apparently malfunctioned, resulting in erroneous pH readings for some groundwater samples. pH is only used as a general indicator parameter for interpreting metals concentrations or as one of several parameters used to assess water quality stability in groundwater sampling. Any pH discrepancies that resulted from the faulty meter had no impact on the collection of valid VOC or metals data or the interpretation of groundwater conditions.***

12. Temporary monitoring wells were used to collect groundwater samples. These wells do not appear to have undergone proper well development (the process of removing fine sediments to improve hydraulic efficiency and provide turbidity free samples). The fact that the groundwater samples were likely to have high turbidity would have resulted in contaminant concentrations in groundwater samples higher than they would have been if the wells had been properly developed. Use of these data would subsequently bias the results of any contaminant fate and transport modeling.

Response: ***As described below and in the RI Report, all groundwater sample points were installed in accordance with State of Missouri requirements. Temporary wells were used to collect data for the RI in the overburden. These wells were installed in direct-push boreholes where the surrounding soil disturbance was minimized. The wells were installed using pre-packed screens and were grouted in place.***

Turbidity in groundwater samples is expected from wells installed in a shallow fine-grained (silt and clay) soil environment. It is not necessarily an indication that the well was not properly installed or developed. It should also be noted that turbidity does not significantly impact results for VOCs, including trichloroethylene (TCE) and PCE, which are primary contaminants of concern at the Site.

13. This issue was further aggravated by well sampling procedures which required only the removal of 3-well volumes of water prior to obtaining the sample. The more appropriate procedure for well purging prior to sampling involves taking measurements of certain physical parameters of the water until the physical parameters stabilize and indicate that a sample representative of the chemical quality of the aquifer could be obtained.

Response: ***Groundwater samples were collected in accordance with U.S. Environmental Protection Agency (EPA) and MDNR protocols. Contrary to the inference made in the comment, and as described in the RI Report, groundwater sampling was generally performed using EPA protocols for low flow sampling. Only in cases where the wells could not be sampled using this method, low yield wells, wells that pumped dry, or where the field parameters did not stabilize after removal of three well volumes, were alternate procedures employed. In these cases, the conditions that required a variance to the preferred procedure were documented.***

Comments on the Groundwater Flow, and Contaminant Fate and Transport Models

1. Rather than using these models to best analyze and evaluate conditions, Westinghouse manipulates these models to support its preliminary CSM and its contention that the primary, if not the only source, of chlorinated solvents in the residential wells originates from the Burial Pit Area. This inherent bias and other serious shortcomings are exemplified by the following:

Response: ***Westinghouse used the groundwater model as an interpretive tool in support of the RI. The figures, maps, and tables presented in the RI Report assess the results of actual groundwater measurements and sampling results. The model was not used to determine contaminant sources or the extent of contamination. As described in the RI Report, VOCs from the Site migrated to the private wells, and there are no other likely sources of VOC contamination in the area.***

Finally, the comment makes inferences that are not part of or presented in the RI. Westinghouse recognizes that there are three areas of the Hematite Site that contribute VOCs to groundwater (i.e., the Burial Pit Area, the Evaporation Ponds, and the deep soils beneath the process buildings). The Burial Pit Area and the Evaporation Ponds are being addressed as probable VOC source areas in OU,1 and all three will be addressed as part of future groundwater response actions.

2. Groundwater overburden contaminant alignment is different from the MODFLOW output raising questions about the future use of the Model. Specifically, the MODFLOW model failed to predict within a reasonable degree of accuracy the measured distribution of contaminants in overburden groundwater. This can be seen by comparing Figures 5.7, 5.8, 5.11, and 5.12 with Figures 5.28, 5.29, and 5.30 of the RI Report. Figures 5.7 and 5.8 show the actual, measured distribution of PCE in shallow and deep overburden monitoring well samples, respectively, and Figures 5.11 and 5.12 show the actual, measured distribution of TCE in shallow and deep overburden monitoring well samples, respectively. Figures 5.28, 5.29, and 5.30 show the model-predicted PCE concentrations in terrace/alluvial deposits approximately 8, 25, and 41 years after the simulated contaminant release, respectively. Comparison of these figures shows that model results failed to reproduce measured results. For example, the PCE concentration at deep overburden monitoring well NB-73 was reported to exceed 1000 ppb (Figure 5.8), however none of the modeling results indicates that the predicted PCE concentration at this location would exceed 100 ppb even after 41 years of transport. Because the model fails to provide reasonable predictions regarding fate and transport of contaminants, it cannot be used for risk assessment or remediation purposes.

Response: ***The model output shows good general correlation with field observations, but the numerical simulation was not intended to replace the actual data. The anomalies in the model described in this comment are also addressed in the RI Report, but, as explained in the RI Report, these anomalies do not materially affect the conclusions of the RI Report. The actual data cannot be ignored solely because the model cannot duplicate the observed existing conditions at all locations. The fact that the numerical model does not precisely fit all observed conditions is not consequential and does not affect the actual investigative results. Additional groundwater information is being collected as part of the IGMP and will be evaluated in the context of future groundwater response actions. This, however, has no impact upon the Selected Remedy for OU1.***

3. The RI and the text for the groundwater model state that no potential sources of contamination, other than the Facility, have been identified. However, there is no documentation of a significant effort to identify potential off-site sources of solvent contamination.

Response: ***The comment is incorrect. In preparing the RI/FS Work Plan, Westinghouse evaluated the potential for other contributory sources. None was identified. Westinghouse also investigated potential off-site sources as part of the RI. The RI included review of historical aerial photographs, and geophysical studies were performed in areas that were identified in those photographs as potentially being disturbed. No other potential source of VOC contamination was identified. It should be noted that even if another source were identified for off-site groundwater impacts, this would not change the Selected Remedy for OU1. The actions to be taken on the Westinghouse property would still be necessary and appropriate. If the commentator has identified other sources of contamination which would affect future groundwater response actions, Westinghouse requests that this information be provided as soon as possible.***

4. The site data depicted in Figures 3.25 and 3.26 do not support the conjecture that the pumping of the Festus wells or the cessation of their pumping affected the potentiometric surfaces of the Jefferson City - Cotter formation and the Roubidoux formation. Therefore, there is no data to support the conclusion that groundwater in the vicinity of the Facility in these formations would have migrated under Joachim Creek and impacted residential wells during the time the Festus wells were operated.

Response: ***As described in the RI Report, the Roubidoux aquifer is historically used for potable water in the area. To reach this more productive unit, local well drillers bored through the Jefferson City - Cotter formation that lies above the Roubidoux unit. Because private wells were typically completed as open boreholes, there was communication established between these bedrock units. Under pumping conditions, water was removed from both the Jefferson City and Roubidoux units. Because most of the private wells in the area were abandoned prior to the RI, the RI Report presents information from local groundwater monitoring wells to assess this influence. Periodic measurements were taken at these wells as part of Westinghouse's commitment to sentry well monitoring, which was overseen by MDNR. The water level information was presented on Figure 3-27 which shows more than a 40 feet change in a monitoring well located between the Site and the City of Festus (BR2-RB). This is not a natural phenomenon. This significant of a change in elevation could obviously affect the groundwater contours presented in the RI and the resulting flow directions. Additional groundwater information is being collected as part of the IGMP and will be evaluated in the context of future groundwater response actions. This, however, has no impact upon the Selected Remedy for OU1.***

5. The RI maps show PCE contamination in the Jefferson City-Cotter Formation beneath Joachim Creek and migrating towards the residential wells. The depiction (in figure 5.13) is inconsistent with the data used to develop the potentiometric surface map for this HSU.

Response: ***Figure 5.13 depicts the interpolation of TCE (not PCE) data collected during the RI sampling event. These data are from the sampling and analysis of water withdrawn from each monitoring well. The potentiometric surface maps are generated from groundwater elevation measurements from the sampling points.***

6. The bedrock aquifer was modeled as an isotropic porous medium. This creates an inaccurate model since bedrock groundwater flow is controlled by fractures and joints in the bedrock which results in anisotropic flow (in this case, an east-west preferred flow) conditions of the aquifer.

Response: ***The groundwater model was used as an interpretive tool, in support of the RI. The figures, maps, and tables presented in the document assess the results of groundwater measurements and/or sampling results. The model is not used to determine contaminant sources, or the extent of contamination. Thus, the fact that the numerical model does not precisely fit all observed conditions should not be interpreted as a flaw in the model and does not have a significant impact on the CSM. The groundwater model was not used for risk assessment or remediation purposes.***

In general, the comments pointing out the limitations of the model do not undermine the credibility of the conclusions in the Report. The groundwater model met the standard of practice to achieve its stated goals.

7. A steady-state model was used, but hydraulic conditions are transient or non- steady state.

Response: ***As stated in Appendix A – Groundwater Monitoring Report of the RI, the steady-state model was considered to be a reasonable approach given that the purpose of the modeling was to explore the general impact of flow patterns and attenuation mechanisms on the contaminants.***

8. While the model shows good calibration there is no indication that sensitivity analyses were performed to demonstrate which parameters and assumptions built into the model had the greater influence on the model output.

Response: ***Additional information regarding Site groundwater will be generated through the IGMP and studies to support future groundwater response actions at the Site. If it is determined that additional modeling of the groundwater is necessary for the future groundwater response actions, sensitivity analyses will be conducted at that time.***

9. The model assumes that sufficient water would be pumped from the residential wells to eliminate the upward flow from the Jefferson City-Cotter Formation to Joachim Creek. There is no empirical data to support this although it is part of the model output.

Response: ***See Response to Comment #6.***

10. The model uses a K value of 0.002 ft/day for the Jefferson City-Cotter /Roubidoux contact. Slug test data show a range of 0.8 to 15.1 ft/d which is inconsistent with the modeled data.

Response: ***The K value used for layers 6 though 8 (the Jefferson City- Cotter HSU) were derived through successive simulations where the conductivity of these layers were lowered until the changes in hydraulic head in Unit 9 did not affect the head in Layers 4 and 5. This is consistent with t he observed lack of hydraulic interconnectivity between the Jefferson City-Cotter and the Roubidoux HSUs.***

11. Westinghouse used the Bower and Rice slug test analysis for an unconfined aquifer to generate K for the Roubidoux, a confined aquifer. Therefore, their calculations are in error.

Response: ***Additional testing of the aquifer characteristics will be conducted in support of future groundwater actions. The K value generated from the slug test analyses has no effect on the FS or ROD for Operable Unit 1.***

12. "Groundwater flow directions in fractured media are dependent on the orientation of transmissive fracture sets." (Chapter 3, RI Report). SAIC inappropriately modeled groundwater flow in bedrock assuming the fractured bedrock was an isotropic porous media.

Response: ***Additional information regarding Site groundwater will be generated through the IGMP and studies to support future groundwater response actions at the Site. The issues raised by Commenter do not affect the Selected Remedy for OU1.***

13. SAIC hydraulic conductivity data were derived from slug tests rather than standard aquifer test methods which involve the pumping of select wells for an extended period of time and observing changes in water levels in wells completed in the same HSU.

Response: ***Additional information regarding Site groundwater will be generated through the IGMP and studies to support future groundwater response actions at the Site. If determined to be necessary for evaluation of future groundwater response actions, pumping test may be conducted. Regardless, the use of slug testing data does not affect the Selected Remedy for OU1.***

14. Model recharge rates appear to be unreasonable and uncharacteristically low.

Response: ***Additional information regarding Site groundwater will be generated through the IGMP and studies to support future groundwater response actions at the Site. The issues raised by Commenter do not affect the Selected Remedy for OU1.***

15. Many model parameters such as dispersivity values, chemical retardation factors, and chemical degradation rates were based on literature values, rather than Site specific characteristics.

Response: ***Additional information regarding Site groundwater will be generated through the IGMP and studies to support future groundwater response actions at the Site. The issues raised by Commenter do not affect the Selected Remedy for OU1.***

16. There is no evidence that SAIC calibrated the contaminant fate and transport components to any site-specific data.

Response: ***Additional information regarding Site groundwater will be generated through the IGMP and studies to support future groundwater response actions at the Site. The issues raised by Commenter do not affect the Selected Remedy for OU1.***

17. Residential well impacts are made to appear as if they have been affected by the Burial Pit Area. However, this occurs because the modelers manipulated data input to the model.

Response: ***Additional information regarding Site groundwater will be generated through the IGMP and studies to support future groundwater response actions at the Site. The issues raised by Commenter do not affect the Selected Remedy for OU1.***

18. To hydraulically drive groundwater near the Burial pits to the residential wells, the model uses a 10 gpm injection well in the Burial Pits Area to simulate a groundwater mound which is transient in nature rather than permanent.

Response: ***Additional information regarding Site groundwater will be generated through the IGMP and studies to support future groundwater response actions at the Site. The issues raised by Commenter do not affect the Selected Remedy for OU1.***

19. The model increased the domestic well extraction rate by a factor of 4.

Response: ***Additional information regarding Site groundwater will be generated through the IGMP and studies to support future groundwater response***

actions at the Site. The issues raised by Commenter do not affect the Selected Remedy for OU1.

20. Modeled potentiometric head values for the Jefferson City-Cotter Formation were higher than measured values, which enhances the potential for downward vertical flow into the Roubidoux Formation.

Response: ***The fact that the numerical model does not precisely fit all observed conditions should not be interpreted as a flaw in the model and does not have a significant impact on the CSM***

21. To enable the groundwater flow model to represent bedrock groundwater flow from the site to the residential wells, SAIC manipulated basic assumptions and data to support that outcome. For example, to reverse the observed upward gradients from each HSU to Joachim Creek, SAIC had to increase the estimated pumping rates in the residential wells by a factor of four and artificially locate the effect of pumping 13 dispersed residential wells to a single location near PW -19. The USGS estimates residential well daily extraction rates in Jefferson County to be 35 cubic feet/day (cu ft./day). Multiplied by 13 wells, this results in a local extraction rate from bedrock residential wells of approximately 154 cu ft./day. However, SAIC uses an average daily extraction rate of 2000 cu ft./day, which when coupled with the simulated 10 gpm injection well in the vicinity of the Burial Pits, creates a flow path of water from the vicinity of BR-08 and BR-09, which would then flow beneath Joachim Creek into the residential wells. This depiction is not based on data or any observations, but as stated above is an artifice of manipulation of input into the model.

Response: ***Additional groundwater sampling is being conducted pursuant to the IGMP to augment the RI data and give a clearer indication of potential seasonal variation. The groundwater investigation that is driven by the IGMP does not focus solely on the burial pits as the source of residential well contamination, but is a broad sampling program that is designed to refine the source and extent of groundwater contamination. IGMP information will be further evaluated in the context of future groundwater response actions.***

22. In summary, shortcomings with the CSM and numeric models include:

- Preconceived or desired outcomes impacted the CSM.
- Carelessness and errors in the RI had an impact on the numerical groundwater model.
- The data were manipulated to establish the Burial Pits as the source of residential well contamination.
- Assertions made in the CSM and the numerical model are either unsupported by the data, or are contradicted by the data.

Response: ***The above comments contend that the groundwater model presented in the Report is flawed and that because the model is flawed, the validity of the conceptual Site model (CSM) is questionable. Those comments are incorrect in that the results (data) generated through measurements or analysis of groundwater samples was the primary basis for the CSM, and groundwater model was used only as a tool to evaluate the CSM.***

It is important to note that additional groundwater sampling is being conducted pursuant to the IGMP to augment the RI data and give a clearer indication of potential seasonal variation. The groundwater investigation that is driven by the IGMP does not focus solely on the burial pits as the source of residential well contamination, but is a broad sampling program that is designed to refine the source and extent of groundwater contamination. IGMP information will be further evaluated in the context of future groundwater response actions.

Comments on the Interim Groundwater Monitoring Plan

1. Westinghouse presents data regarding the Facility's on-site impacts of Radionuclides and VOCs. The data indicate substantial contamination related to operations beneath and around the buildings, the evaporation pond, and the sewer system. However, Westinghouse continues to attempt to focus its groundwater investigation efforts predominantly upon VOCs, and in particular PCE, TCE, and their degradation products, near the Burial Pits.

Response: ***Westinghouse is undertaking the Interim Groundwater Monitoring Plan in order to collect additional information regarding the impacts of past Site activities on groundwater quality. The groundwater investigation that is driven by the IGMP does not focus solely on the burial pits, but is a broad sampling program that is designed to refine the source and extent of groundwater contamination. IGMP information will be further evaluated in the context of future groundwater response actions.***

2. The IGMP acknowledges that PCE and TCE concentrations "suggest the nearby presence of dense, non-aqueous-phase liquid (DNAPL)." The data indicate that DNAPL is likely present beneath the buildings and extending south of the buildings. Yet none of these data cause Westinghouse to change opinions reached in the RI and the CSM that the source of impacts to residential wells is anything but the Burial Pits. The focus on the Burial Pits is unreasonable give[n] the fact that VOC concentrations are two orders of magnitude higher at locations near the southern edge of the buildings than encountered at the Burial Pits and groundwater data does not support the site as the source for the chlorinated solvents detected in residential wells located far from the site across Joachim Creek.

Response: ***The comment makes inferences that are not part of or presented in the RI. Westinghouse recognizes that there are three areas of the Hematite Site that***

contribute VOCs to groundwater (i.e., the Burial Pit Area, the Evaporation Ponds, and the deep soils beneath the process buildings). The IGMP was designed to monitor the groundwater on a Site wide basis and collect enough information to complete a competent evaluation of potential remedies for Operable Unit 2. These issues do not impact the Selected Remedy for OU1.

3. Comments on the approach for on-going Groundwater monitoring:

- It is unclear why all wells (consisting of Groups I-VII) are not consistently used to generate potentiometric surface maps. It would appear that isolating 11 wells (Group II) for water level measurements seems unreasonable since water level data is generated from all Groups when they are sampled.

Response: ***The comment misinterprets the statement regarding the wells used for water level measurements. The 11 wells (Group II) referred to in the comment are monitored only for water level, while the remainder of the wells are monitored for water level and additional parameters, as indicated by the footnote regarding Protocol for sampling in Table 1.***

- PZ-4 should not be used for monitoring water levels or groundwater quality. This well is not completed at the same depth as other Jefferson City-Cotter (JCC) monitoring wells. Data from this well is anomalous, and in the RI and CSM, the use of PZ-4 has resulted in inaccurate representation of data and the numerical modeling.

Response: ***The data collected from PZ-04 will be evaluated and its validity will be assessed. PZ-04 is completed at depth of 59 feet below ground surface and has a 10 foot well screen. Upon completion of the interim groundwater monitoring, the data will be incorporated in to a final Remedial Investigation for Operable Unit 2.***

- The IGMP Group IV wells are described as "Source Wells"; however the data from many of the wells were not incorporated into conclusions of the RI or used in the development of the CSM.

Response: ***It is important to note that a final RI for the groundwater has not been completed. The data being collected during the IGMP will be incorporated into a final Remedial Investigation for Operable Unit 2.***

- The procedure for groundwater sampling requires that indicator parameters (pH, dissolved oxygen, etc.) of fresh aquifer water be monitored. Usually when these parameters stabilize after successive analyses, the well is assumed to have been adequately purged and the water in the well is representative of fresh aquifer water. Only then should a sample be taken. Yet, the procedure for monitoring well sampling requires that only three well volumes of water be

purged prior to sampling. There is no reasonable scientific basis for this. The three well volumes for adequate purging were arbitrarily created by James Gibb in the early 1980s in a paper on groundwater monitoring. In fact, most of the scientific community recognizes the importance of using the stability of physiochemical aquifer parameter stability as the indicator of a well being ready for sampling.

Response: ***Low-flow sampling is conducted to collect water samples from the wells in the IGMP. This procedure requires the stabilization of the indicator parameters prior to the collection of samples. The only variance to this is for wells which go dry prior to stabilization. These wells are allowed to recharge prior to sampling.***

- In the section on Surface Water Measurements, Westinghouse acknowledges overburden groundwater discharges to Joachim Creek, but it is inexplicably mute on the fact that groundwater in the bedrock Jefferson City-Cotter unit also discharges to Joachim Creek. The reason for this omission is likely due to the fact that it is inconsistent with Westinghouse's opinions in the RI, that bedrock groundwater flows beneath Joachim Creek and into the residential wells.

Response: ***The degree to which groundwater associated with the Jefferson City-Cotter formation discharges to Joachim Creek is inconsequential with respect to the discussion of the surface water measurements being made as part of the IGMP.***

RESPONSES TO COMMENTS
SUBMITTED BY JERRY K. RONECKER
HUSCH BLACKWELL SANDERS LLP
VIA LETTER TO MDNR DATED MAY 9, 2008

General Comments

As a threshhold [sic] matter, we were quite surprised to see the draft FS's focus on radionuclides and on areas containing "mixed" wastes (i.e., wastes containing both radioactive and non-radiactive [sic] materials). For example, the draft FS focuses on two categories of waste affecting the selection of a remedy: Low-Level Radioactive Waste (LLRW) and Low-Level Mixed Waste (LLMW). Judge Limbaugh of the U.S. District Court for the Eastern District of Missouri, however, unambiguously ruled on Janaury [sic] 22, 2007, that MDNR is preempted from regulating radionuclides. He ruled that regulating radioactive materials-whether by themselves, or mixed with other materials-remains soley [sic] within the jurisdiction of the U.S. Nuclear Regulatory Commission (NRC). See Missouri vs. Westinghouse Electric, LLC, 487 F. Supp. 2d 1076 (E.D. Mo. 2007).

If MDNR were to approve this draft FS, it would be doing exactly what Judge Limbaugh said it could not do. In the proposed Consent Decree that Judge Limbaugh struck down, MDNR was attempting to "oversee[] the proper and complete implementation" of Westinghouse's RI/FS activities which address radionuclides at the Hematite Site. See Proposed Consent Decree "9, 51. Those are the very same FS "activities" that Westinghouse is, through submittal of the draft FS, asking MDNR to oversee here. Judge Limbaugh has already ruled that MDNR's oversight here is preempted by the Atomic Energy Act.

Westinghouse appears to have prepared this draft FS solely for litigation. The Site, as described in various reports by Westinghouse, contains radionuclides as well as chlorinated solvents, such as TCE, PCE, and their degradation products (hereafter referred to as volatile organic compounds or VOCs). It is the NRC that will oversee the investigation and cleanup of radionuclides at the Hematite Site, not MDNR. If the NRC requires Westinghouse to remove the radionuclide-containing buried wastes, soils, and sediments, then that is what Westinghouse will need to do. And it will have to do so for those wastes, soils, and sediments that contain mixed wastes as well. So it is simply unnecessary, duplicative and wasteful for Westinghouse to prepare an FS that covers LLRW and LLMW when the remedial decisions for those wastes will be made solely by the NRC, not MDNR.

Response: ***The comments raised above are focused on the litigation that Westinghouse was forced to initiate so that the former owners and operators of the Site would contribute to payment of the significant costs of remediating this Site. The jurisdictional issues raised by these comments are addressed more fully in the Responsiveness Summary.***

Technical Comments

1. As discussed in more detail below, some remedial alternatives appear to be dismisssed [sic] without the type of detailed analysis typical of an FS. As a result, the reader is left to conclude that excavation and off-site disposal of buried waste, soil and sediment is the most viable remedial alternative. However, some remedial alternatives that Westinghouse dismisses may still be practical for one or more Areas of Concern (AOCs), by modifying the approach to the application of the remedy.

Response: ***The FS explored a full range of remedial technologies and process options applicable to soil containing volatile organic compounds (VOCs), polynucleated aromatic hydrocarbons (PAHs), and other constituents and screened these technologies in accordance with the methodologies defined by EPA guidance and the NCP. Technologies and process options were screened based on effectiveness, implementability, and cost to select and retain one or more representative processes for each general response action and, if practicable, remedial technology. Based upon this thorough analysis, appropriate alternatives were evaluated and Alternative 4 was judged to be the most appropriate remedy for the conditions presented at OU1 of the Site.***

2. In addition, the draft FS focuses primarily on the VOCs contained within the Burial Pits, despite the fact that concentrations of VOCs may be as high or higher in other AOCs, such as soils beneath and around the buildings.

Response: ***The FS examination of remedial technologies and process options addressed VOCs in all Areas of Concern (AOCs). Both the Burial Pit Area and the Evaporation Ponds, two of the three suspected VOC source areas identified in the RI, are specifically targeted for source remediation under Operable Unit 1. The deep soils beneath the process building represent the third suspect VOC source area. Westinghouse believes that cost-effective remediation is best effected by addressing these deep soils, all of which all located beneath the groundwater table, as part of the groundwater remedy under Operable Unit 2.***

3. Section 2.2.1.1 Radiological Constituents: Westinghouse is developing Derived Concentration Guidance Levels (DCGLs) for soil and groundwater which will be based on "unrestricted release" of the Site consistent with NRC regulations. The DCGLs incorporated into the Decommissioning Plan (that Westinghouse must submit to the NRC) will account for the radioactive dose from residual activity in soil and groundwater with no allowance for activity from Burial Pit waste. This raises a question as to what is driving the remedy for the Burial Pit waste. Westinghouse appears to be working under the assumption that "all" Burial Pit wastes and effected soil will be excavated so as to eliminate residual radioactivity from this area. If so, then it is radionuclides that are driving the excavation and off-site disposal of much of the area and not the VOCs.

Response: ***Remediation of the Burial Pit waste is needed to achieve all of the Remedial Action Objectives (RAOs) set forth in Section 3.1 of the FS. In the Burial Pit Area and the Evaporation Ponds, VOCs and radiological constituents are co-located. The FS develops alternatives based on cost-effective and implementable remedial technologies and process options to address these contaminants.***

4. Section 3.1 and 3.2: Westinghouse states that the wastes contained by the Burial Pits constitute a "Principal Threat Waste," for which the Remedial Action Objective (RAO) calls for "active remediation." Westinghouse claims the Principal Threat Waste criteria is based on the presence of VOCs. First, we do not believe that Westinghouse has justified designating the burial pits as a Principal Threat Waste. Rather, Westinghouse seems to proclaim that is it a Principal Threat Waste, and then use that as evidence that active remediation is necessary. Second, if the burial pits are a Principal Threat Waste based on VOCs, then subsurface soils beneath the buildings, which have been shown to contain VOCs at levels indicating the potential presence of dense non aqueous phase liquids (DNAPL), should receive the same designation. This is another example of Westinghouse's bias--carried forward from the RI--toward the Burial Pits being the ultimate remedy driver to the exclusion of other practical remedial alternatives that are feasible at other AOCs.

Response: ***Materials contained in the Burial Pits clearly meet the definition of principal threat waste as provided in EPA guidance. (See, for example, "A Guide to Principal Threat and Low Level Threat Wastes," Superfund Publication 9380.3-06FS, November 1991; and "Rules of Thumb for Superfund Remedy Selection," OSWER 9355.0-69, August 1997.)***

The deep soils beneath the process buildings will be evaluated for the presence of DNAPL as a possible principal threat waste in the development future groundwater response actions.

5. Section 4.2.2: In various reports prior to the draft FS, Westinghouse describes the Burial Pits in terms of their thickness as being eight to 12 feet. The Buried Waste Evaluation Report (March, 2007), however, indicates that the Burial Pits may not be as extensive or as deep, and that the waste was often observed with a thickness of less than six feet and severely degraded (Appendix A Boring Logs). This suggests that the volume of waste in the Burial Pits is much less than as the volume characterized in the draft FS. This results in an overestimate in the cost for this remedy.

Response: ***The comment is correct in pointing out that the Buried Waste Evaluation Report (March, 2007) suggests a waste quantity associated with the Burial Pit Area that is lower than the quantities used in the FS. This change in volume does not affect the effectiveness or implementability of remedial technologies or process options and, therefore, does not affect the assembly of alternatives. In the detailed and comparative analyses of alternatives, the***

information upon which cost estimates are based appears to be in-line with EPA guidance (See response to Comment #14).

6. Section 4.2.5: Given the significant impacts associated with radionuclides and VOCs in the "Soils Beneath and Around the Buildings," the write-up of this section is very limited when compared to the write- up of the section on the Burial Pits. In addition, given the fact that VOC concentrations are as high as those seen in the Burial Pit area, if the burial pit wastes are considered "Principal Threat Wastes," then the soils beneath and around the buildings should also be considered Principal Threat Waste.

Response: ***See response to Comment #4.***

7. Section 5.0: Generally, in-situ technologies for dealing with VOCs in soil and waste have not adequately been considered or examined. This may be because Westinghouse characterizes these wastes as solid wastes, when in reality the vast majority of the matrix is soil and only a small portion is degraded, residual solid waste. Accordingly, a greater number of in-situ technologies are available to deal with VOCs above and below the water table than are presented in the draft FS. For example, we are aware of a site where perchlorate was treated in the vadose zone using repeated injections to maintain chemical reactivity. Another site made use of enhanced reductive dechlorination to treat high concentrations of PCE and TCE in the vadose zone where the water table was 8 to 10 feet deep and consisted of low permeability soils composed of silty, clayey sand (very similar to what is observed at the Hematite Site) that is able to retain fluids. At another site, thermally enhanced soil-vapor extraction (SVE) was successfully used to remove chlorinated solvents in the vadose zone. These technologies need to be adequately evaluated in the draft FS for the Hematite Site.

Response: ***The FS explored a full range of in situ remedial technologies, both as the primary remedial technique for VOCs and as a pre-treatment technology for AOCs in which radiological contaminants and VOCs are co-located. None of the in situ treatment technologies were found to be cost-effective and implementable in the context of the site-specific conditions (e.g., soil/waste matrix, soil types, contaminants) found at the Hematite Site. Westinghouse offers the following with respect to specific inferences of the comment:***

Perchlorate is not a contaminant of concern at the Hematite Site, and the chemical behavior of perchlorate, which typically occurs as a dissociated anion from ammonium perchlorate, is very different from slightly soluble chlorinated organic compounds such as TCE or PCE.

8. Westinghouse states that the presence of DNAPL can make ex-situ treatment of groundwater very difficult and lead to high costs. DNAPL, however, is rarely observed in ex-situ groundwater treatment systems even when observed in monitoring wells. Our experience with groundwater extraction systems where DNAPL may be in the aquifer

indicate that non aqueous phase liquids can be handled by many treatment technologies without great difficulty or high costs.

Response: ***The commenter misunderstood the FS discussion of the relationship between the presence of DNAPL and ex-situ treatment of groundwater. Westinghouse agrees that DNAPL is rarely observed in ex-situ groundwater treatment systems and that groundwater extracted from aquifers where DNAPL may be present can be handled by many treatment technologies without great difficulty or high costs. The complexity and high costs result from the very slow rate of dissolution of the DNAPL into the extracted groundwater and the resultant slow rate and high cost of aquifer restoration.***

9. Section 5.4.1: Some statements in this Section related to excavation are incorrect. For example, "excavation of deeper buried waste and impacted soils is more difficult and costly." The depth projected for any excavation of impacted materials, however, is not particularly deep (less than 35 feet in most of the areas at the facility) and can be handled by traditional excavation equipment.

Response: ***The comment is correct in pointing out that excavations less than 35 feet deep can typically be conducted using conventional excavating equipment, but the type of excavating equipment plays only a part of the overall cost of excavating contaminated materials, some of which resides below the groundwater table. The cost of excavation increases with depth, as correctly stated in the FS, because requirements for construction dewatering, side slope stabilization, and worker health and safety protection all increase with depth. At the Hematite site, provisions for construction dewatering will be necessary for deeper (greater than about 10 feet) excavations to ensure groundwater inflow does not cause the spread of contamination or worker safety concerns. As excavations deepen, so do the requirements for side-slope stabilization, and all excavations greater than 3.5 feet deep must be conducted with side slope stabilization performed in accordance with OSHA regulations. At some locations at the Hematite site, side-slope stabilization will be accomplished by laying back slopes (thereby increasing the quantity of soil excavated and handle), while, at some locations, sheetpiling or other shoring will be required (e.g., excavation for Evaporation Ponds). Finally, because of the concerns for chlorinated VOCs, which generally have vapor densities greater than 1.0, worker health and safety protection requirements increase as excavations deepen.***

10. Section 5.5.1: Westinghouse retains the option of constructing an on-site LLRW facility. This appears to be a highly unlikely alternative given the surrounding land use and depth to groundwater. In addition, it appears to contradict the stated objective of having the site decommissioned to the "unrestricted use" standard.

Response: ***Westinghouse agrees that constructing an on-site LLRW disposal cell would be a challenging engineering, permitting, and licensing endeavor. In the FS, Westinghouse retained this remedial technology consistent with EPA guidance to retain a range of technologies that incorporate the full range of general response actions. Westinghouse describes the challenges of the on-site disposal alternative in the FS in the detailed and comparative analyses of alternatives.***

11. Section 5.6.1.6: Westinghouse does not retain Air Sparging and Soil Vapor Extraction (AS/SVE) as a remedial alternative. AS/SVE can be applied for remediation of VOC impacted AOCs in both OU-l and OU-2 (groundwater), and the cost of such systems is comparatively low. Such systems have been effectively operated in low permeability and heterogeneous environments.

Response: ***Air sparging is a technology applicable to treatment of groundwater and soils that reside below the groundwater table. Westinghouse agrees that SVE/AS is likely to be a viable remedial technology for either source control or management of migration control for VOCs in groundwater under future groundwater response actions.***

12. Section 5.6.2.1: Westinghouse states: "A review of relevant literature, including the EPA database for innovative treatment technologies, however, indicates that there are no demonstrated, commercially viable treatment technologies involving the direct applications of chemicals to detoxify and destroy chlorinated VOCs in solid waste matrices." This statement is not correct. As our comments on Section 5.0 reflect, there are many examples where VOCs and other compounds were treated in the vadose zone.

Response: ***The statement in the FS, which addresses solid waste matrices, is correct. Moreover, with few exceptions, direct chemical treatment technologies, such as reductive dehalogenation and oxidation, are applicable to saturated soils where the groundwater acts as a vehicle to disburse the treatment chemical in the treatment zone. Without saturated pore space, the treatment chemical, whether oxidant, reducing agent, or other compound, is not effectively utilized, and such treatment for unsaturated soils is inefficient and not cost-effective. Similarly, while clays and clay-silt mixtures situated in the vadose may have water-filled pore space, the permeability of such soils is quite low, resulting in reduced suitability of direct-treatment technologies.***

For unsaturated soils with air-filled pore spaces, soil vapor extraction (SVE) is used to remove VOCs from soils in the vadose zone. The FS separately discusses the applicability of SVE to OU1 at the Hematite site in the FS.

13. Section 6.0: Westinghouse improperly selects its preferred remedial alternative for OU-l by artificially imposing one alternative remedy for all areas of buried waste, soil, and

sediment. Westinghouse states that the remedial alternatives that were developed "are interrelated with regard to the various AOCs at the Hematite Site, in that the selection of an alternative for one AOC will have an impact on the selection of alternatives for other AOCs." This is a perfectly reasonable statement. However, Westinghouse then clarifies that if it selects excavation and off-site disposal as the preferred alternative for the Burial Pit AOC, it is unlikely that it would select an on-site containment alternative for other AOCs. It further states that it will evaluate the alternatives under Operable Unit 1 "holistically, in that, under each distinct alternative, a common general response action will be taken for all AOCs."

If we correctly interpret the last statement, it appears that Westinghouse defaults to a single "common general response action" rather than carefully evaluating AOC-specific alternatives. Westinghouse ultimately focuses on the single remedy that is applicable to all the AOCs in OU-l. This is inconsistent with the approach utilized by unbiased environmental professionals in this industry.

Response: ***All of the AOCs are affected by the same COCs. Westinghouse's approach reflects the recognition of experienced practitioners that remediation needs to be completed through a coherent and implementable construction project. While theoretically different remedial approaches could be taken at different AOCs, it is illogical and impractical to assume, for example, the Burial Pit materials would be exhumed, pretreated on site, with residuals sent off-site for disposal, but the Red Room Roof Burial area would be capped and contained in place.***

14. Section 6.2.4: This entire section is written as if it is the presumptive remedy. Even the operative verb used here is "will" rather than "would be."

Response: ***The preferred remedy is not identified in the FS. The preferred remedy is identified in the Proposed Plan.***

15. Costs: The volume of material Westinghouse reports to be handled in the Burial Pit AOC is significantly higher than is justified by existing data. In particular, the Buried Waste Evaluation Report and other investigations indicate that the aerial [sic] extent and thickness of the waste may not be as large as indicated in the draft FS. It would appear that the volume of waste associated with the Burial Pits may be about 25 to 40 percent less than projected in the draft FS. In addition, the mass of VOCs in the Burial Pits appears to be less than projected. Therefore, costs to address probable lower volumes of waste and soil in the Burial Pit area would be proportionately less than projected in the draft FS.

Response: ***Cost is but one of five balancing criteria used in the detailed analysis and comparative analysis of alternatives. The NCP provides no clear directive or definition of the use of cost information on the detailed and comparative analyses of alternatives, but only identifies what costs are to be assessed [40 CFR 300.430(e)(9)(iii)(G)].. Westinghouse believes that the relative costs of the various alternatives can be estimated sufficiently to provide a meaning***

evaluation of alternatives. As identified in the Proposed Plan, Westinghouse's preferred alternative is neither the least expensive or the most expensive of the action alternatives.

For Alternatives 3 and 5, which involve waste excavation, on-site handling, and subsequent land disposal (either on-site or off-site), the overall cost is proportional to the quantity of material. Even if the comment were true in its assertion that the volume of waste associated with the Burial Pits may be about 25 to 40 percent less than projected in the draft FS, the cost estimate resulting form this underestimation would still be within the +50 to -30 percent level of accuracy provided for such study estimates in EPA guidance. (See "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, Interim Final," OSWER Directive 9355.3-01, October 1988.) The cost of Alternative 2 (on-site containment) primarily depends on the geometry of the containment area (not depth) and would not be as affected as other action alternatives to the changes in waste quantity described in the comment.