HORSESHOE ROAD

Operable Unit 2
Superfund Site

Sayreville, Middlesex County, New Jersey

Value Engineering Study
For
U.S. Environmental Protection Agency, Region 2

Study Date: March 27-29, 2007

Final Report

July 31, 2007

US Army Corps of Engineers
Omaha District

EPA Region 2

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EXECUTIVE SUMMARY

General

The US Army Corps of Engineers performed a Value Engineering (VE) Screen and Study on the Horseshoe Road Superfund Site, Operable Unit Number Two (OU2), Middlesex County, Sayreville, New Jersey. The VE Study was conducted at the USEPA Emergency Response Team HQ in Edison, NJ from March 27 – 29, 2007. The study included a visit to the Horseshoe Road Site on March 27, and a site visit to the Federal Creosote Superfund Site to witness the use of the in-situ sampling methodology proposed for the Horseshoe Road Site.

The VE Screen and Study are based on the principals and standards used in the VE Study process consisting of six phases. The EPA VE process is broken into two components, the screening phase which addresses the first four phases (Information Gathering, Function Analysis, Speculation, Analysis) and the study phase which encompasses the final two phases (Development and Presentation). VE studies the functions of individual items of a project and the relationships of those functions to the overall function of the project. The result of studying the functions allows the team to take a critical look at how these functions are being met and therefore develop alternative ways to achieve the same function while increasing the value and maintaining the primary function of the project. In the end, it is hoped that the project will realize a reduction in cost, increase or maintain the execution of the primary function, and improve or maintain the biddability, constructability and maintainability of the completed operable unit thereby improving the site environment.

Another objective in executing a VE Study is to meet the requirements of the Office of Solid Waste and Emergency Response (OSWER) Directive OSWER 9335.5-24, Value Engineering for Fund Financed Remedial Design and Remedial Action Projects dated 14 April 2006. The VE process accomplishes this within the existing design schedule with minimal disruption. Preliminary proposals and comments resulting from a VE Screen and Study are briefed to the primary stakeholder, the EPA for comment and content, and screened to eliminate those considered to be outside the scope prior to full development to eliminate lost effort. The resulting proposals are then developed and provided to the EPA RPM, remedial action design team, or others designated by the RPM (Remedial Project Manager) for comment. Following review comment incorporation, the final report is presented to the designer for consideration during the design process concurrently with comments from the EPA, USACE, State, or other stakeholder with no impact on the overall schedule.

Estimate of Construction Costs and Budget

The total projected construction cost for all the entire scope of OU2, as identified in the 65% Design Estimate is $52.56 million. At the time of the study, the building demolition portion of the previous OU was complete.

Summary of VE Study Results

During the speculation phase of this study, 63 creative ideas were identified. Twenty-two of these ideas were developed into VE proposals or design comments with cost implications where applicable.

The following table presents a summary of the ideas developed into recommendations and design comments with cost implications. Cost is an important issue for comparison of VE proposals. The costs presented in this report are based upon the design quantities reflected in the 65 percent cost estimate developed by the design consultant. Cost estimates, as prepared for this VE Study, are from costs identified in the existing 65 percent estimate, published cost databases and/or VE team member experience. The estimates provided should be of sufficient detail to allow a decision regarding implementation, but the estimates should not be used to compute actual savings associated with adoption of any one recommendation.

In addition to the Summary of Recommendations, several ideas were developed that were not viable. These developed ideas are included in Appendix E as "Withdrawn Recommendations". They are included in the report to document the logic of why the recommendations were withdrawn.

SUMMARY OF RECOMMENDATIONS

REC # NUMBER	DESCRIPTION	POTENTIAL SAVINGS (COST)
1	Dry Wet Soil Prior to Disposal	$352,000
2	Reuse Soil with Contamination Levels Below Cleanup Criteria On-Site as Backfill	$4,011,000
3	Use Slag for Temporary On-Site Haul Roads	$39,219
4	Back Haul Non-Hazardous Soil for Local Disposal of Schedule D Materials	$488,081
5	Use Excavation Sequencing in lieu of Structural Excavation Support Requirements Adjacent to the Force Mains and Railroad Tracks	$420,810
6	Use Alternate Site Dewatering Methods	$106,080
7	Bury Root Balls On-Site	$1,300
8	Additional Stockpile Sampling to Determine Disposal	$4,270,000
9	Segregate Oversize Rock/Concrete/Debris	$116,200
10	Use Wetland Mitigation Banks in lieu of Establishing Wetlands On-Site	$741,000
11	Consolidate Wetlands, and Revise Grading to Reduce Backfill Requirements	$1,015,000
12	Reduce the Number of Analyses Used for Determining Disposal Requirements	$71,200
13	Reduce Compaction to Minimum Required for an Undeveloped Site, Reduce the Number of Density Tests	$50,000
14	Consider Using a Common Backfill Material (modified mix) for Placement in the Lower Levels of the Excavation.	$112,000

Total Potential Savings is not available since many of the items addressed alternatives to deal with the same issue, primarily excavation and disposal of soils from the site. For example, while Recommendations 10 and 11 are both options to consider for dealing with the wetlands, only one of the two would be incorporated.

Additional Potential Savings
In addition to the savings potentials shown in the recommendations above, there are several design comments that have savings noted. These were not developed as recommendations because of the content material of the comment. Generally, they reference changes or suggested corrections to the design estimate. If total savings resulting from all efforts regarding this VE study are to be computed, the savings noted in the design comments should be added to the accepted recommendations savings.

Acknowledgments
As this is one of the first studies of this kind, VE Screen, VE Study on a HTRW (Hazardous, Toxic and Radioactive Waste) project, the study members should be commended for their effort and perseverance in accomplishing this very successful study. A special thanks is extended to the EPA RPM, the EPA team members, the New York District Construction Staff at the Federal Creosote and Horseshoe Road Sites, and the Kansas City District USACE design team members for their cooperation with the VE team during the on-site visit and for their input during the study.

VALUE ENGINEERING SCREENING STUDY TEAM MEMBERS

NAME	ORGANIZATION
Ken True	CVS, Contractor
Lindsey K. Lien	USACE-HTRW CX
Curtis Payton	USACE CESPK
John Hartley	USACE CENWO
Tim Gallagher	USACE CENAB
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Certification
This is to verify that the Value Engineering Screening Study was conducted in accordance with standard Value Engineering principles and practices.

Kenneth True, PE, CVS, CCE
Value Engineering Screening Study Team Leader

SECTION 1 – INTRODUCTION

This report documents the results of a Value Engineering Screen/Study "the VE Study", on the project "Horseshoe Road Superfund Site, Operable Unit Number Two (OU2), Middlesex County, Sayreville, New Jersey". The VE Study was conducted at USEPA Emergency Response Team HQ in Edison, NJ on March 27 – 29, 2007. The study team was from the USACE HTRW Center of Expertise, and from several other USACE District offices, Environmental Protection Agency, and facilitated by Kenneth True, a Certified Value Specialist (CVS) and Professional Engineer. The names and telephone numbers of all participants in the study are listed in Appendix B.

The Job Plan

This study followed the basic value engineering methodology as endorsed by Society of American Value Engineers International, the professional organization of value engineering. This report does not include any detailed explanations of the value engineering/value analysis processes used during the workshop in development of the results presented herein. A summary of the basic processes used in the study is included to give the reader an idea of the standard VE methodology, consisting of six phases:

Information Phase: The Team studied the current 65 percent conceptual design dated July 2006, the ROD, Proposed Plan, portions of the Remedial Investigation and Feasibility Study, EPA criteria documents, figures, descriptions of project work, and 65 percent cost estimate to fully understand the project scope and required functions. The detailed cost estimate allowed the team to focus on high cost areas of the project which offer the most potential for cost savings. This phase was largely done by the team prior to the on site portion of the VE Study.

Function Analysis Phase: The purpose of this phase is to clearly identify the function(s) of the Project, and to formulate a concept from which new directions can be taken. A Function Analysis Study Technique (FAST) Diagram is an end product of the Function Analysis Phase. The FAST Diagram is included in Appendix C.

Speculation Phase: The CVS led the Team brainstorming sessions to generate ideas that could be beneficial to the remedial action. All team members contributed ideas and critical analysis of the ideas was discouraged until the Analysis Phase (see Appendix B).

Analysis Phase: Evaluation, testing, and critical analysis of all ideas generated during speculation was performed to determine potential for savings or improvement to the site remediation. Ideas that did not survive critical analysis were deleted. Those feasible ideas that survive the analysis phase are then developed into proposals. Those surviving ideas were assigned to members of the team for further development and validate the merit of the proposal. Sometimes this attempt to substantiate the proposal results in the modification or even elimination of the original idea.

Development Phase: Development took place in two phases. The first phase was done on site and consisted of the initial development of proposals, and in certain cases their elimination. Those remaining were further developed until the team disbanded. The second phase consisted of completion of the proposal evaluation upon return to their respective offices where reference materials and other resources were available. Proposal descriptions, along with technical support documentation, and cost estimates were prepared to support implementation of ideas. Development generally takes the form of a written document that clearly expresses the proposed idea, usually a "Before" and "After" description. In addition, the VE Study Team identified items of interest as Comments that were not developed as proposals. These comments follow the study proposals in Section 4.

Presentation Phase: This portion of the study was done in two phases. The first phase consisted of a telephone outbriefing to the EPA RPM, the remaining EPA team, the Kansas City and New York USACE District team, and the design consultant CDM that summarized the initial proposals. Those participants made recommendations concerning elimination or modification of proposals based on the boundaries of the VE Study. Phase two of the Presentation Phase includes preparation and review of a Draft VE Study Report. This report was distributed for review by project supporters and decision makers. A conference call was held to discuss the findings and revisions made accordingly. The EPA will determine responsibilities for implementation of accepted proposals.

This study differs slightly from a “standard” VE study. The differences lie in the applications of some of the methodologies and the way they can be applied to an ongoing HTRW Superfund site that has numerous operable units in order to achieve the desired end result. Also, the time the team spent together was shortened in an attempt to reduce costs, save or accommodate team members’ schedules and/or other obligations. The proposals were initially developed during the March 27 – 29 meetings, and completed subsequent to their return to their individual offices. In any case, the results should be considered as completion of a VE Study for this site.

Boundary of the Study

This study was performed for Operable Unit Number Two (OU2) Soils and Groundwater, for this site. Operable Unit Number One was completed in 2001 and addressed chemical and drum removal, building demolition, grading and stabilization of the site. The primary work left to be performed for OU2 is removal of the contaminated soils and monitoring the groundwater. Work that has been accomplished or currently under way was not addressed in this study. All future work related to OU2 was considered as part of this study.

Ideas and Recommendations

Part of the value engineering methodology is to generate as many ideas as is practical, evaluate each idea, and then select as candidates for further development only those ideas that offer added value to the project. If an idea thus selected, turns out to work in the manner expected, that idea is put forth as a formal value engineering proposal. Proposals represent only those ideas that are proven to the VE team’s satisfaction.

Comments

Some ideas that did not make the selection for development as proposals, were, nevertheless judged worthy of further consideration. These ideas have been written up as Comments and are included in Section 4.

Level of Development

Value Engineering Studies are working sessions for the purpose of developing and recommending alternative approaches to a given project. As such, the results and recommendations presented are of a conceptual nature, and are not intended as a final design. Detailed feasibility assessment and final design development of any of the proposals presented herein, should they be accepted, remain the responsibility of the EPA.

SECTION 2 – PROJECT DESCRIPTION

Background

This report presents the results of the Horseshoe Road Superfund Site, OU2 VE Study performed on March 27 – 29, 2007. The VE Study is intended to add value to projects, in terms of improved quality, enhanced construction methods, reduction in waste volume generated, or money expended on the remediation processes. The Horseshoe Road Superfund Site, OU2 VE Study was funded as part of a pilot program funded by HQ EPA, and coordinated by EPA Region 2 and the USACE HTRW-CX.

Authority for the performance of these studies is contained in the Office of Solid Waste and Emergency Response (OSWER) Directive OSWER 9335.5-24, Value Engineering for Fund Financed Remedial Design and Remedial Action Projects, signed on 14 April 2006. This directive provides guidance concerning requirements addressing Value Engineering for Superfund Remedial Design and Remedial Action Projects.

Project Description

The Horseshoe Road Superfund Site is a 12-acre property located in a remote area in the northern outskirts of the Borough of Sayreville, Middlesex County, New Jersey and is bordered to the north by the Raritan River and property owned by the Middlesex County Utilities Authority (MCUA), to the east by the Kearny Branch of the Raritan River Railroad, and to the west and south by wooded and residential areas. The Gerdau Ameristeel steel mill facility lies to the southwest of the site. The site consists of three areas of concern (AOC):

- Atlantic Development Corporation (ADC).
- Sayreville Pesticide Dump (SPD).
- Horseshoe Road Drum Dump (HRDD).

The HRDD and another adjacent area, the Atlantic Resource Corporation (ARC) area are not the subject of this remedial effort. The Potential Responsible Parties (PRPs) will perform the cleanup of these areas.

EPA has addressed contamination sources and various pathways for exposure associated with the site, completing the remediation in a phased approach under the following separate OUs:

- OU 1 - Demolition of buildings and above ground structures which was completed in April 2001.
- OU 2 – Contaminated soil and groundwater.
- OU 3 – River and marsh sediment.

In September 2004, EPA signed the OU2 ROD, addressing site-wide soils and groundwater. The overall strategy addresses the contamination in a manner that would allow the site to be returned to productive use for industrial, commercial, or recreational purposes.

The remedial action objectives (RAOs) of this project as described in the OU2 ROD are summarized below:

- Excavation of contaminated soil and debris, including deeper soils that act as a continuing source of groundwater contamination at the site.
- Offsite transportation and disposal of contaminated soil and debris, with treatment as necessary.

- Offsite treatment of all RCRA hazardous wastes prior to land disposal.
- Backfilling and grading of all excavated areas with soil containing contamination levels below cleanup criteria.
- Institutional controls, such as a deed notice or covenant, to prevent exposure to residual soils that may exceed levels that would allow for unrestricted use.
- Long-term monitoring and institutional controls will satisfy the CERCLA requirements groundwater.

The 65 percent design basis report and accompanying current cost estimate were made available to the VE Study team at the time of the VE Study. This cost data was used in development of the costs for the proposals found in the VE Study Report.

Estimate of Construction Costs
The total projected construction cost for all the entire scope of OU2, as identified in the 65 percent cost estimate is $52.56 million.

SECTION 3 – VE RECOMMENDATIONS

Organization of Recommendations

This section contains the complete documentation of all recommendations resulting from this study. Each recommendation has been marked with a unique identification number. The parent idea, or ideas from which the recommendation began, can be determined from the Creative Idea List located in Appendix B of this report. Many of the individual items recorded during the speculation phase have been incorporated together into one recommendation. However, for tracking purposes, the original idea numbers that make up a recommendation are shown within the recommendation.

Each recommendation is documented by a separate write-up that includes a description of both the original design and recommended change, a list of advantages and disadvantages, sketches where appropriate, calculations, cost estimate, and the economic impact of the recommendation on the first cost, and where applicable, the life cycle cost. The economic impact is shown in terms of savings or added cost. In some cases, the recommendation is broken down to include write-ups for each creative idea within the recommendation.

VALUE ENGINEERING RECOMMENDATION # 1

PROJECT: Horseshoe Road Superfund Site
LOCATION: Borough of Sayreville, Middlesex County, New Jersey
STUDY DATE: March 27-29, 2007

DESCRIPTIVE TITLE OF RECOMMENDATION:

Dewater/Dry wet soil prior to off-site disposal

Creative Idea 2

ORIGINAL DESIGN:

Due to high water table conditions at the site, the majority of excavated soil will be saturated. The original design calls for excavation, loading, and off-site transportation and disposal of soil without any processing to reduce moisture content.

RECOMMENDED CHANGE:

Process soil on-site to reduce moisture content through evaporation prior to off-site disposal.

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
ORIGINAL DESIGN	$14,936,000	$0	$14,936,000
RECOMMENDED DESIGN	$14,584,000	$0	$14,584,000
ESTIMATED SAVINGS OR (COST)	$352,000	$0	$352,000

ADVANTAGES:

- Decrease weight of soil requiring off-site disposal.

DISADVANTAGES:

- Increased time, equipment and manpower to process.
- Will require additional space on-site to spread and process soil.
- Potential air quality issues if soil contains significant volatiles – will only consider for soils designated for non hazardous disposal.
- There may be a concern that processing may be considered treatment. Therefore, any sampling to determine the disposal method should take place prior to processing.

JUSTIFICATION:

Most of the soil to be excavated at this site is below the water table and therefore will be saturated. The soil must pass the paint filter test prior to shipment. All moisture removed from the soil through on-site processing will result in reduced disposal costs. However, these savings will be offset by the equipment and labor costs required to process the soil. Based on data in Appendix D of the 65% Design Analysis Report, there is about 20 lbs of water in each cubic foot of saturated soil. This equates to about 540 lbs of water for each cubic yard.

It is assumed that spreading the material to a thickness of 1-foot and working the material with a rotor tiller for two hours per day for five days would result in an estimated moisture reduction of 25%. A 25% reduction in moisture would result in a weight reduction of 135 lbs per cubic yard.

With an estimated Subtitle D disposal quantity of 110,100 tons and an estimated density of 1.5 tons/CY, there is an estimated total of 73,400 CY of material scheduled for Subtitle D disposal. A 25% moisture reduction in each CY would result in a total reduction in weight of material requiring disposal of 4,955 tons.

The cost associated with processing this material would consist of a tractor with tiller with a combined hourly rate of $49.12 (EP 1110-1-8). Since there are some space limitations and it will be only necessary to process 2-hours per day, the equipment will sit idle for a significant amount of time. However it is assumed that the total rental charges will not exceed the purchase price of the equipment which is approximately $145,000. The labor rate to operate the equipment is assumed to be $54.00.

VALUE ENGINEERING RECOMMENDATION # 1

Cost Item	Units	$/Unit	Source Code	Original Design		Recommended Design	
				Num of Units	Total $	Num of Units	Total $
Subtitle D Disposal	tons	86.96	D.21	110,100	$9,574,296	105,145	$9,143,409
Equipment Processing Cost	LS			0	$0		$145,000
Operator	hrs	54.00		0	$0	1,120	$60,480
					$0		$0
					$0		$0
					$0		$0
					$0		$0
					$0		$0
					$0		$0
Subtotal					$9,574,296		$9,348,889
Mark-up		@	56%		$5,361,606		$5,235,378
Redesign Costs							
Total					$14,935,902		$14,584,267

VALUE ENGINEERING RECOMMENDATION # 2

PROJECT:	Horseshoe Road Superfund Site
LOCATION:	Borough of Sayreville, Middlesex County, New Jersey
STUDY DATE:	March 27-29, 2007

DESCRIPTIVE TITLE OF RECOMMENDATION:

Reuse excavated soil with contamination levels below cleanup criteria on-site as backfill

Creative Idea 4

ORIGINAL DESIGN:

The existing design calls for all soil removed from the excavation zones to be disposed of off-site in one of three ways, incineration, subtitle C landfill, or subtitle D landfill. Based on existing analytical data, a significant portion of the soil excavated does not exceed levels for any of the Contaminants of Concern. The primary purpose for excavation of these soils is to access underlying soils that do exceed cleanup levels.

RECOMMENDED CHANGE:

- Reuse excavated soil containing contamination levels below cleanup criteria on-site as backfill.

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
ORIGINAL DESIGN	$17,844,000	$0	$17,844,000
RECOMMENDED DESIGN	$13,833,000	$0	$13,833,000
ESTIMATED SAVINGS OR (COST)	$4,011,000	$0	$4,011,000

ADVANTAGES:

- Reduce off-site disposal in landfill.
- Reduce the need for off-site borrow material.
- Reduce truck traffic through local area required to haul fill material to the site.

DISADVANTAGES:

- Higher rate of testing required if material is to be reused on-site. (e.g. 1 sample per 100 CY as opposed to 1 sample per 667 CY for off-site disposal).
- Requires additional space on-site to store material until excavations are ready for backfill.

JUSTIFICATION:
After review of analytical data it was found that there were significant number of layers of soil with no Contaminants of Concern above cleanup levels sandwiched between contaminated soil. The 65% design showed these layers of soil containing contamination levels below cleanup criteria being excavated, transported and disposed of off-site at a Subtitle D landfill. It appeared from the design that surgical excavation techniques were to be used for this site. This VE item recommends that the layers of soil containing contamination levels below cleanup criteria be stockpiled separately, sampled and reused on-site as backfill.

Based on a total of 62 borings (SPD-SB-100 through SPD-SB-157 and SPD-SB-161 through SPD-SB-164) intervals containing contamination levels below cleanup criteria totaling a depth of 116 feet were found within these borings. For simplicity, assuming that each of these borings represents an equal area within the 6 acres scheduled for excavation, each foot of material containing contamination levels below cleanup criteria represents the following volume and weight of soil:

- Volume per foot = (43,560 x 6)/62 = 4,200 cubic ft = 156 CY.
- Weight per foot = 156 CY x 1.5 tons/CY = 234 tons.
- Estimated volume of Excavated Soil containing contamination levels below cleanup criteria = 156 x 116 = 18,096 CY.
- Estimated weight of Excavated Soil containing contamination levels below cleanup criteria = 18,096 x 1.5 tons/CY = 27,144 tons.

Soil that is proposed to be reused on-site will likely require sampling at a frequency of one sample per 100 CY as opposed to the one sample per 1,000 tons (667 CY) for material disposed off-site. This will result in an additional 154 stockpile samples and analysis to implement this change.

Another benefit of reusing excavated soil containing contamination levels below cleanup criteria as backfill is the reduced truck traffic required to bring borrow material on-site. If each truck transports 15 CY soil this would reduce truck traffic by 18,096/15 = 1,206 loads.

VALUE ENGINEERING RECOMMENDATION # 2

Cost Item	Units	$/Unit	Source Code	Original Design		Recommended Design	
				Num of Units	Total $	Num of Units	Total $
Subtitle D Disposal	tons	86.96	D.21	110,100	$9,574,296	82,956	$7,213,854
Common Fill (material only)	CY	20.87	F.25	84,045	$1,754,019	65,949	$1,376,356
Stockpile Sampling	each	1,000.00		110	$110,000	264	$264,000
					$0		$0
					$0		$0
					$0		$0
					$0		$0
					$0		$0
					$0		$0
					$0		$0
Subtotal					$11,438,315		$8,854,209
Mark-up		@	56%		$6,405,456		$4,958,357
Redesign Costs							$20,000
Total					$17,843,772		$13,832,567

VALUE ENGINEERING RECOMMENDATION # 3

PROJECT: Horseshoe Road Superfund Site
LOCATION: Borough of Sayreville, Middlesex County, New Jersey
STUDY DATE: March 27-29, 2007

DESCRIPTIVE TITLE OF RECOMMENDATION:

Use Slag for Temporary on-site Haul Roads

Creative Idea 7

ORIGINAL DESIGN:

The original 65% design did not specifically address the construction of on site haul roads or the materials that may be used to construct them.

RECOMMENDED CHANGE:

Based on information gathered during the site walk the steel recycling facility on the adjacent property has a large slag pile which is available at no cost for use as a road base. Given the high water table at the site and marsh areas in several places on the site it is inevitable that truck traffic associated with on site movement of material will cause shallow groundwater to pump to the surface causing muddy haul paths. To ensure that the haul roads remain passable it is certain that reinforced haul roads will be necessary. It is assumed that roads would be build out of imported road base material which would be delivered via 10 cy - 18 cy over the road haul trucks. It is recommended that haul roads be constructed of available slag material which is currently stockpiled at the adjacent steel factory instead of imported stone. It is likely in the drier areas, and almost certain in the wetter areas, that a nonwoven geotextile will be required below the slag to prevent it from being mixed with the underlying soil under the load of truck traffic. Geotextile is recommended so that the base material is not lost in the soft soils of the site.

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
ORIGINAL DESIGN	Imported road base, $25/ton $25,000 -mgmt $140	0	0
RECOMMENDED DESIGN	0		
ESTIMATED SAVINGS OR (COST)	$39,219		

ADVANTAGES:

Advantages of adding reinforced haul roads to the site will be:

- The reduction of trucks getting bogged down in the mud and therefore increased haul efficiency.
- Decrease in mud accumulation on tires which reduces tracking of mud around the site and into the loadout staging areas.
- Reduction of load on the truck related to turning mud laden tires which improves fuel economy as increasing rotating mass takes up significant energy.
- Minimization of haul road rutting and associated dozer time required for maintenance.
- Use of the slag provides a free road base.
- Use of the local source eliminates the need for haul trucks bringing material through the adjacent neighborhood.
- Use of the local source allows for the potential of off road articulated trucks which will reduce the number of trips required for bringing the material to the site, will eliminate the need to wait for material delivery, and will ultimately increase haul road construction efficiency.
- In the case that haul roads need repair, the source is immediately accessible which reduces delay time waiting for material delivery.
- No procurement costs associated with procuring road base and handling invoicing though negotiating an access agreement will take some level of effort.

DISADVANTAGES:

- It is possible that the contractor will need to mob equipment to the steel facility to load the trucks from the slag pile. There may be liability issues associated with excavating the pile that should be worked out prior to accessing the site.
- Since temporary haul roads will be removed as the excavation proceeds the slag material will require sampling for disposal prior to use. Excessive concentrations of leachable metals would preclude use of this material on the site. That situation is not expected however since it would drive management of the material as a hazardous waste and observations of the operations on the steel plant do not suggest it is being managed as such.

JUSTIFICATION:

Use of the free slag material will provide a readily available road base source for temporary haul roads. Solid haul roads will significantly reduce transit time on the site and increase productivity which reduces the labor and equipment costs on the site. The nearby source reduces traffic in the neighborhood and facilitates rapid procurement of additional material as the need for haul road repair or unforeseen road extensions are realized. All haul road material will eventually be clogged with contaminated material and will require disposal as contaminated. Therefore using the slag, as long as it does not exhibit hazardous characteristics, will not be a problem at the site and will not increase disposal costs above the use of normal base material.

SAVINGS BUILDUP

Assume four 400 ft long haul roads. Each road will have a 25 ft width to accommodate passing of 2 off road trucks and a ½ ft thickness constructed over a non woven geotextile which will provide stability to the road surface.

Note: 3 to 5 inch angular stone was noted on the surface of the site. The material would be excellent for road runout material required by the NJ erosion control regulations.

- The cost of material assuming imported base:

400 ft long x 25 ft wide x .5 ft thick x 1 cy /27 ft3 x 2700 lbs/cy x 1ton/2000 lbs = 250 ton/road x $25/ton = $6250/road x 4 roads = $25,000

- Assume that the cost of material procurement is the same as getting base, however invoice management will be avoided at an estimated savings of

$35/hr for procurement specialist x 4 hours $140

$25,140 x 156% = $39,219

VALUE ENGINEERING RECOMMENDATION # 4

PROJECT: Horseshoe Road Superfund Site
LOCATION: Borough of Sayreville, Middlesex County, New Jersey
STUDY DATE: March 27-29, 2007

DESCRIPTIVE TITLE OF RECOMMENDATION:

Back Haul Non-Hazardous Soil for Local Disposal

Creative Idea 9

ORIGINAL DESIGN:

The original design calls for importation of clean backfill from a local source using haul trucks. All non-hazardous soil that will be shipped offsite will be sent off using rail cars to transport it to a subtitle D facility.

RECOMMENDED CHANGE:

Backhaul non-hazardous waste in the same trucks that bring in the clean backfill and take it to a local approved disposal facility.

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
ORIGINAL DESIGN	138 day subtitle D handling		
RECOMMENDED DESIGN	Reduce schedule by 35 days plus weekends		
ESTIMATED SAVINGS OR (COST)	$404,434		

ADVANTAGES:

- Allows for increase in the amount of waste being shipped off site with no increase in the overall amount of transportation traffic, truck or rail, from the site.
- Allows for a potential significant cost savings since haul trucks bringing in clean soil have a load going out instead of dead heading back to the borrow pit.
- Soil pre identified as subtitle D material may be directly loaded out into the backhaul trucks eliminating the need to stage the material, manage the stockpile and ultimately load into rail car.
- Reduces the amount of material that needs to be stored on site opening the area for more efficient management of the material that must be sent offsite as hazardous soil.
- Faster overall shipment of waste from the site, the limiting activity in the schedule, will reduce the project schedule and all associated direct, indirect and government costs.
- Faster completion of project frees up site for reuse and eliminates remediation related traffic in the neighborhood.

DISADVANTAGES:

- Movement of even non-hazardous contaminated material off site via truck may be met with community resistance due to public perception issues that the EPA is not fulfilling agreements made associate with the project. Community meetings to inform the public and get buy in will be required.
- Haul trucks will need to be lined prior to loading so that decontamination is not required before getting another load of clean backfill.
- A wheel wash will be required to facilitate loading of contaminated material at the excavation point instead of at a staging area with clean haul roads.
- The trip to the disposal facility may increase the overall turn time for the backfill importation which would require finding and incorporating a larger number of trucks in the rotation. The total number of truck loads into the site would remain the same.

JUSTIFICATION:

Shipping the material by rail car requires stockpiling the material and loading it out into rail cars. Direct loading into haul trucks skips that double handling step. The daily supply of rail cars will limit the daily production rate associated with transportation. Removing the material from the site will be the limiting step on the project. The subtitle D material represents over 70% of the anticipated waste and that number is likely to rise with more detailed sampling and segregation of the higher concentration wastes.

Getting more material off the site using alternative methods allowing for direct load will also reduce stockpile management effort and free up stockpile space which may grow limited on the site, especially as the excavation proceeds and the site compresses. Optimizing stockpiling allows for the acceleration of the excavation portion of the work which reduces the need for water management and the amount of water that needs to be treated and cuts off that portion of contractor labor and equipment rental, and government oversight, associated with excavation once the material is excavated. Reduction of the overall project schedule reduces management, overhead and site indirect costs associated with daily operation of the site.

Backhauling will accelerate the movement of material off site without increasing the overall traffic off the site (and actually showing a reduction of rail traffic). The reduced handling of the material reduces labor time and the inherent risks associated with heavy equipment project. Backhauling also provides economic benefit to the local truckers who may gain extra income by adding a leg of transport to each trip.

SAVING BUILDUP

Per day ODC reduction

Field management	$2100
Per Diem	$755
Vehicles	$200
Security	$160
H&S eqpt.	$70
Air monitoring tech	$262
Site utilities	$267
Admin assistant	$150
Misc. direct charge items average	$180
Subtotal	$4144

Per Day labor/equipment reduction

Excavator on dig	$500
Excavator on stockpile	$500
Haul truck	$500
Excavator operator $864	- assume local operators no PD

Truck driver	$432	- assume no reduction in level of effort for lining trucks
Fuel	$200	
Subtotal	$2978	

Subtotal $7122
Markup and profit 56% per estimate $3988

Total contractor $11,110

COE and EPA management assume 2 people on site fully loaded with PD $2300

Total daily burn associated with subtitle D material handling $13,410

Since transportation of waste will be project limiting and subtitle D waste is predominant (73%) it is assumed that there will not be task overlap and a reduction in time associated with subtitle D waste will directly impact final completion date. More efficient pile handling will allow more efficient excavation and a reduction in excavation time reflected only in the excavator and operator time for that task. Direct loading eliminates the haul truck and pile excavator.

Estimated subtitle D handling per 65% est. is 1104 hrs = 138 eight hr days. Assume 25% of the subtitle D material (27,525 cy/ 41,288 ton) can be back hauled which results in a 35 day reduction.

35 x $13,410 = $469,361

Given that the work week is 5 days there is an additional reduction of $3744 per weekend for 5 wks to cover per diem, security and vehicle rental.

Total Savings: $488,801

Not included in the estimate but expected to be a cost that will reduce with reduced schedule is crew rotation costs.
Additional savings will be realized in reduced pile management (dozers, poly, and labor to maintain pile) but these costs were not evaluated since those tasks were not addressed in the estimate.
RR transport is reported to be less than trucks and local disposal, depending on the facility the costs may be significantly higher or lower. Disposal costs are not included in this estimate. Some of the savings may be reduced or eliminated by higher T&D rates for local disposal or increased by lower T&D rates and by handling a higher percentage of the subtitle D material via backhauling. The break even point is an increase in T&D costs of $9.80/ton over the negotiated T&D price without schedule compression

The schedule was built up assuming total one mob funding. In the case of multi year funding there are cost escalations which will be reduced by reducing project duration.

VALUE ENGINEERING RECOMMENDATION # 5

PROJECT: Horseshoe Road Superfund Site
LOCATION: Borough of Sayreville, Middlesex County, New Jersey
STUDY DATE: March 27-29, 2007

DESCRIPTIVE TITLE OF RECOMMENDATION:

Reconsider excavation support requirements for the sheeting by force mains, and railroad tracks by excavation sequencing

Creative Idea 11

ORIGINAL DESIGN:

SOLDIER PILES

The original design calls for the installation of soldier piles along the length of the force main right of way. The piles will be installed by drilling piles rather than driving them to prevent vibrational impact to the forcemain. The design also calls for the installation of driven sheet pile along the rail road right of way.

The top of the forcemain is at approximately 5 ft below current grade. Per communication with the EPA RPM, at one time excavation next to the forcemain was allowed as long as the open cut did not exceed 5 ft width since the pipe design incorporated the confining stress of the soil into the design. Subsequent deterioration of the line has resulted in the need to avoid getting close to the line at all. The historic potential for a cut so close to the pipe suggests it is reasonable to have a limited cut at the current design distance of 25 ft from the pipe. The likelihood of significant ground movement at that distance due to an excess excavation of 2ft-4ft under controlled conditions seems minimal.

Design allows for excavation to a depth of 4 ft below ground surface without the need for structural support. Excavation along the force main is offset by approximately 25 ft from the pipe and is indicated to be to a depth of 16 ft per the design. The soldier pile wall intersects the excavation at section lines J 1.0 to J 0.0, I 1.25 to I 0.0 with additional projection onto H 2.25.

Review of the design drawing sections J-J’ and I-I’ show that the excavation has an average cut of 6-8 ft along J-J’ and on the I segment from 1.25 to .75. At that point the excavation does rapidly increase to the north to the excavation depth of 16 ft used for the soldier pile design.

SHEET PILE

The sheet pile protection along the RR right of way intersects the A-A’ line between 2.00 and 5.5 ft. The maximum excavation depth shown on the section line occurs between 2.25 and 3 and extends to a depth of 6ft. Most of the rest of the section shows total excavation less than 4 ft with a short section of 5 ft excavation. The excavation is offset 18 ft from the track.

RECOMMENDED CHANGE:

Given the allowance for 4 ft of excavation without the need for shoring, it is recommended that installation of sheet piling along the railroad be considered for deletion with the required stability assurance being maintained by backfilling cuts greater than the allowable 4 ft soon after excavation and minimizing the length of the cut face left open before backfilling those sections.

Given the allowance for 4 ft of excavation without the need for shoring, it is recommended that installation of soldier pile installation along the force main be reduced to cover only the deeper portions of the excavation with the required stability assurance in the areas with a max excavation depth of 6-8 ft being maintained by backfilling cuts greater than the allowable 4 ft soon after excavation and minimizing the length of the cut face left open before backfilling those sections.

Increased excavation offsets from the pipe corridor may be realized to gain a higher factor of safety by re-evaluating the clean up requirements in the easement area based on an estimation of contamination left in place around the pipe, review of existing groundwater contamination, and an evaluation of additional adverse impact to the groundwater, or lack thereof, resulting from stability being maintained by excavation sloping over some or all of the excavation face. Sloping for stability would cause an additional wedge of contamination being left in place which would reduce disposal and excavation costs. Increased offset is not assumed in the saving build up.

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
ORIGINAL DESIGN	Sheet pile $53k Soldier pile $347.750		
RECOMMENDED DESIGN	Sheet pile $0 Soldier pile $139k		
ESTIMATED SAVINGS OR (COST)	$261,750 + Haul Road $8,000 capital plus project indirects: total $269,750 raw $420,810 loaded		

ADVANTAGES:

- Eliminate need to install sheet piling with associated reduction in capital costs and project duration associated with building the structure prior to excavation.
- Reduce the amount of soldier wall installed with associated reduction in capital costs and project duration associated with building the structure prior to excavation.
- Reduction in truck traffic through neighborhood associated with construction equipment and material delivery.
- Potential elimination of the need for temporary access roads if the area proves too wet for rig access required for drilling the soldier pile. Estimate cost for that road to be $8,000 assuming imported base material and a geotextile underlayment.

DISADVANTAGES:

- Backfill sequencing would required additional stability analysis to evaluate maximum allowable open cut exceeding 4 ft while maintaining acceptable factor of safety during excavation/backfill.
- Lower production efficiency associated with the need to closely coordinate excavation and backfill and to have a dozer shadowing the excavation.
- May want to coordinate activities with the RR to ensure that a cut face exceeding stability limits is not open when traffic is expected as a passing train would provide a dynamic component to the system.
- Should adequately pre-drain the area prior to excavation to gain strength by reducing pore pressure in the soils.

JUSTIFICATION:

Given the rather large offset of the excavation from the forcemain corridor it would appear feasible that excavation and backfilling sequencing could maintain an acceptable factor of safety over approximately 2/3 of the proposed soldier pile length without the need for the soldier piles. The excavation depths over that length are between 6 and 8 ft, significantly less than the design excavation depth of 16 ft used for the soldier wall design and not much in excess of the allowable 4 ft unsupported depth. Coordination of the backfill and excavation could easily result in less than 5 ft linear of cut face exceeding 4 ft depth assuming a 2h:1v face on a 6 ft total depth excavation and less than 8 ft open face on an 8 ft total depth excavation. Pre-staging backfill in proximity of the excavation and having a dozer, or compactor with blade, available as the excavation progresses would facilitate rapid backfill and compaction of the excavation as the cut advanced.

The excavation depths shown on the section along the RR right of way are all very close to the allowable 4 ft cut which would easily accommodate rapid backfilling behind the excavation to maintain stability. Pre-staging backfill in proximity of the excavation and having a dozer, or compactor with blade, available as the excavation progresses would easily facilitate rapid backfill and compaction of the excavation as the cut advanced.

VALUE ENGINEERING RECOMMENDATION # 6

PROJECT: Horseshoe Road Superfund Site
LOCATION: Borough of Sayreville, Middlesex County, New Jersey
STUDY DATE: March 27-29, 2007

DESCRIPTIVE TITLE OF RECOMMENDATION:

Use Alternate Site Dewatering Methods
Pre-drain site with open ditches – Creative Idea 15
Consider Field Drains for Dewatering – Creative Idea 38
Use large diameter borings or deep sumps instead of well points – Creative Idea 32

ORIGINAL DESIGN:

For the shallower portions of the excavation the design calls for the installation of a number of sumps constructed from a perforated 55 gallon drum. The sump may or may not be wrapped with fabric. Water is conveyed using a small, inexpensive electric sump pumps. Small 1'x1' diversion trenches may be used for additional water conveyance within the excavation.

For dewatering the deeper excavation 2 inch well points were proposed.

RECOMMENDED CHANGE:

Utilization of linear drainage for the shallow excavation. In the simplest form, which is the preferred, ditches are excavated to the design excavation depth with a slope to a collection sump as near to the treatment facility as possible. The trench system can be tied in with the excavation as it proceeds. If possible, deeper portions of the excavation should be dug first so sumps can be installed in the low areas and gravity used to convey flow at the bottom of the excavation.

Rock may or may not be needed in the bottom of the sump. A large high flow trash pump with a float on the intake screen would be used to evacuate the sump while keeping the hose out of the mud.

If traffic flow is impeded culverts or buried field drain (fabric wrapped perforated 6 – 8 inch pipe) could be used in the areas where the haul roads cross the drainage ditch. Field drain is placed utilizing a specialized trenching machine that also places the pipe as it goes. This machine is common in agricultural areas.

Open trenches at the perimeter of the site would control run on while trenches within the site would aid in surface water control. A perimeter trench or field drain would intercept lateral recharge into the site and aid in long term dewatering of the main excavation area.

VALUE ENGINEERING RECOMMENDATION # 6

Deep excavation dewatering would be facilitated using sumps constructed in the excavation and large bore trash pumps. If deep pre-watering is required, large diameter borings with corrugated pipe and 57 stone backfill, or excavated sumps with stone backfill and a culvert pipe riser, are suggested as a replacement to the design well points.

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
ORIGINAL DESIGN	Sumps and Well points; $103,177		
RECOMMENDED DESIGN	Large pumps and hoses $10,000 Field drain installation $25,000 Stone and culvert material $8k		
ESTIMATED SAVINGS OR (COST)	$68,000 raw $106,080 loaded		

Note: **all costs are raw except the final savings which reflects 56% markups**

ADVANTAGES:

- Utilizing linear drainage, especially if installed prior to initiation of excavation and allowing for pre-draining, provides more surface area to more thoroughly drain the relatively tight soils at the sight.
- Laterals can be added as needed and the layout can be optimized with minimal design to provide maximum drainage.
- Tie in can be maintained with the excavation as it advances and is backfilled so hose and/or piping handling is minimized, water in the floor of the excavation is directed to the laterals by sloping and berms created as excavation advances.
- Linear drainage, either trenches or field drain pipe, conveys the water to a minimum amount of collection sumps where the water can be pumped to the treatment facility which minimizes the number of pumps and the associated piping/hoses required.
- Large trash pumps are more reliable than the proposed electric sump pumps, are not prone to clogging by sediment and have a larger factor of safety for conveying additional water which may be contributed to the excavation during storms.
- Open trenches can also be used to convey storm water that falls within the site away from the excavation and to the treatment plant.
- Using trenches and sumps to convey groundwater in the deeper excavations precludes the use of well points and eliminates installation cost.
- Use of large diameter borings to construct deep “well points” provides a much larger area of capture than installed 2 inch well points and have a much higher chance of effectively dewatering the soils based on the permeabilities and recovery rates determined from previous well tests.
- Large diameter borings with rock and culvert material are much easier to construct and less prone to potential failure than 2 inch well points.

DISADVANTAGES:

- The use of open trenches may intercept haul paths requiring the installation of culvert below the haul road.
- Potential safety issues requiring safety fences to barricade open excavations.
- Installation of field drain may require providing 40 hr training to the installer.
- Equipment required for installation of large diameter borings may have access issues while smaller well points may be placed as pre-packed geoprobe installed points if wet conditions are present.
- Installation of field drain may be inhibited in some areas due to tree roots interfering with the trencher. Roots would not impede an excavated trench.

JUSTIFICATION:

Utilization of linear drain fields comprising open ditches, which are easily installed and maintained utilizing the same equipment used for the excavation, or field drains to facilitate site draining will enhance and simplify groundwater control during site excavation relative to the segregated sumps and small pumps included in the current design. The proposed linear drains direct all flow to a small number of sumps located near the treatment facility. The drains provide significant increases in surface area to drain low permeability soils which are reported at the site. Both forms of the drain are rapidly installed using low tech equipment, either an excavator or a trencher. A more continuous drain system can be developed with lateral trenches as needed. Trenches can be directly tied in with the excavation floor as the excavation proceeds without the need to manage hoses or pipes. Management of the deeper excavation water utilizes sumps at the bottom of the cut to recover water and berms/grading of the bottom to direct water away from the cut face to the sump.

If pre-dewatering of the deeper portion of the site is desired the design well points will likely have low recovery and a small radius of influence per the results of the drawdown tests. Use of a large diameter boring as a recovery sump will provide significantly more recovery than the 2-inch well point. An excavated sump would work even better and cost less to install though it would require more rock to keep the sump open. Rock would be placed at the bottom of the sump with a culvert type pipe used to contain the pump or inlet hose which would convey the water to the surface.

Savings build up:

Initial cost per the design is $103,177. The estimate addressed only installation of well points and pumps. Provisions for electrical service to the pumps, and piping from the pumps and sumps to the treatment plant were not addressed. An order of magnitude cost for the larger pumps, installation of field drain and sump rock based on experience at a similar site was $42k which brings the initial savings to $68k neglecting the cost of piping the original design which was not included in the estimate. With markup the cost would be $106,080. The use of the larger pumps, while initially looking like an increased cost, which is how they will be treated, would end up being an overall savings as the proposed electric pumps would likely sustain damage due to high turbidity and would likely not be able to maintain the required pumping rate. Failure of the electric pumps could result in job shut down. The electric pumps would also require either running hard wire electricity or providing generators, neither of which were included in the estimate. Those costs would offset the price of the large pumps to some extent. Additional savings would be realized through more efficient dewatering of the shallower soils which would reduce the weight of water shipped for disposal and make material handling easier. Quantification of this savings was not attempted due to the large number of assumptions required.

VALUE ENGINEERING RECOMMENDATION # 7

PROJECT: Horseshoe Road Superfund Site
LOCATION: Borough of Sayreville, Middlesex County, New Jersey
STUDY DATE: March 27-29, 2007

DESCRIPTIVE TITLE OF RECOMMENDATION:

Backfill tree stumps into the excavation

Creative Idea 20

ORIGINAL DESIGN:

According to Section 2.2.4, Clearing and Grubbing, of the CDM "Remedial Design Overview", "Stumps will be cleaned of earth, sampled and disposed of accordingly".

RECOMMENDED CHANGE:

Utilize the tree stumps as backfill material. Backfilling of the stumps does not add to the contractor's level of effort (the contractor had already planned to remove the residual soils from the stumps, presumably with a power washer, and sample them).
Assume 200 stumps 'qualify' for backfill. Assume average trunk volume of 3 cubic feet. Total volume = 600 cubic feet or app. 22 cubic yards. At app. $20/CY for backfill materials, the savings = app. $445.00. Disposal savings = app. $200.00. Add mark-ups and other miscellaneous costs for a total of approximately $1,300.00 in savings.

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
ORIGINAL DESIGN			
RECOMMENDED DESIGN			
ESTIMATED SAVINGS OR (COST)	$1,300.00		

ADVANTAGES:

- Reduction in backfill material.
- Reduction in backfill truck traffic.

DISADVANTAGES:

- Temporary storage of the stumps.
- Stump size and shape may interfere with compaction efforts.

JUSTIFICATION:

The main reason that organic materials are not usually acceptable as backfill is because of the possibility of decomposition and ultimately, settlement. However, at this site, the backfilled stumps will be well below the water table in an anaerobic state and decomposition is not likely.

Assume backfill soil = app. $17.50/CY
Assume stump disposal = app. $15.27/CY

VALUE ENGINEERING RECOMMENDATION # 7

Cost Item	Units	$/Unit	Source Code	Original Design		Recommended Design	
				Num of Units	Total $	Num of Units	Total $
Stump Disposal	CY	15.27		22.2	$340	0	$0
Backfill Material	CY	17.50		22.2	$390	0	$0
Misc. truck savings	LS	100		1	$100		$0
					$0		$0
					$0		$0
					$0		$0
					$0		$0
					$0		$0
					$0		$0
					$0		$0
					$0		$0
					$0		$0
					$0		$0
Subtotal					$830		$0
Mark-up		@ 56 %			$465		$0
Redesign Costs							
Total					$1,295		$0

PROJECT: Horseshoe Road Superfund Site
LOCATION: Borough of Sayreville, Middlesex County, New Jersey
STUDY DATE: March 27-29, 2007

DESCRIPTIVE TITLE OF RECOMMENDATION:
Sample Stockpiles to Determine Disposal – Creative Idea 22
Additional Sub-sampling of Hazardous Soils – Creative Idea 24

ORIGINAL DESIGN:

Original Design called for use of the in situ results for determination of the disposal facility to which the excavated soil would be taken. This included multiplying by the grossly conservative safety factor of 20 to compare to the TCLP method assuming 100% partitioning.

RECOMMENDED CHANGE:

Implement a stockpile sampling protocol for excavated soils. Waste characterization after removal from the ground and stockpiling will give results that more accurately reflect actual conditions. The sampling procedure could be based on the presumed concentrations based on in situ sampling. The initial ex-situ sampling could be conducted on the material designated as incinerator bound. The first stockpile could be used as a pilot test to determine if there are significant changes between ex-situ and in-situ results. The results of the pilot test could be used as a decision tool to either continue or discontinue ex-situ sampling and analysis.

The initial sampling of a stockpile would be performed using four-point composites. Assuming 600 cubic yard stockpiles, the number of composite samples to be collected is about 34 (for 20,000 cubic yards). The analysis for each COC will need to be sensitive enough that the MDL multiplied by 4 still remains meaningful for decision making.

With respect to option #24, sub sampling can be performed if a stockpile 4 sample composite falls into the "incinerator-bound" category after the initial composite analysis. Subsampling should be performed by separating the pile into 4-150 yard sub-piles, each new stockpile corresponds to one of the original sampling points, and analyzing discrete sub-samples. This process is intended to characterize the waste so it can be disposed of properly. Incorrectly sending 150 cubic yards of material to be incinerated would needlessly cost the project up to $75,000 per occurrence.

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
ORIGINAL DESIGN	37,275,000		37,275,000
RECOMMENDED DESIGN	33,005,000		33,005,000
ESTIMATED SAVINGS OR (COST)	4,270,000		4,270,000

ADVANTAGES:

- Improved characterization will reduce the volume of soil inappropriately sent off site to be incinerated, rather than correctly determined to be suitable for disposal as Subtitle D or C material.
- The change will also optimize the disposal effort by changing the quantities of soil that would be handled and segregated as destined for incineration.
- By limiting the amount of soil that is selected, segregated, and manifested for incineration, the costs for disposal will be reduced.

DISADVANTAGES:

- The recommended change would raise analytical costs for the execution portion of the site work.
- The time that each soil pile is on site will be increased as a result of waiting for analytical results.
- Increases costs and level of effort to cover the soil pile while it is inactive in order to control runoff of contaminants from the soil piles.
- Increases soil handling on site before loading.

JUSTIFICATION:

Based on the conversation held during the out-briefing, EPA and COE indicated that this contingency was tacitly agreed to already. However, the data for the design and the estimates does not reflect this approach. Therefore, it was decided that this recommendation be articulated in this format as a baseline for the benefit of the customer.

VALUE ENGINEERING RECOMMENDATION # 8

Cost Item	Units	$/Unit	Source Code	Original Design		Recommended Design	
				Num of Units	Total $	Num of Units	Total $
Analytical Suite (48 hr turn)	ea	1,000.00		0	$0	68	$68,000 [1]
Sample Collection effort	hr	120.00		0	$0	100	$12,000
Reworking Soil Piles	hr	350.00		0	$0	40	$14,000
					$0		$0
					$0		$0
					$0		$0
Incineration	ton	300.00		33,180	$9,954,000	24,885	$7,465,500 [2]
Subtitle C disposal	ton	100.00		7,530	$753,000	13,942	$1,394,200 [3]
Subtitle D disposal	ton	35.00		110,100	$3,853,500	111,983	$3,919,405 [4]
					$0		$0
					$0		$0
					$0		$0
					$0		$0
					$0		$0
					$0		$0
					$0		$0
					$0		$0
Subtotal					$14,560,500		$12,873,105
Mark-up		@	156%		$22,714,380		$20,082,044
Redesign Costs							$50,000
Total					$37,274,880		$33,005,149

[1] Recommended number of units based on 33,180 tons and one composite sample per 1000 tons with a sub-sampling frequency of 20%

[2] Recommended number of units based on 25% of total tonnage being reduced to Subtitle C eligible

[3] Recommended number of units based on 75% of original estimate of 7,530 plus 25% of 33,180

[4] Recommended number of units based on adding 25% of 7,530

VALUE ENGINEERING RECOMMENDATION # 9

PROJECT: Horseshoe Road Superfund Site
LOCATION: Borough of Sayreville, Middlesex County, New Jersey
STUDY DATE: March 27-29, 2007

DESCRIPTIVE TITLE OF RECOMMENDATION:
Segregate rock from excavated soils - Creative Idea 27

ORIGINAL DESIGN:
The original design describes the methods for excavation and segregation of soils based on degree of contamination. It is also recognized that an unknown volume of debris (i.e. drum carcasses, scrap metal, etc.) exists within the excavation footprint. The debris will be separated and disposed of accordingly. However, rock, and how it is dealt with, is not specifically mentioned in the design.

RECOMMENDED CHANGE:
Recommend that the contractor institute a means to separate all rock, of a reasonable dimension, from the excavated soils. The facility that is accepting the material for incineration will be screening off the 'oversized' material prior to the incineration process. The contractor should be required to include, as a separate section in their Excavation Plan, a method describing their means for rock separation. This section should also include their method of staging and decontaminating the rock prior to placement back into the excavation.

An average cost for disposal of the rock was calculated by multiplying the expected waste stream volumes (incineration, subtitle C and subtitle D) by their associated T&D costs and dividing by the total soil volume. An assumption was made for the volume of rock that will be encountered in the excavation: one half of one percent (0.005) of the total excavation volume (147,000 tons) will contain rock that can be screened off. This equals app. 750 tons. An average disposal cost ($150/ton) was calculated utilizing the 65% cost estimate.

This VE recommendation assumes that a very small volume of separable rock exists within the excavation footprint. As the cost analysis shows, the requirement to separate this rock begins to make sense from a cost standpoint at a very low volume percentage. That being said, the possibility that no separable rock is present within the excavated soil obviously exists. If the designer (or customer) believes that this is the case, recommend inclusion of language in the Excavation Plan similar to the following:

> "As excavation of the soil commences, site personnel are encouraged to carefully observe the soils for inclusive rock. If a (predetermined) volume or percentage of rock exists within the excavated soils, the contractor shall mobilize the equipment necessary to screen off the rock for stockpiling/decontamination and, eventual backfilling."

Another way of addressing this issue: Mobilize screening equipment to the site at the project start. Screen the excavated soil and roughly calculate the volume/percentage of screened materials. The decision to retain or demobilize the screening equipment would be reached based on actual values.

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
ORIGINAL DESIGN	$187,200		
RECOMMENDED DESIGN	$70,980		
ESTIMATED SAVINGS OR (COST)	$116,220		

ADVANTAGES:

- Reduces disposal volume.
- Reduces disposal costs.
- Reduces backfill material required.
- Reduces truck traffic.
- Reduces backfill material costs.
- Saves landfill space.

DISADVANTAGES:

- Requires additional equipment.
- Requires additional handling.
- May affect production.
- May generate decon water.
- Requires space for staging.

JUSTIFICATION:

The environmental and financial (approaches $116,200) advantages of leaving the rock within the excavation far outweigh the disadvantages.

VALUE ENGINEERING RECOMMENDATION # 9

Cost Item	Units	$/Unit	Source Code	Original Design		Recommended Design	
				Num of Units	Total $	Num of Units	Total $
Disposal (average cost) of rock as separate waste streams.	ton	150		750	$112,500	0	$0
Backfill material	CY	20		375	$7,500	0	$0
Screen Rental	mo	1,500		0	$0	16	$24,000
Power washer	LS	500		0	$0	1	$500
Production delay (add a week to total duration)	day	3,000			$0	7	$21,000
					$0		$0
					$0		$0
					$0		$0
					$0		$0
					$0		$0
					$0		$0
					$0		$0
					$0		$0
Subtotal					$120,000		$45,500
Mark-up		@ 56 %			$67,200		$25,480
Redesign Costs							
Total					$187,200		$70,980

VALUE ENGINEERING RECOMMENDATION # 10

PROJECT: Horseshoe Road Superfund Site
LOCATION: Borough of Sayreville, Middlesex County, New Jersey
STUDY DATE: March 27-29, 2007

DESCRIPTIVE TITLE OF RECOMMENDATION:
Use Wetlands Mitigation Banks rather than construct wetlands on-site. Creative Idea 33

ORIGINAL DESIGN:
Original design calls for three distinct wetlands to be constructed on site totaling 0.44 acres of emergent wetlands and 2.75 acres of forested wetlands.

RECOMMENDED CHANGE:
In 1995, a document entitled "Federal Guidance for the Establishment, Use and Operation of Mitigation Banks" was issued jointly by Federal agencies. With the release of this guidance document, the concept and implementation of wetland mitigation banking has become a reality. Use of mitigation banks is fully embraced by permitting and resource agencies. In some cases, use of a mitigation bank is the preferred alternative to satisfying a permit condition.

The federal guidance document defines mitigation banking as "the restoration, creation, enhancement and, in exceptional circumstances, preservation of wetland, and/or other aquatic resources expressly for the purpose of providing compensatory mitigation in advance of authorized impacts to similar resources."

Although mitigation banks are an accepted and sometimes preferred mitigation method, the adherence to the CWA Section 404(b) (1) sequencing guidelines is required. A project must first avoid, then minimize impacts to aquatic resources including wetlands. If impacts are considered unavoidable, mitigation is often required.

Although on-site mitigation is still preferred, the federal guidance documents states, "In general, use of a mitigation bank to compensate for minor aquatic resource impacts (e.g., numerous, small impacts ...) is preferable to on-site mitigation.

This site may be eligible for purchase of wetland credits from a Mitigation Bank. In addition, the possibility could be explored with respect to whether the cost of one credit will buy the elimination of the maintenance requirements which are the greatest unknown in planning for a wetlands construction (this would be a second option to completely excising the wetland construction)..

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
ORIGINAL DESIGN	1,114,000		
RECOMMENDED DESIGN	373,000		
ESTIMATED SAVINGS OR (COST)	741,000		

ADVANTAGES:

- Guaranteed replacement of wetlands in kind from a regulatory standpoint
- Eliminates extra work associated with:
    - Completion of wetlands design after 65%
    - Construction
    - Purchase of vegetation
    - Placement and establishment of vegetation
    - 5-year review
    - Maintenance
    - Management of hydrology
    - Monitoring.

- With the second option of only eliminating the maintenance requirements *AFTER* installation
- Keeps wetland in the remedial action but eliminates:
    - Post-installation regulatory requirements
    - Hydrology management
    - Monitoring of establishment of vegetation
    - Post installation maintenance.

DISADVANTAGES:

For the first option:

- With the full elimination option the public may be unsatisfied.
- Requires more coordination with City planners.

JUSTIFICATION:

Based on the conversation held during the out-briefing, EPA indicated that there may already be one credit banked. If this is the case this site might be the ideal location to use the credit.

VALUE ENGINEERING RECOMMENDATION # 10

Cost Item	Units	$/Unit	Source Code	Original Design		Recommended Design	
				Num of Units	Total $	Num of Units	Total $
Complete Wetlands Design	ea	10,000.00		1	$10,000	0	$0 [1]
Wetlands Construction	ls	419,046.00		1	$419,046	0	$0
Maintenance and Monitoring	ls	6,067.00		1	$6,067	0	$0
					$0		$0
Wetland Bank Purchase (0.9 acre)	cred	126,300.00		0	$0	1	$126,300
					$0		$0
					$0		$0
					$0		$0
					$0		$0
					$0		$0
					$0		$0
					$0		$0
					$0		$0
					$0		$0
Subtotal					$435,113		$126,300
Mark-up		@	156%		$678,776		$197,028
Redesign Costs							$50,000
Total					$1,113,889		$373,328

[1] Recommended number of units based on 33,180 tons and one composite sample per 1000 tons with a sub-sampling frequency of 20%

[2] Recommended number of units based on 25% of total tonnage being reduced to Subtitle C eligible

[3] Recommended number of units based on 75% of original estimate of 7,530 plus 25% of 33,180

[4] Recommended number of units based on adding 25% of 7,530

VALUE ENGINEERING RECOMMENDATION # 11

PROJECT: Horseshoe Road Superfund Site
LOCATION: Borough of Sayreville, Middlesex County, New Jersey
STUDY DATE: March 27-29, 2007

DESCRIPTIVE TITLE OF RECOMMENDATION:

Consolidate Wetlands, and Revise Grading to Reduce Backfill Requirements

Revise Grading to Minimize Backfill – Creative Idea 40
Consolidate Wetlands – Creative Idea 41

NOTE: Both of the above options are in some ways exclusive of Item 33

ORIGINAL DESIGN:

- Construction of wetlands in 4 locations
- Backfill of all excavations to near surface with structural or select fill and topsoil for the last few inches

RECOMMENDED CHANGE:

Consider filling the areas to be constructed as wetlands not to the grade level but to a deeper completion elevation as allowable (#40). The deeper completion may also allow for making the wetlands contiguous (#41). This could be done especially for the forested wetland on the far north extreme of the site and the larger forested wetland in grid F7 of drawing 13. The two forested wetlands could be connected by leaving a pond between the two thereby eliminating the need to place fill in the excavations to 14 and 16 feet below grade. This would provide contiguous habitat between wetlands as well as obviate the need for approximately 17,000 cubic yards or 28,000 tons of backfill.

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
ORIGINAL DESIGN	4,744,000		
RECOMMENDED DESIGN	3,729,000		
ESTIMATED SAVINGS OR (COST)	1,015,000		

ADVANTAGES:

- Increases aerial extent of wetlands.
- Creates larger and more contiguous habitat.
- Creates area where natural siltation with fluvial deposits can occur.
- Decreases soil import requirement for backfill.

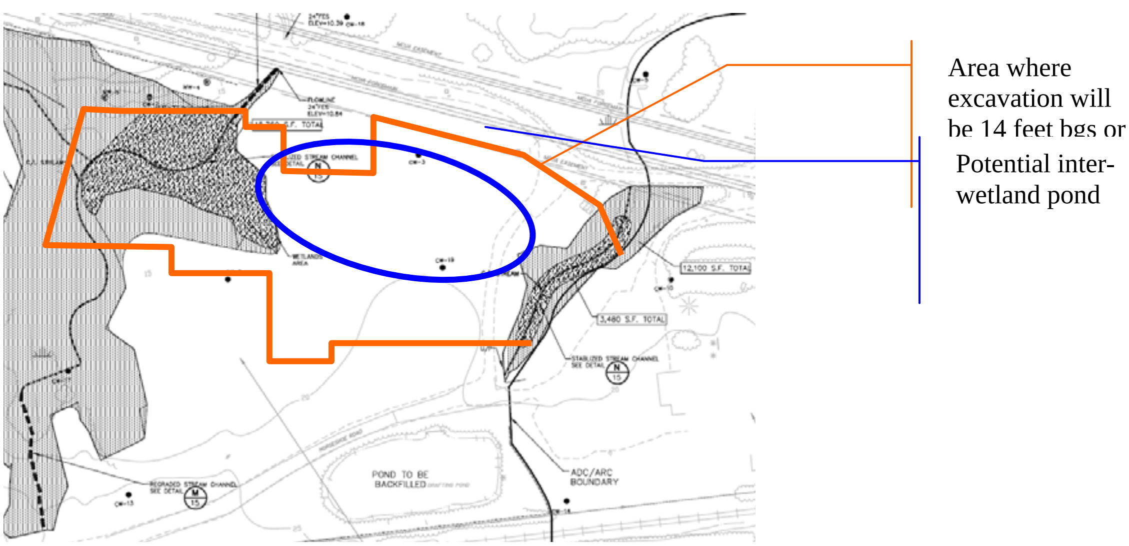
DISADVANTAGES:

For the first option:

- Smaller aerial extent of land suitable for commercial use.
- Credit is not given for open water as a wetland but there is also no net loss of the originally designed wetland.

JUSTIFICATION:

The potential for saving $1M is compelling. If it is possible to create an open water connection between wetlands without violating any wetlands construction regulations and if groundwater proves to be high enough to feed into such a feature, then the customer could consider this a viable option. See the conceptual drawing below.



VALUE ENGINEERING RECOMMENDATION # 11

Cost Item	Units	$/Unit	Source Code	Original Design		Recommended Design		
				Num of Units	Total $	Num of Units	Total $	
Import ~ 28Ktons of fill	ton	13.86		126,068	$1,747,302	98,068	$1,359,222	1
Fill Spread & Compact 17K cy	cy	1.16		84,045	$97,492	67,045	$77,772	
geotech testing	ea	26.75		12	$321	10	$256	
Nuke gauge tests	ea	45.51		175	$7,964	0	$0	
					$0		$0	
					$0		$0	
					$0		$0	
					$0		$0	
					$0		$0	
					$0		$0	
					$0		$0	
Subtotal					$1,853,080		$1,437,251	
Mark-up		@	156%		$2,890,805		$2,242,111	
Redesign Costs							$50,000	
Total					$4,743,885		$3,729,362	

[1] Recommended number of units based on 33,180 tons and one composite sample per 1000 tons with a sub-sampling frequency of 20%

[2] Recommended number of units based on 25% of total tonnage being reduced to Subtitle C eligible

[3] Recommended number of units based on 75% of original estimate of 7,530 plus 25% of 33,180

[4] Recommended number of units based on adding 25% of 7,530

VALUE ENGINEERING RECOMMENDATION # 12

PROJECT: Horseshoe Road Superfund Site
LOCATION: Borough of Sayreville, Middlesex County, New Jersey
STUDY DATE: March 27-29, 2007

DESCRIPTIVE TITLE OF RECOMMENDATION:

Reduce the Number of Analysis Used for Determining Disposal Requirements.

Creative Idea 51

ORIGINAL DESIGN:

Testing proposed for all analytes listed.

RECOMMENDED CHANGE:

Reduce the analysis to the list of COCs.

Estimated costs of stockpile sampling, not given
Estimated costs of in situ sampling, $390,000 less $162,000 fixed costs = $228,000 analytical costs (with 0.56 markup $356,000)
20 percent reduction in analytical costs $356,000 x 0.2 = $71,200.

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
ORIGINAL DESIGN			
RECOMMENDED DESIGN			
ESTIMATED SAVINGS OR (COST)	$71,200		$71,200

ADVANTAGES:

- Data Handling is reduced.
- Data Validation is reduced.
- List is easier to review.
- Paperwork is reduced.
- Time is saved.

DISADVANTAGES:

- Less information is collected for the same sampling cost.
- May require ‘buy-in’ from the State.

JUSTIFICATION:

By reducing the list of analytes to the COC list only, the sampling cost savings could be significant (estimated between 20 – 40 percent) due to the reduced calibration time and reduction in explaining the presence of tentatively identified compounds (TIC’s). Lab reporting should be limited to the COC list. Added benefits would be less time spent reviewing the refined list. Ideally, this will translate into more site efficiency. Coordination with the disposal facility should be done in advance to address application of TCLP analysis for volatiles, or if the disposal facility will accept total concentrations in lieu of TCLP. (Estimated range was based on a conversation with the EPA CLP Manager and QA Coordinator).

Cost information based on the 65% estimate, item D.20 In situ sampling.
Estimated costs of stockpile sampling, not given.
Estimated costs of in situ sampling, $390,000 less $162,000 fixed costs = $228,000 analytical costs (with 0.56 markup $356,000)
20 percent reduction in analytical costs $356,000 x 0.2 = $71,200.

VALUE ENGINEERING RECOMMENDATION # 13

PROJECT: Horseshoe Road Superfund Site
LOCATION: Borough of Sayreville, Middlesex County, New Jersey
STUDY DATE: March 27-29, 2007

DESCRIPTIVE TITLE OF RECOMMENDATION:

Reduce compaction to minimum required for an undeveloped site. – Creative Idea 53

Minimize number or eliminate density tests (performance spec). Use a test section. - Creative Idea 54

ORIGINAL DESIGN:

The project is currently at 65% design, therefore, the specifications have not been written. The designers, CDM, indicated that the standard CE specification will be used that would require compaction to 90 % or 95 % modified density. The Federal Creosote project, which was visited by this VE team as part of the study information gathering, required 95% modified density for all backfill on that project.

RECOMMENDED CHANGE:

Reduce or eliminate the compaction and density requirements. If eliminated, substitute a performance specification to obtain the minimum consolidation needed.

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
ORIGINAL DESIGN	$50,000		
RECOMMENDED DESIGN	0		
ESTIMATED SAVINGS OR (COST)	$50,000		

ADVANTAGES:

- Eliminates need for ongoing density testing.
- Could significantly increase productive, eliminates delays.
- Requires less equipment on job site.
- Decreases overall constriction duration.

DISADVANTAGES:

- There may be some surface settlement on the site after completion.
- If and when the site was developed for future light industrial use, any construction may require marginally larger footings.

JUSTIFICATION:

The backfill material that is being used at the Federal Creosote project is a very uniform granular material that is very ideal for backfill and ease of compaction. The contractor's representative that participated in this VE study indicates that the material was common imported backfill material and would likely be used for this project. At the Federal Creosote site, they are achieving 100% modified density compaction with just two passes of a smooth face roller, usually without vibration. With the ease of compaction being used, a simple performance specification, such as one or two passes, would assure adequate compaction. A performance measurement could be established early in the project thereby eliminating the need for continued density testing. This simplifies the project management and eliminates any delays and cost for densities. Also, some of the site will be developed into wetlands. These areas would require almost no compaction. If the future use is park or commons areas, very little or no compaction is needed as any future settlement would not present adverse problems.

Costs: Assume deletion of density testing LS $30,000

VALUE ENGINEERING RECOMMENDATION # 14

PROJECT: Horseshoe Road Superfund Site
LOCATION: Borough of Sayreville, Middlesex County, New Jersey
STUDY DATE: March 27-29, 2007

DESCRIPTIVE TITLE OF RECOMMENDATION:

Utilize Different soil for backfill at lower elevations.

Creative Idea 63

ORIGINAL DESIGN:

Section 2.2.6.4.2, Backfilling and Grading, of the CDM "Remedial Design Summary" states "Imported backfill material including structural fill, common fill, stones, and gravel brought to the site will be free of organic material, frozen material, rubbish, or other unsuitable materials. All material used as fill will be tested to ensure they are free from chemical contamination as defined by (NJ Cleanup Criteria)."
The CDM 65 % design estimate includes a price for imported backfill material with an approximate cost of $13.86/ton (taken from page 42).

RECOMMENDED CHANGE:

Recommend utilizing a less expensive backfill material at the lower elevations of the excavation. This material will function similarly to the originally designed material and can be placed/ compacted in a similar manner. Recommend that the contractor be required to attempt to locate a less expensive material. For the purpose of performing this estimate, 50% of the 'common' soils could be replaced and a cost of $12.00/ton was utilized (vs. the $13.86 cost listed in the estimate).
Cost savings to the project could approach $112,000.00.

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
ORIGINAL DESIGN	$908,107		
RECOMMENDED DESIGN	$796,146		
ESTIMATED SAVINGS OR (COST)	$112,000		

ADVANTAGES:

- Performance is equal.
- Installation is equal.
- Material is less expensive.

DISADVANTAGES:

- Some additional on-site coordination is necessary.
- A source would need to be located.
- An additional proctor analysis is necessary.
- Coordination of placement is necessary as it relates to the wetlands location.

JUSTIFICATION:

Use of a less expensive material at the lower elevations and/or in other areas that will not affect the wetlands construction will not affect the remedy, will not affect the installation method and will not affect the final restoration as it relates to vegetation growth.

VALUE ENGINEERING RECOMMENDATION # 14

Cost Item	Units	$/Unit	Source Code	Original Design		Recommended Design	
				Num of Units	Total $	Num of Units	Total $
'New' Backfill Material	CY	12.00		42,000	$582,120	42,000	$504,000
Additional Proctor testing	LS	350		0	$0	1	$350
Additional effort	LS	1,000		0	$0	1	$1,000
Design coordination for placement	LS	5,000			$0		$5,000
					$0		$0
					$0		$0
					$0		$0
					$0		$0
					$0		$0
					$0		$0
					$0		$0
					$0		$0
					$0		$0
Subtotal					$582,120		$510,350
Mark-up		@ 56 %			$325,987		$285,796
Redesign Costs							
Total					$908,107		$796,146

SECTION 4 -SUMMARY OF DESIGN COMMENTS

SUMMARY OF DESIGN COMMENTS	
ID # CMT #	**Design Comment / Description**
3	**REUSE STONE PRESENT ON SITE.** A significant quantity of 2-inch angular stone was placed on the site during the OU1 demolition. This stone should be used on site during the OU2 RA rather than hauled off, to reduce truck traffic and as a cost saving measure.
5, 6	**REUSE FENCE FABRIC, AND RAILROAD TRACK.** There is approximately 1300 linear feet of fence fabric on site that may be suitable for reuse. Using a cost for fabric of $13/LF (MCACES/65% estimate), the resulting savings would be $16,900. Reusing the existing 400 LF of rail, assuming it was of suitable quality would save approximately $16,000, based on a rail cost of $40/LF (RS Means and 65% estimate). Total potential savings could be nearly $33,000.
13	**REDESIGN RR SPURS TO ACCOMMODATE STOCKPILING AND LOAD OUT FROM BOTH SPURS.** The factor limiting productivity in this project is transportation and disposal of waste which has been limited to RR transport only. The current lay out shows approx 360 ft of track on the western spur and approx 260 ft of track that can be accessed for load out on the eastern spur. At 60 ft/car that allows staging for 10 cars total as designed with limited staging area on the east side. Another 120 ft of spur is available on the eastern spur but inaccessible for load out. At 90 ton/car, or about 60 cy/car, the 800 cy/day will take all available cars. Additional space needs to be made to accommodate stockpiles immediately adjacent to the tracks for both spurs so delays in train switch outs does not stop excavation or force double handling of stockpiles. The use of in situ screening and sampling in the field during excavation should be used to facilitate establishment of stockpiles adjacent to the spurs. Given the high volume of subtitle D material and the fact that the determination of subtitle D disposal will be based on pre excavation sampling, one spur could be dedicated to those stockpiles with incineration and subtitle C material staged on the other siding.
17	**DEVELOP EXCAVATIONS SO THAT THE DEEPER PORTIONS ARE EXCAVATED FIRST.** Excavations of the deeper portions of the excavation first allows the deep area to serve as a groundwater sump during the course of the excavation of the rest of that phase of excavation. Groundwater will drain via gravity from the working face to a collection sump in the low spot of the excavation. Water can be further controlled in the excavation by utilizing berms and or trenches constructed with material at the bottom of the hole as excavation proceeds. The deeper sump created in the excavation will also accommodate surface runoff in the event of large storms.

ID # CMT #	Design Comment / Description
18	**USE TREE MULCH WASTE IN THE WETLANDS.** When designing the wetlands areas, consider the incorporation of the chopped mulch resulting from the clearing and grubbing operation into the design as part of the wetlands or as part of the adjacent landscaping.
25	**USE OF REAL TIME ANALYSIS AND FIELD SCREENING FOR WASTE PILE SEGREGATION AND EXCAVATION CONTROL.** Given that waste segregation is a critical path element for this project, both in terms of excavation management and optimization of correct disposal classification, the use of real time or other field type analysis is recommended. Turn around time for these tests are often quite rapid. EPA field evaluations of PCB immunoassays showed a production rate of 10-13 samples/hr at one site. Collection and analysis of headspace samples takes only minutes though time may be required to allow the sample to sit and off-gas, especially in cold temps where heating may be required. Headspace analysis using a PID is recommended for screening for VOC as the excavation proceeds. Grab samples are taken from the excavator bucket at regular intervals when the excavation is proceeding in areas where significant changed conditions, i.e. hot spot boundaries, are expected based on prior characterization. This process will be especially useful in segregating out subtitle D level VOC contamination since the headspace readings will be very low. Likewise, soils likely to be subject to incineration should show relatively high headspace. Revision of calibration of headspace to lab analysis can be made in the field as disposal samples are analyzed. Draeger tube analysis of headspace samples may also be used though there is not likely enough value added to justify the cost. Immunoassy kits can be used to determine the presence of PAH, PCB, Lead, TCE in soil. Tests conducted by USEPA have shown that the accuracy of the PCB tests are sufficient for segregation of soils impacted by PCB under TSCA regulations. Given the need to take PCB samples in situ this test can be a valuable tool to plan lab confirmation sampling and excavation development around likely TSCA areas. Field test kits appear to be available for organochlorine pesticides (specifically DDT related of which methoxychlor is one) though information indicating they are adequate for evaluating methoxychlor to required detection limits was not found. Calibration of the assay response to actual methoxychlor concentrations in site soils, as determined by lab analysis may be required due to the non pesticide specific nature of the screening. XRF analysis can be used to refine suspected metals impacted hot spots where metals are sufficiently concentrated to potentially drive disposal requirements from subtitle D to subtitle C.

ID # CMT #	Design Comment / Description
26	**INVESTIGATE ALTERNATE INCINERATOR/DISPOSAL SITES OR USE MULTIPLE DISPOSAL SITES.** The costs reflected in the design estimate appear to be conservatively high. Vendor quotes from other sites as well as contractor provided ranges for similarly classified soils indicate T&D costs quoted in the 65% estimate may be 15 – 20 percent higher then the best available quotes.
29	**MINIMIZE SITE INFRASTRUCTURE.** Review of the cost estimate showed and excessive number of trailers and associated utility costs for the site. Shower trailers are not typically provided on level D projects. Multiple storage trailers would not be needed for a dominantly excavation project, one connex usually is sufficient. Typically two single wide trailers are sufficient for gov and contractor staff on all but the largest of projects as determined by working crew size. Reduction of the infrastructure reduces mob and demob costs, rental costs, utility hook ups and monthly utility costs.
39	**LOOK FOR OPPORTUNITIES TO REUSE EQUIPMENT IN THE GOVERNMENT OWNED INVENTORY.** Conti indicated there is surplus office equipment available at Picatinny Arsenal. The USACE Used Equipment List contains items such as a wood chipper, air monitoring stations, and some tankage that might be of use at the Horseshoe Road Site. Click on the following link to view the equipment available http://www.environmental.usace.army.mil/used_equipment.htm.
46	**ASSESS THE NEED FOR A FOUR PERCENT CONTRACTOR BOND.** The proposed contracting strategy for the Horseshoe Road Remedial Action is a cost reimbursable contract. Bond is generally not required for contracts of this type which will eliminate the cost associated with the project by $1.025 M plus markups of approximately 0.56, or a total of $1.6 M.
50	**REASSESS COST ASSIGNED TO PERMIT ACQUISITION**. Permits are not generally required on CERCLA projects though the project must meet the substantive requirements of the permit. The 65 percent design estimate indicates a level of effort to obtain permit equivalents of 2 percent of the project base cost or $512,000. This equates to over 3 man years of labor after markups are applied. Recommend reducing the amount identified by 75 percent to approximately $128,000, or $200,000 after markups. Reduction after markups (0.56) would result in a reduction in the overall cost of $600,000.

ID # CMT #	Design Comment / Description
57	**REEVALUATE WETLAND RESTORATION COSTS.** Review of the cost build up for this phase of work suggests that the associated tasks are under funded. - The planning in particular ($3,687) looked too low to effectively evaluate the existing hydrology and develop a design capable of re-attaining that condition. The maintenance allowance for the establishment period is not sufficient. - Restoration of wooded wetlands requires significant monitoring to ensure success. $6,000 does not allow for much maintenance or reporting. - The revegetation costs seem low for a combination of purchase/transport/stage and plant cost given the material costs and labor rates in NJ, and site direct and indirect charges associated with the task. - The wetland seed mix does not appear to include application. Past experience in NJ during mid 1990's had wetland hydro seeding in the $2,000 an acre range. The use of a stone lined channel as part of the wetland reconstruction should be evaluated. Use of hardened structures is most frequently necessary to protect buildings, roads etc. In a restored wetland the stream should be allowed to readjust naturally to accommodate flow and sediment load and to maintain intimate contact with the flood plain/wetland. Restricting the stream to a set channel could result in system imbalance with associated down cutting of the stream that could act as a drain on the restored wetland. Analysis of the current stream condition, gradient, sinuosity etc, is a good starting point for re-establishing the stream channel, however, following removal of the vegetation and altering the grade during site work both the runoff contribution to the stream and the sediment load will be different and the stream will need to adapt to that. The use of soft engineering such as plantings or erosion mat and soil burritos are better suited for stabilizing the stream bank in these settings and would be much cheaper than the proposed channel.

ID # CMT #	Design Comment / Description
58	**VERIFY THE OVERHEAD AND G/A RATES ARE APPROPRIATE.**
59	**REEVALUATE EXCAVATION PRODUCTION RATES.** Review of the estimate for the excavation portion of the project shows a very low production rate for the excavation. It appears that the excavation schedule has been fit into the shipping schedule. Apparently the off road haul truck has been included in the stockpile handling portion of the estimate and only one truck has been included. Increasing the number of haul trucks will increase the excavation time and facilitate faster stockpiling. With the limitation on shipping the stockpiled material will have a longer time to air dry and gravity drain which will reduce disposal tonnage and costs. Accelerated excavation will reduce field direct and indirect costs (such as oiler labor costs, excavator rental and haul road maintenance) associated with excavation that can be eliminated as soon as sufficient stockpiling has occurred to carry the current year funding. Current estimate has 150,810 tons or 100,570 cy of material for disposal. Since the haul truck hours are equivalent to combined primary and secondary excavation hours it is assumed that the disposal quantity covers both segments of removal. 1,512 hrs were provided in the estimate for the excavation of contaminated soil. 100,570 cy x 1/1512 hrs = 66.5 cy/hr per the cat book a 77k lb excavator is approximately a Cat 330 equivalent. A 2 cy bucket is specified which results in 33 bucket loads/hr to meet 66 cy/hr. The Cat cycle time is shown to be approx 30 sec or less in good to average conditions. Assuming that with the moisture and depth digging will range from average to poor cycle times of 45-60 sec can be expected. The current estimate reflects a digging efficiency of 50% or less. That efficiency should be increased to minimum acceptable levels (80%-85%) by adding additional trucks and ensuring the equipment is operated efficiently. A larger machine should be used for deeper portions of the excavation due to greater reach capabilities. The bucket capacity of a larger machine will offset the slower cycle time resulting in overall faster excavation and loading times. Again a minimum of 2-3 trucks should be thrown in the cycle for each excavator.

APPENDICES

The appendices in this report contain backup information supporting the body of the report, and the mechanics of the workshop. The following appendices are included.

CONTENTS

APPENDIX A
STUDY PARTICIPANTS

STUDY PARTICIPANTS

Workshop Attendance											
Attendees				**Participation**							
Horseshoe Road SF Site, New Jersey March 27-29, 2007				**Meetings**			**Study Sessions**				
Name	Organization and Address (Organization first, with complete address underneath)	Tel # and FAX. (Tel first with FAX underneath)	Role in wk shop	Site Visit	Mid Wk Rev	Teteph Out Brief	Day 1	Day 2	Day 3	Day 4	Day 5
Kenneth True	VE Contractor kentrue@maladon.com	402-339-1936 C 402-516-2635	Team Facilitator	X		X	X	X	X		
Tim Gallagher	USACE, Baltimore District Tim.gallagher@nab02.usace.army.mil	484-356-4312	CE, Construction	X		X	X	X	X		
Curtis Payton	USACE, Sacramento District Curtis.payton@usace.army.mil	916-557-7431	Geologist	X		X	X	X	X		
Paul Speckin	USACE, Kansas City Paul.d.speckin@usace.army.mil	816-389-3592	Geotech Engineer	X		X	X	X	X		
Lindsey Lien	USACE, HTRW CX Lindsey.k.lien@usace.army.mil	402-697-2580	Project Coordinator	X		X	X	X	X		
Thomas Mathew	CDM,	732-590-4638	AE Design Manager	X			X	X			
Andy Weber	Conti Env and Infrastructure aweber@conticorp.com	908-791-4817	RA Contractor	X			X	X			
John Hartley	USACE, Omaha, Rapid Response. John.r.hartley@usace.army.mil	402-216-4248 Geochemist	Rapid Resp.,Site Characterization	X		X	X	X	X		
Muzaffer Rahmani	CDM	732-225-7000	CI	X							
Kershu Ta	CDM	732-225-7000	CI	X							
John Osolin	USEPA	212-637-4412	RPM	X		X					
Nanci Higginbotham	USACE, Kansas City	816-389-3359	Project Manager	X		X					
Jack Murphy	Conti Env and Infrastructure	908-791-4144	RA Contractor	X							
Phil Rosewicz	USACE, CENWK	816-389-3902	Geotechnical Engineer	X							
Thomas Roche	USACE, NAP	908-243-0118	Construction Engineer	X							
Neal Kolbe	USACE, CENAP	908-243-0118	Construction Engineer	X							

Attendees Role in this workshop (column 4 of the form). Use more than one description if appropriate.
C = Consultant Cl = ClientD = Designer DM = Design Manager FM = Facility Manager FO = Facility Operator
Ob = Observer Ow = Owner PM = Project Manager PrM = Program Manager TM = Team Member U = User
Note: X = Present most of the day. O = Present part of the day Blank = not present that day.

APPENDIX B
CREATIVE IDEAS LIST

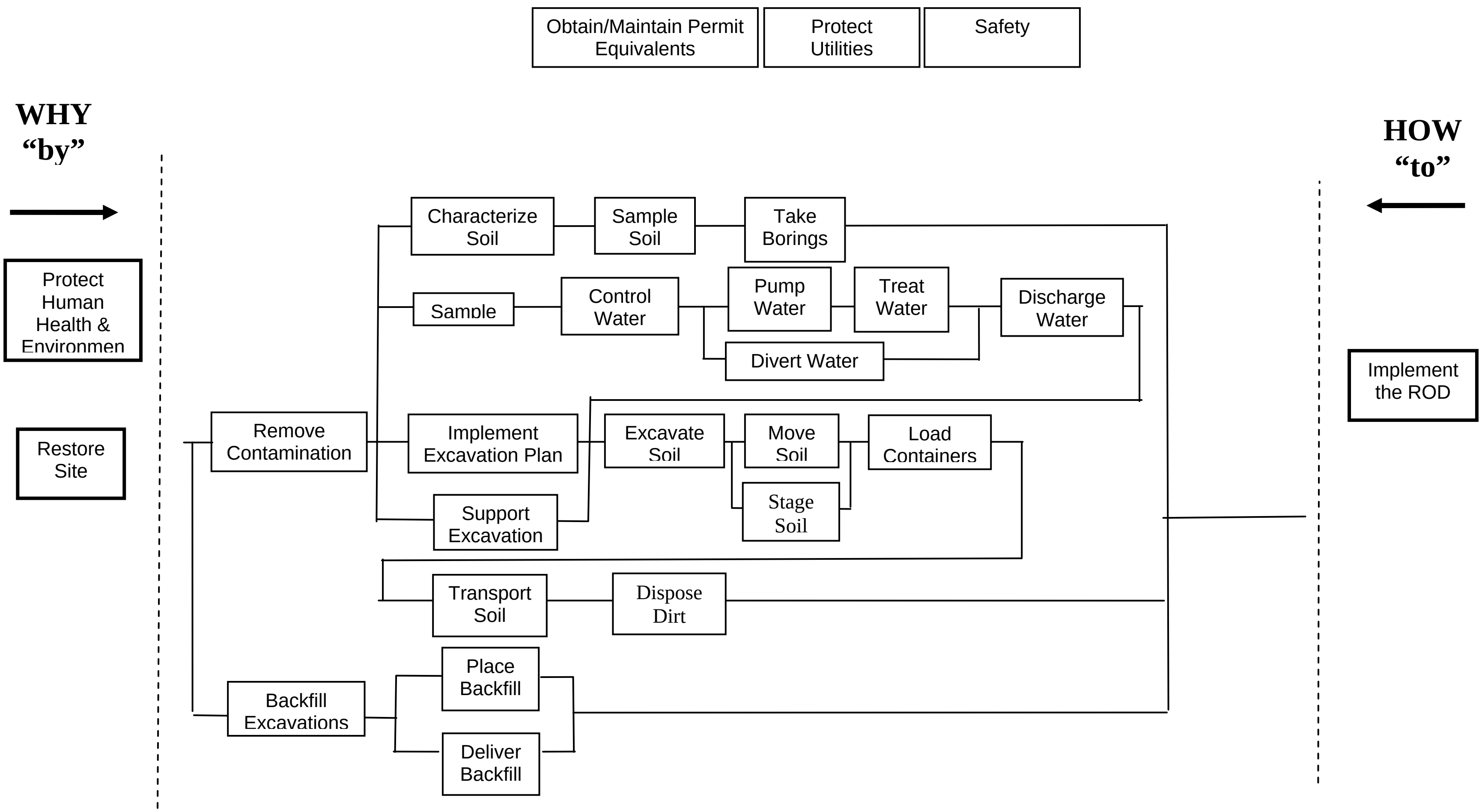
List of CREATIVE IDEAS			
Idea Category: Horseshoe Road			
ID #	**Name of Idea / description**	**Value Potential**	**To be Developed**
1	Reuse/recycle Concrete	DEV w/3	PS
2	Dewater soil dry vs. wet disposal	DEV	PS
3	Reuse Stone	DEV w/1	PS
4	Reuse soil containing contamination levels below cleanup criteria on site as backfill	DEV	PS
5	Reuse fence fabric	DC	LL
6	Reuse Rail for new Spur	DC	LL
7	Use Slag for Temporary on-site Haul Roads	DEV	JH
8	Define Truck Route on Site	E	
9	Back haul non-hazardous soil for local recycling	DEV	JH
10	Define Secondary Truck Route off Site	E	
11	Reconsider excavation support requirements for the sheeting by force mains, and railroad tracks – by excavation sequencing	DEV	JH
12	Alternate means for protecting force mains (freeze/slope)	DEV	TG
13	Access both rail spurs for load out	DC	JH
14	Reinforcing the force main	E	
15	Pre-drain site with open ditches	DEV	JH
16	Use existing slabs for stockpile areas	E	
17	Excavation from deepest excavation areas out to act as sump	DC	JH
18	Mulch Tree waste for use in wetlands	DC	LL
19	Clear trees for reuse after sampling	E	
20	Bury Root Balls on Site	DEV	TG
21	Hydro axe smaller trees	E	
22	Sample stock piles to determine disposal	DEV w/24	CP
23	Minimize hazardous disposal	E	

List of CREATIVE IDEAS			
Idea Category: Horseshoe Road			
ID #	**Name of Idea / description**	**Value Potential**	**To be Developed**
24	Additional sub sampling of hazardous piles	DEV w/22	CP
25	Optimize waste segregation using real-time soil analysis	DEV	JH
26	Investigate Alt. Incinerator/Disposal Sites and/or use Multiple Sites	DC	LL
27	Segregate Oversize Rock/Concrete/Debris	DEV w/1	TG
28	Accelerate excavation	DEV	JH
29	Minimize on-site infrastructure	DC	JH
30	Use conveyor belts in lieu of infrastructure to support trains/trucks	DEV	CP
31	Cutoff wall to minimize dewatering	DEV	PS
32	Use large augers to install large dimension sumps as opposed to wellpoints (esp. stage 3)	E	
33	Investigate mitigation banks	DEV	CP
34	Place the rail road spur on the PRP property to allow for stockpiling on PRP site – increase production costs	E	
35	Unconstrained project funding to expedite schedule versus incremental funding	E	
36	Contracting method	E	
37	Cost-reimbursable contractor purchase equipment	E	
38	Consider Field Drains for Dewatering	DEV w/	JH
39	Look for reuse opportunities of government equip (Picatinny, etc)	DEV	LL
40	Revise grading to minimize backfill	DEV w/41	CP
41	Consolidate wetlands	DEV w/40	CP
42	Stabilize (wet) soils to be disposed as incineration soils with subtitle D soils, stockpile for disposal	DEV	TG
43	Use non 40 hour trained people for transporting clean backfill to the site, esp. wetlands	E	
44	Disking/air drying area to reduce tonnage	DEV w/2	PS
45	Analyze Solar power vs. line provided electricity	E	
46	Bond not needed for a cost reimbursable contract	DC	LL

List of CREATIVE IDEAS			
Idea Category: Horseshoe Road			
ID #	**Name of Idea / description**	**Value Potential**	**To be Developed**
47	Do we need to do metals analysis if they are not COC's	DC	CP
48	Do ambient studies for metals & SVOC's (not background)	DC	CP
49	Does contract prohibit limited analysis for disposal based on the COC	DC	CP
50	Is there a $500K level of effort for permitting	DC	LL
51	Limit analyses used as drivers for disposal (VOCs?)	DEV	TG
52	Maximize direct load out from the site	E	
53	Reduce compaction to minimum required for an undeveloped site	DEV	KT
54	Minimize number or eliminate density tests (performance spec) Use a test section	DEV	KT
55	Are both spurs necessary based on the expected funding needs and related production	E	
56	Cost for all disposal rates should be re-evaluated	DC	TG
57	Wetlands costs need to be checked	DC	JH
58	Overhead/G&A should be checked	DC	LL
59	Look at Production Rates	DC	JH
60	Look at on-site lab vs. off-site lab	E	
61	Well abandonment method = drill out and tremmie from bottom of well to excavation line	DC	CP
62	Grout from bottom of well to bottom of excavation line	DC	CP
63	Consider using a common backfill material (modified mix) for placement in the lower levels of the excavation.	DEV	TG

APPENDIX C
FUNCTION ANALYSIS SYSTEM TECHNIQUE (FAST) DIAGRAM

Excavation	Remove Contamination
Disposal	Waste Disposal
Transportation	Relocate Waste
Dewater	Ease Excavation
Excavation Support	Stabilize Slope/Prevent Movement
Utility Relocate	Ease Excavation/Protect Utility
RR Spur	Transport Soil
Run On Control	Ease Excavation
Erosion Control	Protect Environment
Run Off Control	Protect Environment
Backfill	Restore Site
Stockpile Mgmt	Ease Disposal
Sampling	Characterize Site
Dewater Soil/Dry Soil	Facilitate Disposal/Reduce Cost
Excavate/Control Sampling	Optimize Excavation
Wetland Construction	Restore Environment
Rebuild Roads	Restore Roads
Slab Demolition	Ease Excavation
Clear/Grub	Ease Excavation
Treat Water	Protect Environment
Mob/Demob	Support Project
Infrastructure Control	Support Project



Function Analysis System Technique (FAST) Diagram
OU2 Horseshoe Road Superfund Site

APPENDIX D
PHOTOGRAPHS















APPENDIX E
WITHDRAWN RECOMMENDATIONS

VALUE ENGINEERING RECOMMENDATION # 10

PROJECT: Horseshoe Road Superfund Site
LOCATION: Borough of Sayreville, Middlesex County, New Jersey
STUDY DATE: March 27-29, 2007

DESCRIPTIVE TITLE OF RECOMMENDATION:

Use conveyor belts in lieu of infrastructure to support trains and trucks.

Creative Idea 30 - WITHDRAWN

ORIGINAL DESIGN:

Original Design calls for

- Haul road adjacent to railroad tracks and into site.
- Use of loaders with capacity 5 yards to transfer waste soil to cargo trains.
- Use of trucks going on site to deposit clean fill.
- A rate of one load from the loader to the train every 4 minutes.

RECOMMENDED CHANGE:

Use conveyor belts to load the trains as well as transfer the backfill soil onto the site from public right of way. This will require two conveyor belt lines composed of 100 foot modular units – 1500 feet for incoming backfill loads and 100 feet for outgoing waste soil loaded onto the trains. See attached conceptual drawing. This also includes a hopper at the input for each conveyor line and a bridge over the rail road.

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
ORIGINAL DESIGN	1,027,000		1,027,000
RECOMMENDED DESIGN	2,907,000		2,907,000
ESTIMATED SAVINGS OR (COST)	(1,880,000)		(1,880,000)

WARNING: This cost is based on a *purchase price* for the conveyor system. This is generally not done and the Contractor is instead required to depreciate the cost of the use of the equipment over the 18 month period of the job and is then allowed to resell the unit at market value. This could substantially reduce the cost of this recommendation. Therefore the cost above should be considered a worst case-outlier.

ADVANTAGES:

- Eliminates the need for a haul road onto the site.
- Eliminates the need for a road adjacent to the railroad tracks.
- Increases the loading productivity.
- Increases the backfill speed.
- Decreases likelihood of damage to plastic liner.
- Decreases traffic on site and therefore potential for accident, injury, and down time due to out-loading interfering with delivery of backfill.
- Less truck-time on site thereby reducing emissions.
- Belt can bypass obstacles like rail road and roads meaning no traffic control.

DISADVANTAGES:

- Failure of the conveyor belt causes up to 5 days of down time.
- Requires additional staff to manage and maintain the belt system.
- System may not be flexible enough to make sharp turns.
- Requires decontamination if used for outgoing loads.
- High maintenance system requiring labor devoted to the system.
- May require repositioning on a frequent basis for outgoing loads (at least 10 times per day).
- Outgoing loads may have some fall-off which will require policing.
- Requires that the Contractor performing the work purchase the conveyor unit and depreciate the capital costs rather than charge the full amount of purchase. Also requires the contractor to undertake the administrative costs of resale.

JUSTIFICATION:

Based on order of magnitude estimates by a regional manufacturer, the conveyor belt system may not be advantageous enough to justify the added costs of nearly $1.8 million (purchase basis). However, this value analysis also includes many intangibles that can be considered outside of cost. This option becomes more cost competitive as the depreciation of the conveyor system goes down. Nevertheless, even if depreciation approaches zero, this option at best costs $808,000 more than the current design.

REFERENCES:

Gralnik, Marshal. Global Equipment Marketing, Inc. Boca Raton, Florida <561-750-8662>. Personal communication. 2 April 2007. Telephone call initiated by Curtis Payton.

Smalis, Doug. Smalis Conveyors, Inc. Pittsburg, Pennsylvania <724-925-8500>. Personal communication. 3 April 2007. Telephone call initiated by Curtis Payton.