WHITE CHEMICAL COMPANY

Operable Unit 2
Superfund Site

Newark, Essex County, New Jersey

Value Engineering Screening Study
For
U.S. Army Corps of Engineers

Study Date: December 2006

Final Report

February 6, 2007

US Army
Corps of Engineers

US Environmental
Protection Agency

EXECUTIVE SUMMARY

General

The USACE HTRW Center of Expertise performed a Value Engineering Screening Study (VESS) on the White Chemical Company Superfund Site, Operable Unit Number Two, Essex County, Newark, New Jersey. The VESS was conducted at the Philadelphia District USACE Office 5 and 6 December 2006. The study included a visit to the White Chemical Site on 5 December.

The VESS is based on the principals and standards used in the Value Engineering (VE) Study process. 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 VESS is to meet the requirements of 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 VESS process accomplishes this within the existing design schedule with minimal disruption. Proposals and comments resulting from a VESS are provided to the remedial action design team within the review process schedule and can be incorporated with comments from the EPA, USACE, State, or other stakeholder.

Estimate of Construction Costs and Budget

The total projected construction cost for all the entire scope of OU-2, as identified in the ROD is $7.66 million. At the time of the VESS, the building demolition portion of the OU was nearly complete except for disposal of the rubble still on site. The OU-2 cost estimate for the soils remediation portion of the project based on the September 2005 ROD, was $5.4 million

Summary of VE Study Results

During the speculation phase of this study, 83 creative ideas were identified. Twenty-seven of these ideas were developed into VE proposals or design comments with cost implications where applicable.

Related ideas were grouped into four broader categories for development into proposals, and 11 ideas were incorporated into the report as seven comments. Costs were not identified for certain proposals that had no cost data available at the time of the VESS.

The following table presents a summary of the ideas developed into recommendations and design comments with cost implications where applicable. Cost is an important issue for comparison of VE proposals. The costs presented in this report are not based upon original design quantities because a detailed original cost estimate with quantities is not available. Cost estimates as prepared for this VESS are from 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.

SUMMARY OF PROPOSALS

PROPOSAL NO.	DESCRIPTION	POTENTIAL SAVINGS (COST)
1	Sampling Program Improvements	Not Definable
2	Water Management	$7,300
3	Soils Disposal and Reuse Issues	$25,500
4	Use of Alternative Backfill Materials On-Site	$489,000

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.

Acknowledgments
As this is one of the first studies of this kind, VESS on a HTRW 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 team members for their cooperation and to the RPM who met with the team during the on-site visit and shared her thoughts and special interests in the project.

VALUE ENGINEERING SCREENING STUDY TEAM MEMBERS

NAME	ORGANIZATION
Ken True	CVS, Contractor
Lindsey K. Lien	USACE-HTRW CX
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Ed Hanlon	USEPA HQ
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Michael Mohn	USACE CENAP
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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

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

TABLE OF CONTENTS

SECTION 1 – INTRODUCTION

This report documents the results of a value engineering screening study on the project "White Chemical Company Superfund Site, Operable Unit Number Two, Essex County, Newark, New Jersey". The VESS was conducted at the Philadelphia District USACE (United States Army Corps of Engineers) Office 5 and 6 December 2006. The study team was from the USACE HTRW Center of Expertise, and from several other USACE District offices, Environmental Protection Agency (EPA) Headquarters, 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 SAVE 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 are included to give the reader an idea of the standard Value Engineering (VE) methodology, consisting of six phases:

Information Phase: The Team studied the current conceptual design provided to the EPA on 20 November 2006 which was not approved by the EPA and was subsequently disapproved by the EPA, the ROD, Proposed Plan, portions of the Remedial Investigation, EPA criteria documents, figures, descriptions of project work, and ROD cost estimate to fully understand the project scope and required functions. A detailed cost estimate was not available at the time of the VESS to allow 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 VESS.

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 Information Phase. The FAST Diagram is included in Appendix D.

Speculation Phase: The CVS led the Team brainstorming sessions to generate ideas that could potentially 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 were divided into two categories, those that may impact the ROD, and those that did not impact the ROD. 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 at their individual offices.

Development Phase: Usually during a full VE Study more research and in-depth resolution is pursued with the entire group present to substantiate an idea. After returning to their individual offices, the VESS Team Members developed the surviving ideas into written proposals. Proposal descriptions, along with technical support documentation, and cost estimates were prepared to support implementation of ideas. Sometimes this attempt to substantiate the proposal results in the modification or even elimination of the original idea. Development generally takes the form of a written document that clearly expresses the proposed idea, usually a "Before" and "After" depiction. In addition, the VESS Team identified items of interest as Comments that were not developed as proposals. These comments follow the study proposals.

Presentation Phase: The published VE Study Report is 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 from a "standard" VE study and is therefore called a VESS. 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 considerably decreased in part to attempt to reduce costs, save or accommodate team members' schedules and/or other obligations. The proposals were developed subsequent to the 5-6 December meetings by individual team members. In any case, the results should be considered as completion of a Value Engineering Study for this site.

Boundary of the Study

This study was performed for operable unit number two (OU2) for this site. Operable unit number one, addressed chemical and drum removal and stabilization of the site, was completed several years ago. OU2 on site work has commenced and included demolition of the existing buildings on site and some site grading. The primary work left to be performed for OU2 is removal of the contaminated soils. A follow on operable unit addresses the ground water. 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 or VESS 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 White Chemical Company VESS performed on December 5 – 6, 2006. The Value Engineering Screening Study (VESS) 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 process. The White Chemical Company VESS was funded as part of a pilot program funded by HQ EPA, and coordinated by EPA Region 2 and the USACE.

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 Site, which measures 4.4 acres, is located at 660 Frelinghuysen Avenue (Block 3872, Lot 109) in the City of Newark, Essex County, New Jersey (Figure 1-1). Frelinghuysen Avenue is a major thoroughfare with significant residential, commercial, and industrial populations. An airport-support services complex is currently located north of the Site. The eastern border of the Site is adjacent to Conrail and Amtrak rail lines that serve as a major rail corridor in New Jersey. Weequahick Park (including Weequahick Lake and a golf course), a school, and several large housing complexes, high-rise senior citizen residences, and cemeteries are located within 0.4 mile to the west of the Site.

Based upon an evaluation of the various alternatives, EPA's selected remedy is Alternative S-5, Off-site Disposal, as the preferred alternative for the remediation of soils, above-ground storage tanks and buildings at the White Chemical Corporation Site. Prior to demolition, the major Site features included nine buildings, a former above ground storage tank (AST) farm (tank farm), and an underground tunnel. Five large buildings (Building Numbers 33, 34, 34A, 35 and 36), three smaller facility support buildings (Boiler Room, Pump House and Maintenance Shop), and a decontamination shed were located on the western portion of the property. The majority of these buildings were grouped around the former tank farm located near the center of the Site. As previously stated, these facilities as well as the underground tunnel that originated in the western portion of Building No. 34 that leads to the south have been investigated by EPA and demolished prior to the writing of this report.

The scope of this remediation is defined by the United States Environmental Protection Agency (EPA) September 2005 Operable Unit 2 (OU2) Record of Decision (ROD) (EPA 2005) addressing the soil remediation at the White Chemical Corporation (WCC) Superfund Site (the Site), located in the City of Newark, Essex County, New Jersey. The current cost estimate was not available at the time of the Value Engineering Screening Study (VESS) which required use of cost data found in the ROD and Proposed Plan.

Estimate of Construction Costs

The total projected construction cost for all the entire scope of OU-2, as identified in the ROD is $7.66 million. At the time of the VESS, the building demolition portion of the OU was nearly complete except for disposal of the rubble still on site. The OU-2 cost estimate for the soils remediation portion of the project based on the September 2005 ROD was $5.4 million.

SECTION 3 – VE PROPOSALS

Organization of Proposals

This section contains the complete documentation of all proposals resulting from this study. Each proposal has been marked with a unique identification number. The parent idea, or ideas from which the proposal 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 proposal. However, for tracking purposes, the original idea numbers that make up a proposal are shown within the proposal.

Each proposal 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 proposal is broken down to include write-ups for each creative idea within the proposal.

1: Sampling Program Improvements

VALUE ENGINEERING SCREENING PROPOSAL

Proposal 1 Page 1 of 3
Summary of VESS Recommendations 11, 12, 24, 30, 33, 34, 35, 37
Description: Sampling Program Improvements

DESCRIPTION:
This proposal combines and summarizes the following 10 recommendations into 3 subcategories:

1.1 Pre Construction Groundwater Investigation

Hierarchy of indentations identifies subordinate tasks/ideas to the main task/idea

- No. 11- Investigate groundwater first, prior to construction
  - No. 12- Apply the TRIAD process to sampling and analysis
    - No. 24- Use an On-Site Lab
    - No. 37- Use GeoprobeT sampling methods where possible

1.2 Perform Pre-Construction Verification Sampling

- No. 33- Perform soil verification characterization prior to construction
  - No. 30- Presample the extent of contamination prior to construction
    - No. 35- Perform porosity testing of the soils during characterization to ensure pore water is not responsible for some of the elevated concentrations at depth
  - No. 34- Separate the Contract for Soil Characterization

ORIGINAL DESIGN 1.1:
From Section 2.2.7: "… the additional post-demolition sampling data indicated that contamination extends below the groundwater table in several areas. Depending upon the final excavation cut lines; localized dewatering may be required to excavate the contaminated material below the groundwater table."

RECOMMENDED CHANGE 1.1:
Verify if groundwater is contributing wholly or in part to soil contamination. The EPA may want to consider the impact of groundwater on recent soil sampling results before committing to excavation and removal of soil below the groundwater table, especially at depths approaching 30 feet below ground surface (bgs). The present presumption is that the soil in question is a source, or potential source of groundwater contamination. The EPA may wish to validate this presumption against the concept that contamination present in the groundwater has contributed to elevated concentrations of contaminants in the soils during recent sampling events.

The EPA may wish to investigate groundwater in areas across the site where soil concentrations are elevated below the groundwater table. It appears that a geoprobe/hydropunch method can provide rapid groundwater sample collection. Analysis by an on site lab would enable the user to map the contamination data as it is acquired. A random grid with a pre-negotiated spacing could be used and followed by focused soil gas surveys. This does not have to be a large area for groundwater investigation.

On the basis of the need for undisturbed samples (see 1.2, recommendation 35) Geoprobe Sampling (#37) may be eliminated.

ADVANTAGES 1.1:
If it is determined that groundwater is the source of soil contamination, at depth, the volume of soil excavation and disposal, will result in significant time and cost savings. In addition dewatering and other associated costs (Proposal 2) will also be reduced as a result of the reduced excavation volume.

Acquisition of groundwater data will be useful for the OU-2 remedial design but it will also provide valuable information that will reduce the costs associated with the ongoing investigative work for the groundwater operable unit, OU3.

DISADVANTAGES 1.1:
The added data acquisition will increase the duration of RI/FS/RD phase.

Added data from the investigation may result in more contamination being found (not really a disadvantage but a schedule issue)

ORIGINAL DESIGN 1.2:
The original design calls for the RA contractor to collect pre-confirmation samples from the perimeters of the target excavation limits at the depths to be excavated. In addition, the RA Contractor will have no prior knowledge of the degree or lack of contamination at the perimeters of each excavation area.

No discussion has been offered in the ROD, Conceptual Design Memo, or other documents exist that explore the possibility that in some locations, the groundwater may be the source of contamination of the soil. For example, while it is fairly clear that the soil at SB-9 (at the 9-ft depth interval) is a likely source of groundwater contamination indicative of a release point, it is also likely that the soil at SJ-27 (at the 15-ft depth interval) is a result of high concentrations of VOCs in the groundwater being absorbed into the soil matrix.

There has been no porosity testing data offered that may support or refute this hypothesis. [Note: A key question is at what groundwater concentration would groundwater contaminate soils to the point that the soils would recontaminate groundwater above groundwater cleanup goals (e.g., MCLs). The state GWSCC ARAR is intended to serve as a guide to identify the correct concentrations linking soil to groundwater concentrations. A solution that EPA's RCRA program uses in its RCRA regulations is to identify K_d for contaminants at a site (i.e., the ratio of groundwater concentration to soil concentration, per contaminant, and per soil type.]

RECOMMENDED CHANGE 1.2:
Either by modification to CDM's existing contract or by means of another contract vehicle, perform sampling of the soil at the desired depth at each excavation area prior to solicitation of

the RA contract.

In addition to soil samples for environmental (VOCs) analysis, separate soil samples should be collected with a 3-inch O.D. split spoon sampler with 6-inch long by 2.5-inch diameter stainless steel sleeves. The sleeves should be preserved in the field by assuring that each sleeve is completely full before sealing with Teflon tape and plastic end caps. A minimum of 8 soil samples from each significant (i.e. water bearing) soil horizon is recommended (8 being the minimum set for statistical robustness) and each sample analyzed for vertical permeability, horizontal permeability, and porosity). The porosity can be used to identify how much groundwater is part of the saturated soil column and – on that basis - what contribution groundwater makes to overall soil sample contamination.

This suite of geotechnical tests generally costs $520 per sample or $4160 per set of 8.

ADVANTAGES 1.2:
The design can be more robust in terms of defining stopping points for excavation and more easily support the concept when put under public scrutiny.

The volume of soil requiring excavation and disposal may be reduced if it is determined that groundwater is the source of soil contamination in portions of the saturated zone.

Acquires groundwater data for use in RD for OU2 but also provides information that may be used for OU3 design.

DISADVANTAGES 1.2:
Added sampling will likely increase the duration of the RI/FS/RD phase for OU-2.

REFERENCES 1.2:
Chad Walker - Sierra Testing Labs. Telephone Communication. Sacramento to El Dorado Hills, California. 21 December 2006. Curtis Payton making inquiry.

2: Water Management

VALUE ENGINEERING SCREENING PROPOSAL

Proposal 2 Page 1 of 3
Summary of VESS Recommendations 16, 19, 41, 42 & 43
Description: Water Management

DESCRIPTION:
This proposal combines and summarizes the following five recommendations:

No. 16- Lower the groundwater table prior to excavation
No. 19- Discharge dewatering water to the city for treatment
No. 41- Excavate in wet areas during low seasonal groundwater periods
No. 42- Identify low seasonal groundwater periods
No. 43- Discharge water to the swale

Options and costs for water discharge are also presented.

ORIGINAL DESIGN:
Details regarding dewatering and discharge options are not yet included in the conceptual design, and therefore did not estimate the magnitude of the effort involved. It is assumed that dewatering may be required during any time of the year.

RECOMMENDED CHANGE:
Due to the uncertainty of the conceptual design, the following recommendations and analyses are provided to aid the project team in the development of the final design. It is assumed that excavation below the water table will be required in Area E (21 feet), Area F (27 feet), Area G (16 feet), Area K (9 feet), and Area L (10 feet). For this analysis, it is assumed that groundwater is approximately 10 feet below the ground surface.

- <u>Excavate during seasonal low groundwater periods</u>: According to the RI, the groundwater fluctuates approximately 1.5 feet seasonally. An analysis was done to see if significant reductions in dewatering would occur if excavations were performed during seasonal groundwater lows. The analysis indicates that excavating site soils during seasonal groundwater lows would **not** be a significant factor for appreciably reducing dewatering volumes from the site, and should not be considered for further development.

- <u>Dewatering by well point system</u>: A well point system is recommended to perform any dewatering for any excavation that extends deeper than 2 feet below the groundwater surface. Dewatering by this method is common to contractors, is relatively simple to install, and is flexible enough to meet site specific requirements. It should be noted that the costs for the installation and operation of a typical dewatering system can be up to $100,000 per month. Typically, well points will be required (~ every 5 feet) around the excavation perimeter. It is standard practice that the groundwater be lowered to a minimum of 2 feet below the bottom of the excavation.

- Note: If the permeability of the site soils is higher than silty sands (assumed), the quantities of dewatering and associated discharge costs could be as much as ***one order of magnitude higher.***

Rough calculations on the amount of water generated for each excavation area are as follows, (assuming silty-sands, dewatering for **3 weeks** per area):

Excavation Area	Dewatering GW Flow (gpm)	Total Gallons Discharged
E	59	1,784,000
F	17	514,000
G	35	1,058,000
K	5	151,000
L	5	151,000
Total		3,658,000

- An initial evaluation of discharge options was performed. The options shown reflect discharging water from the site with onsite treatment and discharge to the swale or discharge to the City's Wastewater Treatment Plant. From this limited evaluation, it appears that discharge to the city may be less costly. Actual costs should be verified in subsequent designs.

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
TREAT WATER ONSITE AND DISCHARGE IN SWALE (assume $4/1000 gal)	$14,600	N/A	$14,600
DISCHARGE ALL WATER TO CITY (assume $2/1000 gal)	$7,300	N/A	$7,300
ESTIMATED SAVINGS OR (COST)	$7,300	N/A	$7,300

Summary of Recommendations 16, 19, 41, 42 & 43
Description: Water Management

ADVANTAGES:

- As evaluated, discharge of site water to the City appears to be less costly than on-site treatment and surface water discharge.

- Alleviates potentially difficult negotiations/agreements with the Railroad for off-site discharge to the swale.

DISADVANTAGES:

- Agreements with the City will need to be negotiated and developed.

JUSTIFICATION:

- Results in modest cost savings to the project.

3: Soils Disposal and Reuse Issues

VALUE ENGINEERING SCREENING PROPOSAL

Proposal 3 Page 1 of 2
Summary of Recommendation 79
Description: Soils Disposal and Reuse Issues

DESCRIPTION: This proposal summarizes the following recommendation:
No. 79- Segregate uncontaminated soils/materials for reuse

ORIGINAL DESIGN:
All excavated materials are planned for offsite disposal as hazardous waste, non-hazardous waste or non-hazardous debris.

RECOMMENDED CHANGE:
Segregate materials that are suspected to be non-contaminated materials for acceptable reuse. This would most likely include concrete rubble and debris.

ADVANTAGES:
Reduces the volume of materials that must be disposed offsite with an associated cost savings and reduces the volume of clean backfill material that must be imported.

DISADVANTAGES:
Requires additional screening equipment to segregate concrete and other debris from the contaminated materials.

JUSTIFICATION:
There may be a considerable amount of clean debris within the areas of excavation for contaminated soils. The volume of materials to be disposed offsite could be reduced. The clean debris could be reused as part of the backfill of the excavated areas.

Proposal 3
Summary of Recommendation 79
Description: Soils Disposal and Reuse Issues

Cost Item	Units	$/Unit	Original Design		Recommended Design	
			Num of Units	Total $	Num of Units	Total $
Recommendation 79:						
Segregate non-contaminated						
soil/materials onsite	cy	15.00	0	$0	1,500	$22,500
Reuse non-contaminated						
materials as backfill	cy	12.00	1,500	$18,000	0	$0
Reduce material disposed						
offsite as non-haz	cy	20.00	1,500	$30,000	0	$0
Subtotal				$48,000		$22,500
Mark-up						
Redesign Costs						
Total				**$48,000**		**$22,500**

4: Use of Alternate Backfill Materials On-site

VALUE ENGINEERING SCREENING PROPOSAL

Proposal 4 Page 1 of 2
Summary of Recommendations 3, & 5
Description: Use of Alternate Backfill Materials On-Site

DESCRIPTION:
This proposal combines and summarizes the following two recommendations:

No. 3- Consider other than topsoil and seeding over select fill at the site
No. 5- Use crushed block as backfill

ORIGINAL DESIGN:
The Record of Decision document selected remedy, Alternative S-5: Excavation and Off-Site Disposal, lists “select fill” as the backfill material and “topsoil and seed” as the final surface treatment at the site.

RECOMMENDED CHANGE:
No 3: Substituting a modified mixture, such as PADOT 2-RC or similar, for the specified “select fill” as the backfill material, is recommended. The modified mixture could be delivered to the site, unloaded, spread and compacted in much the same way as the select fill material would, but at a reduced material cost.
Utilizing the ROD unit price for select fill installation, 29,154 CY at $25.00/CY, vs. an approximate $20.00/CY modified mixture installation cost; a cost savings of approximately $145,770.00 could be realized.
If the EPA chose to eliminate the need for topsoil and seeding, approximately $319,500.00 could be saved (utilizing the ROD values of $15.00/SY and a 4” installation depth).
Installing topsoil and seed as the final surface treatment would necessitate unnecessary O & M costs (app. $5,000.00/yr per the Record of Decision document). By substituting the modified mix as the final surface treatment, approximately $4,000.00/yr could be saved in O&M costs.

No 5. Use of the stockpiled rubble as a backfill material has the potential to save the project both time and money. Another reason to pursue this recommendation is because it could keep a number of trucks off the road (avoiding pollution, traffic issues, fuel usage, etc.).
A conservative estimate of the stockpiled rubble is 45,000 CF or 1,667 CY. The on-site superintendent, at the time of the VE team site visit, indicated that the stockpile had been tested in various places and that app. 50% of the test results “failed”. If this is the case, then app. 834 CY of the material is appropriate for backfilling. Use of this material, in lieu of the ROD-specified select fill, as backfill material could save the project in the following ways:

Backfill material: 834 CY @ $20.00/CY = $16,680.00. (The ROD uses ‘$25/CY’ ($20,850 total) for ‘Backfill Material’. This estimate uses $20/CY because a cost still remains ($4,170) for delivering the stockpiled rubble into the excavation and compacting it).

No disposal costs for 834 CY @ $8.00/CY = $6,672.00.

Summary of Recommendations 3 & 5
Description: Use of Alternate Backfill Materials On-Site

150 10-CY dump trucks would not be using the roads. Assume a 20-mile round trip, to and from the soil source or disposal site, and a $1.00/mile vehicle cost: $3,000.00.
There is a cost involved in segregating the pile, however. This cost would be mainly for operator and equipment. Assume 4 days of segregation @ $1,000.00/day = $4,000.00.

It is possible that the conservative value used above (50 %) is, in fact, much lower than the actual percentage of clean v. dirty material. If this is the case, the savings would only increase.

ADVANTAGES:
No. 3- Savings on materials used for backfill
Substituting a low maintenance surface for a grass covered area will reduce the cost of installation and operation and maintenance costs

No. 5- Cost savings brought about by reducing the volume of fill material purchased, disposing a smaller volume of material, and reduced transportation costs as well as reduced truck traffic in a residential area and practicing recycling/reuse.

DISADVANTAGES:
No. 3, 5 - None

SUMMARY OF COSTS ANALYSIS			
	First Cost	O & M Costs (Annual Cost)	Total LC Cost (Present Worth)
ORIGINAL DESIGN	Select Fill and Topsoil and Seed $1,095,700	$5000	
RECOMMENDED DESIGN	PADOT 2-RC or similar no topsoil & Seed, Reuse 50% demo rubble $606,400	$1000	
ESTIMATED SAVINGS OR (COST)	$489,300	$4,000/year	

SECTION 4 -SUMMARY OF DESIGN COMMENTS

SUMMARY OF DESIGN COMMENTS	
ID # CMT #	**Design Comment / Description**
2	**CHECK USED EQUIPMENT INVENTORY.** Refer to the Used Equipment List on the following link to determine if equipment is available that can be used on the White Chemical RA. http://www.environmental.usace.army.mil/used_equipment.htm
20	**SEAL UTILITY TUNNEL**. The future design should ensure that the utility tunnel located on the western property boundary is properly sealed and closed. The tunnel continues off the site, perhaps into nearby buildings. The seal should be watertight and capable of supporting anticipated soil loading from backfill materials. The location of the end of the tunnel should be noted on the as-built drawings. If necessary, the location can be marked at the surface with a monument.
22, 27	**CAREFULLY EVALUATE CONTRACTING METHODS.** The Value Engineering study team recommends that the RA design team consider all available contracting mechanisms and selects an appropriate mechanism consistent with the risks inherent in the final design documents. Contract mechanisms span the spectrum from fixed-price, sealed-bid through unit-price, to cost-reimbursement. Fixed-price, sealed-bid contracts are most appropriate for contracts where the scope is well defined and, thus, cost risk is lower. A well-defined scope provides the contractor with sufficient information upon which to prepare a bid price with minimal risk that the ultimate cost of performance will exceed the bid price. The fixed-price provides the government with the benefit of price competition, which will result in the government receiving the final product at the lowest reasonable cost. A fixed-price contract also provides the contractor with incentive to be efficient, because higher efficiency will result in greater profit. Fixed-price contracts are not appropriate for work with poor scope definition. The uncertainties in a project with a poorly defined scope prevent a contractor from reasonably pricing the work, raising the possibility of claims and significant government effort to address contract changes as the scope changes during the work. Cost-reimbursable contracts are most appropriate for projects with poor or broad scope definition. Cost-reimbursement contracts relieve the contractor from cost risks associated with the poorly defined scope. The contractor receives payment for his actual cost of performing the work, plus a fixed fee (profit) for undertaking the work. Cost reimbursement contracts protect the government from excessive bids that result from contractors adding contingencies to protect themselves from the unknown aspects of the project scope. However, some of this cost benefit is offset by additional costs the government incurs to manage the cost-reimbursement contract. Because the cost-reimbursement contract places the cost risk on the government, the government must play a more active role in day-to-day management of site activities. Between the two extremes lies a unit-price contract. A unit-price contract transfers the cost risk of scope growth from the contractor to the government, but leaves the cost risk for the nature of work with the contractor. The contractor has incentive to be efficient in his operations because he maximizes his profit on each unit of work he performs. In addition, the contractor's price, if the government obtains the price through competition, will reflect the lowest reasonable price per unit of work because

SUMMARY OF DESIGN COMMENTS	
ID # CMT #	**Design Comment / Description**
	The government accepts the risk of the uncertain final quantity. The government's management of the work is simpler because the government need only verify quantities of work performed. However, under a unit-price contract, the government carries the risk of excessively compensating the contractor if the unit price contains a significant profit margin and quantities of work grow excessively. The designer may consider other contracting mechanisms that blend aspects of these three basic types. On a continuum from least cost risk to the government to greatest cost risk to the government the mechanisms are: 1. Firm fixed price, sealed bid 2. Firm fixed price, sealed bid, with unit price bid items. 3. Firm fixed price, negotiated 4. Firm fixed price, negotiated, with unit price line items. 5. Unit price contract, sealed bid 6. Unit price contract, negotiated 7. Time and materials 8. Cost reimbursable, award fee 9. Cost reimbursable As the project currently stands, a number of risk factors appear, including depth of excavation, necessity for dewatering, quantity of dewatering, extent of debris, and final horizontal extent of excavation. Considering the status of the project at the time of review, the study team believes a cost-reimbursable contract to represent the most appropriate approach to the work. However, as the design of the remedy continues, the scope becomes better defined, and performance risk declines, other contract mechanisms may be more appropriate.
23	**BRING RA CONTRACTOR ON BOARD ASAP.** It is recommended that the EPA consider bringing a Remedial Action Contractor on board as quickly as is practical. The primary goal for this action is to obtain soil samples in a timely manner so that excavation plans, staging, and ultimate disposal options can be better defined. It appears that the need to obtain and analyze additional soil samples is on the critical path for the project (refer to the November 2006 Design Memorandum).
31, 32, 36	**REQUIRE AN EXCAVATION PLAN.** It is recommended that the remediation contractor be responsible for designing an efficient system for excavating and loading out the contaminated soils. It is further recommended that this design be part of a formal submission (an 'Excavation Plan' as part of the overall Work Plan, perhaps) that would require Government approval. The excavation plan should include a section on "Backfilling and Compaction", which should include information on soil type, ideal moisture content, density requirements, lift thicknesses, compaction equipment, and etc. If it is determined that cost savings are a high priority on this site, the contractor could be required to demonstrate (by constructing a 'test pad', perhaps) that the proper compaction of the material is being achieved utilizing specific construction methods. The compaction of the materials could be verified with the appropriate equipment for this purpose (i.e. Troxler gauge). During the overall backfilling operations, proper QA would ensure that these construction methods were being followed. This could reduce

SUMMARY OF DESIGN COMMENTS	
ID # CMT #	**Design Comment / Description**
	the need for a (third party?) compaction testing contractor, thus, reducing the contract costs.
70	**INITIATE IC PLAN.** The VE Study Team recommends beginning the development of an Institutional Control Plan so that appropriate deed restrictions and other institutional controls can be readily implemented at the end of the remedial action.
81	**The EPA may want to consider using in-situ confirmation sampling/direct load and haul, versus soil excavation stockpiling, sampling, and disposal.** The original design calls for use of in-situ soil sampling of soils in lieu of post-excavation sampling. The in-situ soil sampling can be performed in a way that the samples could also be analyzed to satisfy waste profiling and segregation for offsite disposal. It is expected that this would require TCLP analyses to the in-situ sampling plan instead of collecting samples from stockpiles. This suggestion could allow pre-identification of which excavation areas contain hazardous wastes or non-hazardous wastes. Then the materials could be direct loaded into the appropriate trucks for transportation to the appropriate disposal facility without stockpiling materials into separate piles, a concern on this size-constrained site. This would eliminate working around stockpiles for long periods of time on a small site with numerous open excavations present as the project proceeds. The original conceptual design already includes plans to backfill excavations immediately after they are opened but open pits will exist for a short period awaiting post-excavation sampling. The site size constraints will be become more of an issue as the final excavations progress, and the lack of contaminated areas for stockpiles. This comment may provide more benefit in project logistics than in cost, but it is possible as much as $100,000 could be saved in reduced project duration due to elimination of delays working around site obstacles (stockpiles).

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

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APPENDIX B
SPECULATION & ANALYSIS LIST

SPECULATION LIST

E evaluate idea **D** deleted idea **CMT** comment **1,2,3,4 =** Proposal Number

List of Creative Ideas			
Idea Category: White Chemical Company 12 06 2006			
ID #	**Name of Idea / description**	**Value Potential**	**Final Status**
1	Buy vs. rent equipment	D	D
2	Look at surplus equip	E	CMT
3	Consider other than topsoil/seed – Crusher run	E	4
4	Pave the site	E	D
5	Use crushed block as backfill	E	4
6	Reuse site rubble as topping	E	D
7	Reuse rubble as road base for site entry	E	D
8	Use rubble as road base for drainage control	E	D
9	Negotiate out of state disposal	E	D
10	Change soil cleanup goals Table 6	E	D
11	Investigate GW first – before construction	E	1
12	Apply triad to sampling and analysis	E	1
13	Excavate in saturated zone w/bucket auger	E	D
14	Excavate in saturated zone w/vac truck	D	D
15	Segregate crushed material for use in drain wall	D	D
16	Lower ground water table prior to excavation	E	2
17	Use dewatered water for dust control	D	D
18	Treat with biopond	D	D
19	Discharge to city	E	2
20	Seal off utility tunnel	E	CMT
21	Buy Stack	D	D
22	Competitively bid contract	E	CMT
23	Get contractor on board now	E	CMT

SPECULATION LIST

E evaluate idea **D** deleted idea **CMT** comment **1,2,3,4 =** Proposal Number

List of Creative Ideas			
Idea Category: White Chemical Company 12 06 2006			
ID #	**Name of Idea / description**	**Value Potential**	**To be Developed**
24	On-site lab	E	1
25	Immunoassay	D	D
26	Over excavate	D	D
27	Unit price the contract	E	CMT
28	Propane Powered Hauling Trucks	D	D
29	Direct Load to waste site	D	D
30	Designer pre sample	E	1
31	Load trucks at street with conveyor belt	E	CMT
32	Backfill with granular material to minimize compaction	E	CMT
33	Soil characterization/verification up front	E	1
34	Separate Contract for Soil Characterization	E	1
35	Porosity test on soil during characterization	E	1
36	Reduce backfill compaction requirement	E	CMT
37	Geoprobe sampling	E	1
38	ID materials that can be reused for GW remedy – gran mtls	D	D
39	Define GW remedy before doing final OU2 soil RA design	E	D
40	Meet permit equivalents	D	D
41	Excavate during seasonal low ground water periods	E	2
42	Identify low seasonal ground water periods	E	2
43	Discharge water to swale	E	2
44	Conveyor belt to transfer station	D	D
45	Look at bigger trucks for soil	E	D
46	Build haul road to transfer facility	D	D

SPECULATION LIST

E evaluate idea **D** deleted idea **CMT** comment **1,2,3,4 =** Proposal Number

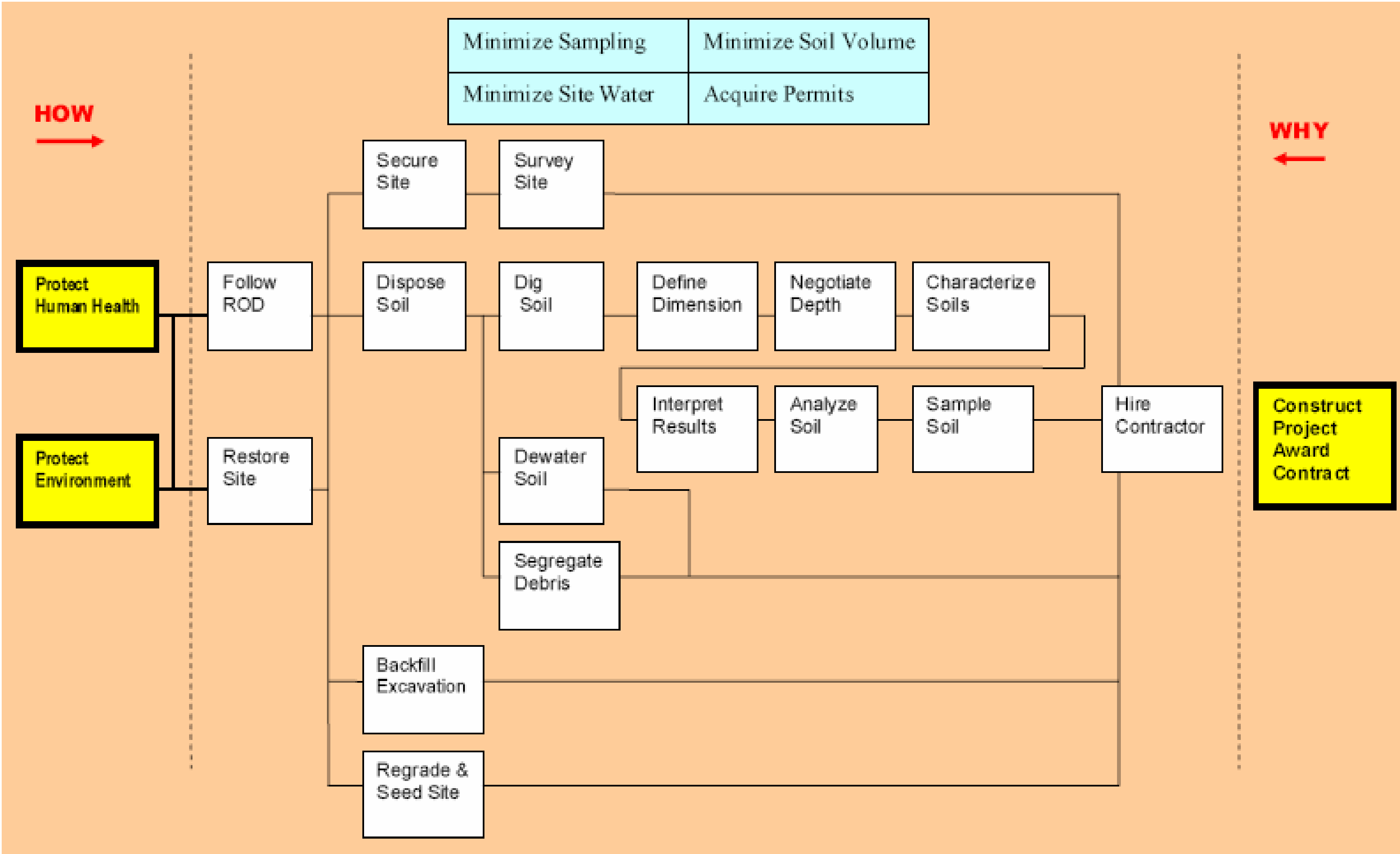
List of Creative Ideas			
Idea Category: White Chemical Company 12 06 2006			
ID #	**Name of Idea / description**	**Value Potential**	**To be Developed**
47	Buy out to the city	D	D
48	Build on site landfill	D	D
49	Buy adjacent properties	D	D
50	Investigate vapor intrusion off site	E	D
51	Identify the true pollution/site dimensions beyond the fence	E	D
52	Recycle the stack	D	D
53	Perform air monitoring on site	D	D
54	Reconsider Use of SVE for Soils	E	D
55	Soil gas sampling	D	D
56	In Situ stabilization	E	D
57	Bioremediation	D	D
58	Hot Spot remediation in lieu of excavation – ISCO	E	D
59	In situ vitrification below ground water	D	D
60	Ex-situ stabilization	D	D
61	Phytoremediation	D	D
62	Address Sample Grid 30 x 30	E	D
63	Address Random vs. Bias Sampling	E	D
64	Establish overall Site Remediation Schedule OU2 and OU3	E	D
65	Establish Schedule for OU2	E	D
66	Link Schedule sequence for OU2 and OU3	E	D
67	Waive GWSCC impact to GW to soil criteria	E	D
68	Correlate lab results with real time results	D	D
69	Dig to 2’ only for industrial use	E	D

SPECULATION LIST

E evaluate idea **D** deleted idea **CMT** comment **1,2,3,4 =** Proposal Number

List of Creative Ideas			
Idea Category: White Chemical Company 12 06 2006			
ID #	**Name of Idea / description**	**Value Potential**	**To be Developed**
70	Define deed restrictions	E	CMT
71	Find beneficial use contaminated materials roads/railroads	E	D
72	Treat soil on site and haul off (2000 cy)	E	D
73	Charge Essex county for added costs of their staging fac	D	D
74	Improve public relations about the site	D	D
75	Consider other uses than commercial uses	D	D
76	Clarify what the ROD says	E	D
77	Radio controlled plane for topo survey	E	D
78	Use common fill vs. select	E	D
79	Segregate uncontaminated soil for reuse	E	3
80	Direct Load soil vs. stockpile	D	D
81	Do cost comparison between in-situ confirmation sampling & direct haul vs. stockpile and sample for TCLP	E	CMT
82	Clarify what Oct 16 – Oct 19 2006 memo ART ROD	E	D
83	Consider Asphalt Cover for Containment	E	D

<u>APPENDIX C</u>
FUNCTION ANALYSIS SYSTEM TECHNIQUE (FAST) DIAGRAM



Function Analysis System Technique (FAST) Diagram – White Chemical Co.

APPENDIX D
PICTURES

PICTURES

White Chemical Company Superfund Site
Newark, Essex County, New Jersey

Pictures taken December 05, 2006


DANGER
NOTICE
UNAUTHORIZED PERSONS KEEP OUT
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