Final Report

Pilot Region-Based Optimization Program for Fund-Lead Sites in EPA Region 3

Site Optimization Tracker: Saunders Supply Company Superfund Site Chuckatuck, Pennsylvania

EPA Region III

Solid Waste and
Emergency Response
(5102P)

EPA 542-R-06-006l
December 2006
www.epa.gov

Pilot Region-Based Optimization Program for Fund-Lead Sites in EPA Region 3

Site Optimization Tracker: Saunders Supply Company Superfund Site Chuckatuck, Pennsylvania

EPA Region III

Site Optimization Tracker:

Saunders Supply Company Superfund Site
Chuckatuck, Virginia

EPA Region III

December 30, 2005

SECTION 1:

CURRENT SITE INFORMATION FORM

Date: 12/30/05 Filled Out By: GeoTrans, Inc.

A. Site Location, Contact Information, and Site Status

1. Site name	2. Site Location (city and State)	3. EPA Region
Saunders Supply Company	**Chuckatuck, VA**	**3**

4a. EPA RPM	5a. State Contact
Andy Palestini	**Thomas Modena**
4b. EPA RPM Phone Number	5b. State Contact Phone Number
215-814-3233	**804-698-4183**
4c. EPA RPM Email Address	5c. State Contact Email Address
palestini.andy@epa.gov	**tmodena@deq.state.va.us**

5. Is the ground water remedy an interim remedy or a final remedy? Interim ☐ Final ☒

6. Is the site EPA lead or State-lead with Fund money? EPA ☒ State ☐

B. General Site Information

1a. Date of Original ROD for Ground Water Remedy	1b. Dates of Other Ground Water Decision Documents (e.g., ESD, ROD Amendment)
09/30/1991	**ROD Amendment - 09/27/1996**
2a. Date of O&F	2b. Date for transfer to State
06/01/1999	**06/01/2009**

3. What is the primary goal of the P&T system (select one)?	4. Check those classes of contaminants that are contaminants of concern at the site.
☐ Contaminant plume containment	☐ VOCs (e.g., TCE, benzene, etc.)
☐ Aquifer restoration	☒ SVOCs (e.g., PAHs, PCP, etc.)
☒ Containment and restoration	☒ metals (e.g., arsenic, chromium, etc.)
☐ Well-head treatment	☐ other

5. Has NAPL or evidence of NAPL been observed at the site? Yes ☒ No ☐

6. What is the approximate total pumping rate? **1 gpm**

7. How many active extraction wells (or trenches) are there?	**4**	8. How many monitoring wells are regularly sampled?	**11**
9. How many samples are collected from monitoring wells or piezometers each year? (e.g., 40 if 10 wells are sampled quarterly)	**44**	10. How many process monitoring samples (e.g., extraction wells, influent, effluent, etc.) are collected and analyzed each year? (e.g., 24 if influent and effluent are sampled monthly)	**64**

11. What above-ground treatment processes are used (check all that apply)?

☐ Air stripping	☒ Metals precipitation
☒ Carbon adsorption (liquid phase only)	☐ Biological treatment
☒ Filtration	☐ UV/Oxidation
☐ Off-gas treatment	☐ Reverse osmosis
☐ Ion exchange	☐ Other

12. What is the approximate percentage of system downtime per year? 10% ☒ 10 - 20% ☐ >20% ☐

C. Site Costs

1. Annual O&M costs

O&M Category	Actual[1] Annual Costs for FY04	Estimated[2] Annual Costs for FY05	Estimated[2] Annual Costs for FY06
Labor: project management, reporting, technical support	**$22,900**	**$22,000**	**$22,000**
Labor: system operation	**$30,900**	**$30,000**	**$30,000**
Labor: ground water sampling	**$34,200**	**$34,000**	**$22,000***
Utilities: electricity	**$2,000**	**$2,000**	**$2,000**
Utilities: other	**$500**	**$500**	**$500**
Consumables (GAC, chemicals, etc.)	**$600**	**$600**	**$600**
Discharge or disposal costs	**$0**	**$0**	**$0**
Analytical costs	**$27,000****	**$27,000****	**$20,000****
Other (parts, routine maintenance, etc.)	**$200**	**$200**	**$200**
O&M Total	**$118,300**	**$116,300**	**$97,300**

The O&M total should be equal to the total O&M costs for the specified fiscal years, including oversight from USACE or another contractor. For costs that do not fit in one of the above cost categories, include them in the "Other" category. If it is not possible to break out the costs into the above categories, use the categories as best as possible and provide notes in the following box.

2. Non-routine or other costs	**$3,800**	**$3,500**	**$43,500*****

Additional costs beyond routine O&M for the specified fiscal years should be included in the above spaces. Such costs might be associated with additional investigations, non-routine maintenance, additional extraction wells, or other operable units. The total costs billed to the site for the specified fiscal years should be equal to the O&M total plus the costs entered in item 2.

Notes on costs:

1. Costs, with the exception of the analytical costs, were provided by the RPM.

2 FY05 and FY06 costs were estimated by the ROET based on the RPM projections and discussions during the optimization follow-up meetings.

* Decrease in ground water sampling labor reflects the expectation that the site team will reduce the ground water monitoring frequency as indicated in the optimization evaluation.

** Analytical costs were estimated by the ROET based on the sampling program. The analytical costs are not incurred by the EPA site team because the samples are analyzed by the CLP program. However, analytical costs similar to those estimated by the ROET, will likely be incurred by the State when the site is transferred to the State after LTRA. The decrease from FY05 to FY06 reflects the above-mentioned sampling reduction.

*** The additional $40,000 in non-routine costs projected for FY06 assumes that the site team will implement recommendations from the optimization evaluation.

D. Five-Year Review

1. Date of the Most Recent Five-Year Review	**12/29/2004**

2. Protectiveness Statement from the Most Recent Five-Year Review

☐ Protective	☐ Not Protective
☒ Protective in the short-term	☐ Determination of Protectiveness Deferred

3. Please summarize the primary recommendations in the space below

1. Determine the extent of contamination east of MW-20S/21D well nest. Results will be analyzed to determine if additional ground water recovery wells are needed to capture a larger plume and whether additional monitoring wells are needed east of the MW-20S/21D well nest.

2. Determine whether contaminants in the Yorktown aquifer are being controlled by the existing extraction system. Results will be analyzed to determine if additional ground water recovery wells are needed to remediate the Yorktown aquifer plume.

3. Institutional controls restricting using the Columbia and Yorktown aquifers as a source of ground water must be implemented for the Kelly property.

E. Other Information

If there is other information about the site that should be provided please indicate that information in the space below. Please consider enforcement activity, community perception, technical problems to be addressed, and/or areas where a third-party perspective may be valuable.

Saunders Supply Company is approximately 400 feet from Godwins Millpond, which is used by the city of Suffolk as one of their sources of drinking water. The city, on their own initiative, sample several of the EPA monitoring wells monthly because of their obvious concern that their drinking water source does not become contaminated.

SECTION 2:

FOLLOW-UP HISTORY AND SUMMARIES

Note: Follow-up summaries are provided in reverse chronological order and include updated and/or new recommendations.

FOLLOW-UP HISTORY

Date of Original Optimization Evaluation	February 10, 2005 (Evaluation meeting) July 29, 2005 (Final Report)

	Meeting Date	Report Date	Item
X	July 13, 2005	July 29, 2005	Follow-Up #1 (conducted as part of pilot project)
X	November 7, 2005	December 30, 2005	Follow-Up #2 (conducted as part of pilot project)
			Follow-Up #3
			Follow-Up #4
			Follow-Up #5
			Follow-Up #6
			Follow-Up #7
			Follow-Up #8

"x" in box indicates the item has been completed

SUMMARY OF FOLLOW-UP #2

Site or System Name	Saunders Supply Company Superfund Site
Date of This Follow-Up Summary	December 30, 2005
Date of Follow-Up Meeting or Call (Indicate if Meeting or Call)	November 7, 2005 – Meeting

ROET MEMBERS CONDUCTING THE FOLLOW-UP EVALUATION:

Name	Affiliation	Phone	Email
Norm Kulujian	U.S. EPA Region 3	215-814-3130	kulujian.norm@epa.gov
Kathy Davies	U.S. EPA Region 3	215-814-3315	davies.kathy@epa.gov
Eric Johnson	U.S. EPA Region 3	215-814-3313	johnson.eric@epa.gov
Peter Schaul	U.S. EPA Region 3	215-814-3183	schaul.peter@epa.gov
Peter Rich	GeoTrans, Inc.	410-990-4607	prich@geotransinc.com
Rob Greenwald	GeoTrans, Inc.	732-409-0344	rgreenwald@geotransinc.com
Doug Sutton	GeoTrans, Inc.	732-409-0344	dsutton@geotransinc.com
Steve Chang	U.S. EPA OSRTI	703-603-9017	chang.steven@epa.gov

SITE TEAM MEMBERS (INCLUDING CONTRACTORS) INTERVIEWED

Name	Affiliation	Phone	Email
Andy Palestini	U.S. EPA Region 3 (RPM)	215-814-3199	Andy.Palestini@epa.gov

IMPLEMENTATION STATUS OF ALL RECOMMENDATIONS UNDER CONSIDERATION BUT NOT PREVIOUSLY IMPLEMENTED

Recommendation	**E-2.1 Prepare a Document that Clearly States and Illustrates the Conceptual Model**		
Recommendation Reason	Protectiveness	**Implementation Status**	Planned
Comments: The site team is planning to implement this recommendation. A round of monitoring with a modified sampling technique has been conducted in response to a recommendation provided during the previous follow-up meeting. Favorable results from this sampling would have suggested that the contamination was immobile and would not merit continued operation of the P&T system. However, the results were not favorable, and the site team will now proceed with improving the site conceptual model and implementing the recommendations from the optimization evaluation.			

Recommendation	**E-2.2 Conduct a Preliminary Capture Zone Analysis**		
Recommendation Reason	Protectiveness	**Implementation Status**	In progress
Comments: Progress toward implementing this recommendation was delayed while the site team was collecting the samples discussed in association with Recommendations E-2.1 and F1-1. Now that the results suggest the continued need for P&T, the site team is proceeding with this recommendation.			

Recommendation	**E-2.3 Potentially Consider Additional Monitoring Points**		
Recommendation Reason	Protectiveness	**Implementation Status**	Will not be implemented
Comments: The site team will not be able to install the additional monitoring points suggested by the ROET due to inaccessible terrain. The site team will need to evaluate capture through other lines of evidence.			

Recommendation	**E-3.1 Reduce Monitoring Well Sampling Frequency**		
Recommendation Reason	Cost Reduction	**Implementation Status**	In progress
Comments: Progress toward implementing this recommendation was delayed while the site team was collecting the samples discussed in association with Recommendations E-2.1 and F1-1. Now that the results suggest the continued need for P&T, the site team is proceeding with this recommendation.			

Recommendation	**E-4.1 Improve Annual O&M and Monitoring Reports**		
Recommendation Reason	Technical Improvement	**Implementation Status**	In progress
Comments: Progress toward implementing this recommendation was delayed while the site team was collecting the samples discussed in association with Recommendations E-2.1 and F1-1. Now that the results suggest the continued need for P&T, the site team is proceeding with this recommendation.			

Recommendation	**E-5.1 Base Remedy Path Forward on Findings from Implementing the Above Recommendations**		
Recommendation Reason	Site Closeout	**Implementation Status**	In Progress
Comments: Progress toward implementing this recommendation was delayed while the site team was collecting the samples discussed in association with Recommendations E-2.1 and F1-1. Now that the results suggest the continued need for P&T, the site team is proceeding with this recommendation.			
Recommendation	**F1-1 Conduct Monitoring with Revised Sampling Technique**		
Recommendation Reason	Site Closeout	**Implementation Status**	Implemented
Comments: The site team conducted two rounds of monitoring with the suggested sampling technique. The results confirmed that contamination is present above standards in the aqueous phase, confirming the need to continue the P&T remedy. The site team is proceeding with implementation of the other recommendations.			

Key for recommendation numbers:

- *E denotes a recommendation from the original optimization evaluation*
- *F1, F2, etc. denote recommendations from the first, second, etc. follow-up meeting*
- *The number corresponds to the number of the recommendation as stated in the optimization evaluation or follow-up summary where the recommendation was provided*

RECOMMENDATIONS PREVIOUSLY IMPLEMENTED OR THAT WILL NOT BE IMPLEMENTED

None.

OTHER CHANGES, UPDATES, OR SIGNIFICANT FINDINGS SINCE LAST FOLLOW-UP

- The site team was previously considering in-situ chemical oxidation; however, after further internal consideration among the site team and discussion with the ROET, the site team believes that an in-situ chemical oxidation application will not provide a noticeable benefit to the site in terms of reducing operating costs or shortening the time to cleanup. The site team is therefore no longer considering in-situ chemical oxidation.

NEW OR UPDATED RECOMMENDATIONS FROM THIS FOLLOW-UP

- None.

SUMMARY OF FOLLOW-UP #1

Site or System Name	Saunders Supply Company Superfund Site
Date of This Follow-Up Summary	July 29, 2005
Date of Follow-Up Meeting or Call (Indicate if Meeting or Call)	July 13, 2005 – Meeting

ROET MEMBERS CONDUCTING THE FOLLOW-UP EVALUATION:

Name	Affiliation	Phone	Email
Norm Kulujian	U.S. EPA Region 3	215-814-3130	kulujian.norm@epa.gov
Peter Schaul	U.S. EPA Region 3	215-814-3183	schaul.peter@epa.gov
Kathy Davies	U.S. EPA Region 3	215-814-3315	davies.kathy@epa.gov
Peter Rich	GeoTrans, Inc.	410-990-4607	prich@geotransinc.com
Rob Greenwald	GeoTrans, Inc.	732-409-0344	rgreenwald@geotransinc.com
Doug Sutton	GeoTrans, Inc.	732-409-0344	dsutton@geotransinc.com

SITE TEAM MEMBERS (INCLUDING CONTRACTORS) INTERVIEWED

Name	Affiliation	Phone	Email
Andy Palestini	U.S. EPA Region 3 (RPM)	215-814-3199	Andy.Palestini@epa.gov
Bernice Pasquini	U.S. EPA Region 3 (Hydro)	215-814-3326	pasquini.bernice@epa.gov

IMPLEMENTATION STATUS OF PREVIOUSLY IDENTIFIED RECOMMENDATIONS

Recommendation	2.1 Prepare a Document that Clearly States and Illustrates the Conceptual Model		
Recommendation Reason	Protectiveness	**Implementation Status**	Planned
Comments: The site team is planning to implement this recommendation, but a round of monitoring conducted with a modified sampling technique will be conducted before the document is prepared. During the followup meeting Region 3 identified that the variable results for metals are likely due to sampling the wells with a bailer, fixing the samples for preservation, and then filtering at the lab for analysis of dissolved concentrations. At this site in particular, the sampling with bailers is likely yielding turbid samples, and the fixative is likely dissolving adsorbed metals prior to the filtration and analysis. Therefore, although the intent is to measure dissolved concentrations, the sampling and analysis procedures are likely yielding total concentrations. The dissolved metals concentrations are likely much lower than historic sampling has suggested, and the same phenomena is likely affecting the PCP sampling as well (as suggested in the evaluation report). The sampling technique for the site will likely be revised to low-flow sampling with a peristaltic pump and in-line filter for both metals and PCP. At least two rounds of sampling will be conducted with the revised sampling technique before making any decisions regarding a modification to the remedy. If the monitoring results indicate that the plume is immobile due to contamination being absorbed to solids rather than dissolved in ground water, P&T may not be necessary.			

Recommendation	2.2 Conduct a Preliminary Capture Zone Analysis		
Recommendation Reason	Protectiveness	**Implementation Status**	Delayed
Comments: The implementation of this recommendation is contingent on the results of the sampling and site conceptual model development discussed in the follow-up of Recommendation 2.1. At least two rounds of sampling will be conducted with the revised sampling technique before making any decisions regarding a modification to the remedy. If the monitoring results (using a revised sampling technique) indicate that the plume is immobile due to contamination being absorbed to solids rather than dissolved in ground water, P&T and continued monitoring may not be necessary.			

Recommendation	2.3 Potentially Consider Additional Monitoring Points		
Recommendation Reason	Protectiveness	**Implementation Status**	Delayed
Comments: The implementation of this recommendation is contingent on the results of the sampling and site conceptual model development discussed in the follow-up of Recommendation 2.1. At least two rounds of sampling will be conducted with the revised sampling technique before making any decisions regarding a modification to the remedy. If the monitoring results (using a revised sampling technique) indicate that the plume is immobile due to contamination being absorbed to solids rather than dissolved in ground water, P&T and continued monitoring may not be necessary.			

Recommendation	3.1 Reduce Monitoring Well Sampling Frequency		
Recommendation Reason	Cost Reduction	**Implementation Status**	Delayed
Comments: The implementation of this recommendation is contingent on the results of the sampling and site conceptual model development discussed in the follow-up of Recommendation 2.1. At least two rounds of sampling will be conducted with the revised sampling technique before making any decisions regarding a modification to the remedy. If the monitoring results (using a revised sampling technique) indicate that the plume is immobile due to contamination being absorbed to solids rather than dissolved in ground water, P&T and continued monitoring may not be necessary.			

Recommendation	**4.1 Improve Annual O&M and Monitoring Reports**		
Recommendation Reason	Technical Improvement	**Implementation Status**	Delayed
Comments: The implementation of this recommendation is contingent on the results of the sampling and site conceptual model development discussed in the follow-up of Recommendation 2.1. At least two rounds of sampling will be conducted with the revised sampling technique before making any decisions regarding a modification to the remedy. If the monitoring results (using a revised sampling technique) indicate that the plume is immobile due to contamination being absorbed to solids rather than dissolved in ground water, P&T and continued monitoring may not be necessary.			

Recommendation	**5.1 Base Remedy Path Forward on Findings from Implementing the Above Recommendations**		
Recommendation Reason	Cost Reduction	**Implementation Status**	In Progress
Comments: The site team is moving forward with the sampling described in the follow-up to Recommendation 2.1.			

OTHER CHANGES, UPDATES, OR SIGNIFICANT FINDINGS SINCE LAST FOLLOW-UP

- The site team has been meeting with the ERT to discuss the potential use of in-situ chemical oxidation at MW-21D. Further discussions will be tabled until the site team conducts at least two rounds of monitoring with a revised sampling technique (as described in the followup to Recommendation 2.1 above).

- The first round of monitoring with the revised sampling technique should occur by the end of August 2005.

NEW OR UPDATED RECOMMENDATIONS FROM THIS FOLLOW-UP

1. It is recommended that the Region proceed with the revised sampling procedure as described in the follow-up to Recommendation 2.1 above. Other activities such as capture zone analyses, installation of additional monitoring wells, chemical oxidation, etc. should be postponed until the results of the new sampling have been interpreted and a revised site conceptual model developed. Conducting this sampling should not result in substantial additional cost given that the sampling would replace a regularly scheduled sampling round. Minor costs, perhaps $2,000, might be required for additional equipment that might be needed.

UPDATED COST SUMMARY TABLE

Recommendation	Reason	Implementation Status	Estimated Capital Costs ($)	Actual Capital Costs ($)	Estimated Change in Annual Costs ($/yr)	Actual Change in Annual Costs ($/yr)
Original Optimization Evaluation Recommendations						
2.1 Prepare a Document that Clearly States and Illustrates the Conceptual Model	Protectiveness	Planned	$15,000		$0	
2.2 Conduct a Preliminary Capture Zone Analysis	Protectiveness	In progress	$25,000		$0	
2.3 Potentially Consider Additional Monitoring Points (based on results from 2.1 and 2.2)	Protectiveness	Will not be implemented	$60,000		$2,000	
3.1 Reduce Reduce Monitoring Well Sampling Frequency	Cost Reduction	In progress	$0		($12,000)	
4.1 Improve Annual O&M and Monitoring Reports	Technical Improvement	In progress	$0		$0	
5.1 Base Remedy Path Forward on Findings from Implementing the Above Recommendations	Site Closeout	In progress	Not quantified		Not quantified	
New or Updated Recommendations from Follow-up #1, July 13, 2005						
1. Conduct monitoring with revised sampling technique	Site Closeout	Implemented	$2,000	Not yet quantified	Not quantified	$0
New or Updated Recommendations from Follow-up #2, November 7, 2005						
None.						

Costs in parentheses imply cost reductions.

APPENDIX: A

ARCHIVE OF TECHNICAL ASSISTANCE PROVIDED BY THE ROET

Note: Technical assistance items are provided in reverse chronological order.

Technical assistance has not been provided by the ROET to date.

APPENDIX: B

BASELINE SITE INFORMATION SHEET AND OPTIMIZATION EVALUATION REPORT

Streamlined
Optimization Evaluation Report

Saunders Supply Company Superfund Site
Chuckatuck, Virginia

EPA Region III

July 29, 2005

SECTION 1:

BASELINE SITE INFORMATION FORM

Date: 2/7/05 Filled Out By: Andy Palestini

A. Site Location, Contact Information, and Site Status

1. Site name	2. Site Location (city and State)	3. EPA Region
Saunders Supply Company	**Chuckatuck, VA**	**3**

4a. EPA RPM	5a. State Contact
Andy Palestini	**Thomas Modena**
4b. EPA RPM Phone Number	5b. State Contact Phone Number
215-814-3233	**804-698-4183**
4c. EPA RPM Email Address	5c. State Contact Email Address
palestini.andy@epa.gov	**tmodena@deq.state.va.us**

5. Is the ground water remedy an interim remedy or a final remedy? Interim ☐ Final ☒

6. Is the site EPA lead or State-lead with Fund money? EPA ☒ State ☐

B. General Site Information

1a. Date of Original ROD for Ground Water Remedy	1b. Dates of Other Ground Water Decision Documents (e.g., ESD, ROD Amendment)
09/30/1991	**ROD Amendment - 09/27/1996**
2a. Date of O&F	2b. Date for transfer to State
06/01/1999	**06/01/2009**

3. What is the primary goal of the P&T system (select one)?	4. Check those classes of contaminants that are contaminants of concern at the site.
☐ Contaminant plume containment	☐ VOCs (e.g., TCE, benzene, etc.)
☐ Aquifer restoration	☒ SVOCs (e.g., PAHs, PCP, etc.)
☒ Containment and restoration	☒ metals (e.g., arsenic, chromium, etc.)
☐ Well-head treatment	☐ other

5. Has NAPL or evidence of NAPL been observed at the site? Yes ☒ No ☐

6. What is the approximate total pumping rate? **10 gpm**

7. How many active extraction wells (or trenches) are there?	**4**	8. How many monitoring wells are regularly sampled?	**11**
9. How many samples are collected from monitoring wells or piezometers each year? (e.g., 40 if 10 wells are sampled quarterly)	**44**	10. How many process monitoring samples (e.g., extraction wells, influent, effluent, etc.) are collected and analyzed each year? (e.g., 24 if influent and effluent are sampled monthly)	**64**

11. What above-ground treatment processes are used (check all that apply)?

☐ Air stripping	☒ Metals precipitation
☒ Carbon adsorption (liquid phase only)	☐ Biological treatment
☒ Filtration	☐ UV/Oxidation
☐ Off-gas treatment	☐ Reverse osmosis
☐ Ion exchange	☐ Other

12. What is the approximate percentage of system downtime per year? 10% ☒ 10 - 20% ☐ >20% ☐

C. Site Costs

1. Annual O&M costs

O&M Category	Actual Annual Costs for FY03	Actual Annual Costs for FY04	Projected Annual Costs for FY05
Labor: project management, reporting, technical support	**$37,600**	**$22,900**	**$22,000**
Labor: system operation	**$49,200**	**$30,900**	**$30,000**
Labor: ground water sampling	**$35,600**	**$34,200**	**$34,000**
Utilities: electricity	**$2,000**	**$2,000**	**$2,000**
Utilities: other	**$500**	**$500**	**$500**
Consumables (GAC, chemicals, etc.)	**$600**	**$600**	**$600**
Discharge or disposal costs	**$0**	**$0**	**$0**
Analytical costs	**$0**	**$0**	**$0**
Other (parts, routine maintenance, etc.)	**$200**	**$200**	**$200**
O&M Total	**$125,700**	**$91,300**	**$89,300**

The O&M total should be equal to the total O&M costs for the specified fiscal years, including oversight from USACE or another contractor. For costs that do not fit in one of the above cost categories, include them in the "Other" category. If it is not possible to break out the costs into the above categories, use the categories as best as possible and provide notes in the following box.

2. Non-routine or other costs	**$1,200**	**$3,800**	**$3,500**

Additional costs beyond routine O&M for the specified fiscal years should be included in the above spaces. Such costs might be associated with additional investigations, non-routine maintenance, additional extraction wells, or other operable units. The total costs billed to the site for the specified fiscal years should be equal to the O&M total plus the costs entered in item 2.

Notes on costs:

D. Five-Year Review

1. Date of the Most Recent Five-Year Review	**12/29/2004**

2. Protectiveness Statement from the Most Recent Five-Year Review

☐ Protective	☐ Not Protective
☒ Protective in the short-term	☐ Determination of Protectiveness Deferred

3. Please summarize the primary recommendations in the space below

1. Determine the extent of contamination east of MW-20S/21D well nest. Results will be analyzed to determine if additional ground water recovery wells are needed to capture a larger plume and whether additional monitoring wells are needed east of the MW-20S/21D well nest.

2. Determine whether contaminants in the Yorktown aquifer are being controlled by the existing extraction system. Results will be analyzed to determine if additional ground water recovery wells are needed to remediate the Yorktown aquifer plume.

3. Institutional controls restricting using the Columbia and Yorktown aquifers as a source of ground water must be implemented for the Kelly property.

E. Other Information

If there is other information about the site that should be provided please indicate that information in the space below. Please consider enforcement activity, community perception, technical problems to be addressed, and/or areas where a third-party perspective may be valuable.

Saunders Supply Company is approximately 400 feet from Godwins Millpond, which is used by the city of Suffolk as one of their sources of drinking water. The city, on their own initiative, sample several of the EPA monitoring wells monthly because of their obvious concern that their drinking water source does not become contaminated.

SECTION 2:

STREAMLINED OPTIMIZATION EVALUATION FINDINGS AND RECOMMENDATION

Saunders Supply Company Superfund Site

Date of Evaluation Meeting: February 10, 2005 Date of Final Report: July 29, 2005

ROET MEMBERS CONDUCTING THE STREAMLINED OPTIMIZATION EVALUATION:

Name	Affiliation	Phone	Email
Peter Ludzia	U.S. EPA Region 3 (Section Chief)	215-814-3190	ludzia.peter@epa.gov
Norm Kulujian	U.S. EPA Region 3	215-814-3130	Kulujian.norm@epa.gov
Kathy Davies	U.S. EPA Region 3	215-814-3315	Davies.kathy@epa.gov
Peter Schaul	U.S. EPA Region 3 (Branch Chief)	215-814-3183	schaul.peter@epa.gov
Peter Rich	GeoTrans, Inc.	410-990-4607	prich@geotransinc.com
Doug Sutton	GeoTrans, Inc.	732-409-0344	dsutton@geotransinc.com
Chuck Sands	U.S. EPA OSRTI	703-603-8857	Sands.charles@epa.gov
Jean Balent (by phone)	U.S. EPA OSRTI	202-564-1709	Balent.jean@epa.gov

SITE TEAM MEMBERS (INCLUDING CONTRACTORS) INTERVIEWED

Name	Affiliation	Phone	Email
Andy Palestini	U.S. EPA Region 3 (RPM)	215-814-3199	Palestini.andy@epa.gov
Bernice Pasquini	U.S. EPA Region 3 (Hydro)	215-814-3326	pasquini.bernice@epa.gov
Tom Modena	Virginia Dept. of Environmental Quality	804-698-4183	tmodena@deq.state.va.us
Dan Gilroy	CDM	703-968-0900	GilroyD@cdm.com

1.0 SIGNIFICANT FINDINGS BEYOND THOSE REPORTED ON SITE INFORMATION FORM

The evaluation team observed an RPM who appears to be an effective site manager. The observations and recommendations herein are not intended to imply a deficiency in the work of either the designers or operators, but are offered as constructive suggestions in the best interest of the EPA and the public. Recommendations made herein obviously have the benefit of site characterization data and the operational data unavailable to the original designers.

Findings beyond those reported on the site information form include the following:

- The Saunders Supply facility began on-site chemical treatment of lumber in 1946 with pentachlorophenol (PCP) solution. Treatment with chromated copper arsenate was introduced to the facility in 1974. By 1984, the PCP process was completely converted to the CCA process. The site was proposed to the National Priorities List in 1987, and a remedial investigation took place from September 1988 and May 1991. The operation on lumber treatment stopped in 1991. The Record of Decision (ROD), signed in 1991, included treatment of the soils in the source areas and monitoring of ground water. A ROD Amendment in 1996 included P&T. The P&T system was installed in early 1998 and started operation on April 20, 1998.

- The primary ground water contaminants are PCP, arsenic, and chromium. The following table summarizes cleanup levels, the highest 2004 average concentration of each contaminant detected in a site monitoring well, and the monitoring well where that highest average was detected.

Contaminant of Concern	Cleanup Level (ug/L)	Max. Dissolved Concentration in 10/04 (ug/L)	Location of Sample
PCP	1	280	MW-21D
Arsenic*	10	1,810	MW-7S
Chromium*	100	200	MW-9S

** Reported concentrations are for dissolved metals*

- The upper water-bearing unit at the site is the Columbia Aquifer, which extends from near the surface to approximately 20 feet below ground surface (bgs). Boring logs from the *Deep Groundwater Investigation Memorandum* indicate a very tight formation that yields very little or no water in some intervals.

- Prior to this investigation, the Columbia Aquifer was thought to be underlain by a semi-confining layer of 2 to 7 feet of clay above the 100-foot thick sands of the Yorktown aquifer. The *Deep Groundwater Investigation Memorandum*, which summarizes data collected at the end of 2004, indicates that below the semi-confining layer the Yorktown aquifer consisted of silt/clay mixtures to a depth of 76 feet bgs. This material was tightly compacted and typically dry. Ground water could be recovered only in select locations at depths below 30 feet bgs.

- Site wells are identified as shallow and deep. Shallow wells are screened in the upper 2 to 20 feet of the subsurface and "deep" wells are screened at an interval about 2 feet below the bottom of the nearby shallow well for 10 feet. No site wells are screened below 30 feet bgs. The recovery wells are screened 13 to 21 feet deep.

- Ground water sampling results indicate that the most elevated PCP contamination is in MW-21D and MW-8D. MW-21D is located approximately 200 feet downgradient of the Saunders property and is screened from approximately 20 to 30 feet bgs. MW-

8D is located immediately downgradient of the Saunders property and is screened from approximately 14 feet to 24 feet bgs. Therefore, the highest PCP concentrations have been detected deeper than any of the site recovery wells. In comparison, the shallow monitoring wells and the extraction wells typically have PCP concentrations less than 10 ug/L.

- The recent *Deep Groundwater Investigation Memorandum* summarizes a direct-push investigation, in which site lithology was logged and four ground water samples were collected. One of the samples (DPT5-42) was collected near MW-21D at a depth of 42 feet (approximately 12 feet deeper than MW-21D), and PCP was not detected. Two samples (DPT2-42 and DPT2-42P) were collected at upgradient of MW-21D approximately 50 feet downgradient of MW-8D, both at a depth of 42 feet bgs. PCP was detected at 2.3 and 3.7 ug/L, respectively, which is at least an order of magnitude lower than the concentrations in MW-8D and MW-21D.

- The highest arsenic and chromium concentrations are located in shallow wells MW-7S and MW-9S, respectively, which are both shallow wells located immediately downgradient of the Saunders property. Deep wells in these locations have substantially lower concentrations, indicating that arsenic and chromium contamination decreases with depth. Wells MW-7S and MW-9S are screened from 2 feet to 12 feet bgs and 1 foot to 11 feet bgs, respectively.

- Godwin's Millpond, located approximately 500 feet north of the site, is a municipal water supply source for the city of Suffolk.

- The P&T system consists of following components:

    - 4 extraction wells oriented parallel to the primary direction of ground water flow (which is to northwest)

    - A reaction tank with chemical feed

    - The chemical precipitation step used to minimize iron fouling of the remaining treatment train components

    - A settling tank

    - A sand filter

    - Granular activated carbon (GAC) vessels contained in 55-gallon drums

    - An effluent tank

    - The treated water is discharged to a surface water body that is not connected to Godwin's Millpond

- The design extraction rate for the system is 10 gpm, but the actual extraction rate over the life of the system is relatively consistent at approximately 1 gpm.

- The average flow per month reported in these Table 4-2 of the *Annual Operation and Maintenance (O&M) and Monitoring Report 2004* appears to be incorrect for RW-2, RW-3 and RW-4 since October 2003. The total flow measurements appear to be accurate, but the calculated average flow does not correspond with the total flow measurements. The calculated average flow appears to overestimate the actual average flow rate by a factor of 5 to 7.

- The system is checked weekly. The treatment system operates effectively and consistently meets discharge limits.

- The P&T objective is containment of the plume (primarily to protect Godwin's Millpond) and cleanup of ground water to the above-mentioned standards. Initially, the site team targeted a 5-foot drawdown as an indication of hydraulic containment. Currently, capture is determined based on concentration trends and inward flow based on potentiometric maps. However, water level measurements from operating extraction wells are being used in the development of the potentiometric maps, which generally results in overestimates of the degree of capture. In addition, there does not appear to be enough monitoring wells to be conclusive about the interpreted ground water flow indicated in the potentiometric surface maps. Therefore, the evaluation of capture is likely not reliable.

- Insufficient information is also available to conduct an analytical ground water flow analysis that compares the amount of contaminated water flowing through the site with the amount of water extracted by the extraction network. The following parameters are typically needed for this preliminary analysis, and as is indicated in the list below, some of this information is not available.

    - Background hydraulic gradient (not available)
    - Hydraulic conductivity estimate (not available)
    - Aquifer thickness (likely between 5 and 10 feet for the Columbia Aquifer)
    - Plume width (the plume is not fully delineated)
    - Pumping rate (approximately 1 gpm)

- Analyzing concentration trends in downgradient performance monitoring wells and sentinel wells can generally be used to evaluate capture. However, downgradient monitoring points are fairly limited. MW-19D is relatively far downgradient and may not yet be influenced, and it adjacent to Godwin's Millpond, which means that if MW-19D becomes impacted then the remedy has likely already failed in meeting its objective. Furthermore, it is unclear if MW-19D is installed at the appropriate depth to monitor the performance of the extraction network.

- The P&T system has removed about 0.1 pounds of PCP per year. The recent apparent error in the average flow calculation has also led to errors regarding PCP

removal in Table 4-2, especially with RW-2. Concentrations at the extraction wells fluctuate over time but actual mass removal remains very low.

2.0 RECOMMENDATIONS TO IMPROVE SYSTEM PROTECTIVENESS

2.1 PREPARE A DOCUMENT THAT CLEARLY STATES AND ILLUSTRATES THE CONCEPTUAL MODEL

Although the recent *Deep Groundwater Investigation Memorandum* and the *Annual O&M and Monitoring Report 2004* present important site data, a site conceptual model is not clearly laid out. An effort should be made to update the conceptual model. Geologic cross-sections should be prepared to clearly portray well construction information and litho logy encountered during soil borings. Furthermore, horizontal and vertical ground water flow patterns should be interpreted and ground water flow velocities estimated. Finally, the fate and transport of the site-related contamination (PCP, arsenic, and chromium) should also be interpreted, particularly with respect to migration toward Godwin's Millpond.

This conceptual model should also attempt to explain the observation of apparently isolated high PCP concentrations at MW-21D and the fluctuating concentrations at the recovery wells, MW-7S, MW-11S, and other monitoring wells. The influence of precipitation variation over time on concentrations should be considered as should the influence of turbidity in the PCP results. The PCP contamination may be present in a dissolved contaminant plume, but it may also be primarily absorbed to solids, relatively immobile, and only apparent at elevated concentrations in turbid samples.

This effort of developing a site conceptual model will help provide evidence as to whether the P&T system provides any significant benefit or alternative (more targeted) approaches should be considered. It is estimated that this effort, which does not involve any field-work or data collection, might cost $15,000.

In addition to routine ground water sampling for PCP, the site team may consider taking filtered samples for PCP. Dissolved PCP would be present in the filtered samples, and absorbed PCP associated with high turbidity would likely be removed through filtration. This should add very little cost to the next routine sampling event given that the laboratory analysis is not charged to the site.

2.2 CONDUCT A PRELIMINARY CAPTURE ZONE ANALYSIS

The site team should evaluate the plume capture offered by the P&T system by conducting an analytical ground water flow analysis. To do this, the site team first needs a background hydraulic gradient and an estimated hydraulic conductivity for the Columbia Aquifer. The site team should install three or four piezometers near (e.g., within 10 feet of) RW-2 and/or RW-4 that can be used during a pump test. The

site team should then shut down the P&T system and measure the water levels in the newly installed piezometers as the aquifer recovers. This recovery test should allow the site team to estimate the hydraulic conductivity, and, after the aquifer recovers, the site team can determine the background hydraulic gradient. When the site team restarts the P&T system, the water levels in the piezometers can again be monitored. This pump test would provide additional data for estimating the hydraulic conductivity.

The background hydraulic gradient and the hydraulic conductivity estimate should allow the site team to conduct a ground water flow analysis to preliminarily determine the areal extent of the capture offered by the extraction system. This effort, including a work plan and analysis of the data could likely be accomplished for under $25,000.

2.3 POTENTIALLY CONSIDER ADDITIONAL MONITORING POINTS

The above preliminary capture zone analysis provides one line of evidence to evaluate capture. An additional line of evidence for evaluating capture would be likely appropriate, especially if the above-mentioned capture preliminary zone analysis is inconclusive and the site conceptual model suggests continued contaminant migration toward surface water.

Ground water flows toward the creek located to west of the extraction net work, and there are no monitoring wells between the extraction network and the creek. Installing monitoring wells in this area and monitoring concentration trends would provide additional information for evaluating capture. A potential scope of work would be to install monitoring well clusters in the following locations:

- 100 feet to the west of RW-3
- 50 feet northwest of RW-4 (perhaps 20 feet west of DPT-7)
- 150 to 200 feet north of RW-4

The well clusters might include a shallow well screened in a similar zone to that influenced by the extraction network, and a deeper well that is screened in a similar zone to that of MW-21D.

It is recognized that the access may be difficult or impracticable. It is also recognized that a number of borings have recently been installed without intercepting ground water. As a result, this recommendation to install additional monitoring wells is intended to be contingent on results (or lack of results) from the recommendations in Sections 2.1 and 2.2, and it is understood that a subset of the proposed wells may be more appropriate. It is unlikely that more than the proposed six wells would be necessary.

These wells, if installed, could be used as downgradient performance wells to help evaluate plume capture, or, in the absence of pumping, the degree of contaminant migration. The cost for this effort (if conducted) might be $60,000, including a work plan, oversight, and reporting. Adding these wells to the monitoring program (assuming annual monitoring as discussed in Section 3.0) would cost an additional $2,000 per year.

3.0 RECOMMENDATIONS TO REDUCE SYSTEM COST

3.1 REDUCE MONITORING WELL SAMPLING FREQUENCY

Ground water sampling is the highest cost O&M item at the site. Eleven monitoring wells (6 deep and 5 shallow) and four recovery wells are sampled and analyzed quarterly for semi-volatile organics and 17 dissolved metals. It was reported that three additional monitoring wells will be added to the monitoring network. Based on the lack of trends apparent in quarterly data, the slow ground water flow velocity at the site and the extended time to be required to meet remedial goals, the optimization team recommends a reduction in the sampling frequency of monitoring wells. The site team could reduce sampling of some monitoring wells (MW-9S, MW-10D, MW-11S, MW-12D, MW-22S, MW-23D, MW-19D) to semi-annual and the remaining monitoring wells (MW-7S, MW-8D, MW-20S, MW-21D) to annual. After a few years of monitoring with this schedule, the monitoring frequency might be reduced to annual for all site monitoring wells. The reduction in sampling frequency to a combination semi-annual and annual sampling should save about $12,000 in sampling labor and equipment per year. Recovery well sampling could be maintained at a quarterly frequency.

Additional savings in analytical costs cannot be quantified since the site does not pay for these directly under the EPA lab program. Most of the metals could be removed from the analyte list for further laboratory savings since only arsenic and chromium are considered in site reports.

4.0 RECOMMENDATIONS FOR TECHNICAL IMPROVEMENT

4.1 IMPROVE ANNUAL O&M AND MONITORING REPORTS

These reports should include a more clear statement of the site conceptual model (developed as part of Recommendation 2.1), and should correct the calculations made in Table 4.2. This effort should not require additional funds.

5.0 RECOMMENDATIONS TO SPEED SITE CLOSEOUT

5.1 BASE REMEDY PATH FORWARD ON FINDINGS FROM IMPLEMENTING THE ABOVE RECOMMENDATIONS

The existing P&T system may be providing some benefit with hydraulic containment but it is removing minimal contaminant mass. Based on PCP concentration trends, the system operation will likely have to continue for decades (if it is technically practicable in any time frame) to reach the PCP cleanup goal, particularly since the current extraction areas do not directly address the areas with the highest ground water contamination.

The site team and Region will need to consider the developed conceptual model and the capture zone evaluation to determine next steps for the remedy. Based on the suggested recommendations, the Region may find that the remedy provides adequate and necessary capture in a cost-effective manner. On the other hand, the Region may find that the contaminant mobility is very limited, that the P&T system is unnecessary for capture, and that the P&T system is not a cost-effective means for removing contaminant mass. These two different findings might result in two different paths forward. Under one scenario, the Region would continue operation of the P&T system (perhaps with enhanced extraction) and focus on reducing annual costs. Under another scenario, the Region might discontinue P&T operation and focus on targeted remediation.

If targeted remediation is considered in the absence of an operating P&T system, the Region might consider focused excavation (e.g., shallow PCP and arsenic contamination at MW-7S), in-situ chemical oxidation (Fenton's reagent), or zero-valent iron injection. If the P&T system will continue to operate, the site team could consider adding extraction points near MW-21D and MW-8D. Areas to be targeted might include MW-7S, MW-8D, MW-21D, RW-1, RW-2, and RW-3. Further evaluation of these technologies/options is not likely necessary until the conceptual model has been developed and the Region is seriously considering piloting targeted remediation.

PRIORITIZATION AND SEQUENCING OF RECOMMENDATIONS

Recommendations 2.1 and 2.2 should be implemented first, followed by Recommendation 3.1. Recommendation 2.3 can be implemented if the site team sees a clear benefit to the additional data based on their understanding of the site conceptual model and plume capture. Recommendation 4.1 should be implemented with the next annual report. Recommendation 5.1 is simply a recommendation to reconsider the path forward at the site after implementing the other recommendations and conducting the suggested evaluations.

Cost Summary Table

Recommendation	Reason	Estimated Additional Capital Costs ($)	Estimated Change in Annual Costs ($/yr)
2.1 Prepare A Document That Clearly States And Illustrates The Conceptual Model	Effectiveness	$15,000	$0
2.2 Conduct a Preliminary Capture Zone Analysis	Effectiveness	$25,000	$0
2.3 Potentially Consider Additional Monitoring Points (based on results from 2.1 and 2.2)	Effectiveness	$60,000	$2,000
3.1 Reduce Monitoring Well Sampling Frequency	Cost	$0	($12,000)
4.1 Improve Annual Reports	Technical Improvement	$0	$0
5.1 Base Remedy Path Forward on Findings from Implementing the above Recommendations	Site Closeout	Not Quantified	Not quantified

Costs in parentheses imply cost reductions.