Final Report

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

Site Optimization Tracker: North Penn Area 1 Superfund Site Souderton Montgomery County, Pennsylvania

EPA Region III

Solid Waste and
Emergency Response
(5102P)

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

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

Site Optimization Tracker: North Penn Area 1 Superfund Site Souderton Montgomery County, Pennsylvania

EPA Region III

Site Optimization Tracker:

North Penn Area 1 Superfund Site
Souderton
Montgomery County, Pennsylvania

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
North Penn Area 1	**Souderton, Montgomery County, PA**	**3**

4a. EPA RPM	5a. State Contact
Maria Garcia (Angie)	**April Flipse**
4b. EPA RPM Phone Number	5b. State Contact Phone Number
215-814-3199	**484-250-5721**
4c. EPA RPM Email Address	5c. State Contact Email Address
garcia.maria@epa.gov	**april.flipse@state.pa.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)
9/30/94 OU2-Interim	**ESD#1 (10/29/97), ESD #2 (9/24/98)**
2a. Date of O&F	2b. Date for transfer to State
9/24/98	**September 2008**

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? **0* (discontinued in early 2005)**

7. How many active extraction wells (or trenches) are there?	**0***	8. How many monitoring wells are regularly sampled?	**4**
9. How many samples are collected from monitoring wells or piezometers each year? (e.g., 40 if 10 wells are sampled quarterly)	**8**	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)	**0***

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

☐ Air stripping	☐ Metals precipitation
☐ Carbon adsorption	☐ Biological treatment
☐ Filtration	☐ UV/Oxidation
☐ Off-gas treatment	☐ Reverse osmosis
☐ Ion exchange	☒ Other **was direct discharge to POTW**

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	**$5,489**		
Labor: system operation			
Labor: ground water sampling	**$1,013**		
Utilities: electricity	**$669**		
Utilities: other			
Consumables (GAC, chemicals, etc.)			
Discharge or disposal costs	**$8,793**		
Analytical costs	**$1,000***		
Other (parts, routine maintenance, etc.)	**$8,524**		
O&M Total	**$25,668**		

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			

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. FY04 costs are based on costs for EPA's contractor who is conducting the LTRA.
2. Pumping was discontinued in early 2005, soon after the initial optimization evaluation meeting. Costs for FY05 and FY06 are difficult to predict at this point given the fact that pumping has been discontinued, and further investigation will be conducted at the site.

* 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 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 assumed sampling reduction.

For FY04 costs, the following comments apply:

- Direct labor is contractor's personnel costs, excluding sampling labor.

- Other costs include: sampling supplies, equipment, shipping of samples, sampling report, and contractor's indirect costs and fees.

D. Five-Year Review

1. Date of the Most Recent Five-Year Review	**September 26,2003**

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

The site is considered protective in the short-term, but fluctuating high concentrations at monitoring well NPA1-S1 should be investigated further before determining the remedy is protective in the long-term. The 5-year review recommended that such an investigation be performed to determine the source.

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.

The previously active pumping well produced water with very low concentrations of PCE (several ug/l), the prime contaminant of concern. In contrast, monitoring well NPA1-S1, located downgradient of that sole extraction well, has concentrations in the ppm range for PCE. Pumping is not occurring from NPA1-S1.

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 8, 2005 (Evaluation meeting) August 5, 2005 (Final report)

	Meeting Date	Report Date	Item
X	July 20, 2005	August 5, 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

* Although the ROET (including the optimization contractor) was present for follow-up meeting #2, the RPM was not available and other site team members (e.g., the hydrogeologist) reported that no additional progress had been made since the previous follow-up meeting. In addition, the site hydrogeologist noted that there was no need for further technical assistance at this point.

SUMMARY OF FOLLOW-UP #2

Site or System Name	North Penn Area 1 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*

** Although the ROET (including the optimization contractor) was present for follow-up meeting #2, the RPM was not available and other site team members (e.g., the hydrogeologist) reported that no additional progress had been made since the previous follow-up meeting. In addition, the site hydrogeologist noted that there was no need for further technical assistance at this point.*

SUMMARY OF FOLLOW-UP #1

Site or System Name	North Penn Area 1 Superfund Site
Date of This Follow-Up Summary	August 5, 2005
Date of Follow-Up Meeting or Call (Indicate if Meeting or Call)	July 20, 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
Paul Leonard	U.S. EPA Region 3	215-814-3350	Leonard.paul@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
Maria Garcia (Angie)	U.S. EPA Region 3 (RPM)	215-814-3199	Garcia.Maria@epa.gov

IMPLEMENTATION STATUS OF PREVIOUSLY IDENTIFIED HIGH PRIORITY RECOMMENDATIONS

Recommendation	**2.1 Prepare a Document that Clearly States and Illustrates the Conceptual Model**		
Recommendation Reason	Protectiveness	**Implementation Status**	In Progress
Comments: The RPM indicates she is constructing a work request that will include this "Conceptual Model task". She hopes to have this work assignment in place by September 2005.			
Recommendation	**2.2 Characterize Area near NP1-S1 Initially with a Pump Test (In Place of Planned Packer Test)**		
Recommendation Reason	Protectiveness	**Implementation Status**	In Progress
Comments: The RPM indicates she is constructing a work request that will include this pump test. She hopes to have this work assignment in place by September 2005, and hopes that the results will be available prior to the next follow-up for this site, which will likely occur in October or November 2005. The RPM also noted that she may request Technical Assistance from the Optimization Evaluation Team to review the statement of work, cost estimates, etc.			
Recommendation	**4.1 Improve Semi-Annual Monitoring Reports**		
Recommendation Reason	Protectiveness	**Implementation Status**	In-Progress
Comments: The RPM indicates this recommendation is planned to be implemented.			

IMPLEMENTATION STATUS OF OTHER PREVIOUSLY IDENTIFIED RECOMMENDATIONS

Recommendation	**2.3 Consider Need for Further Characterization**		
Recommendation Reason	Technical Improvement	**Implementation Status**	Delayed (Contingent)
Comments: This recommendation is contingent on the results of Recommendations 2.1 and 2.2.			
Recommendation	**4.2 Revise Pumping Strategy at GKM Well**		
Recommendation Reason	Technical Improvement	**Implementation Status**	Implemented
Comments: Pumping was reportedly discontinued at the GKM well soon after the initial evaluation meeting, in early 2005.			
Recommendation	**5.1 Consider Options for In-Situ Remediation Near NP1-S1**		
Recommendation Reason	Site Closeout	**Implementation Status**	Delayed (Contingent)
Comments: This recommendation is contingent on the results of Recommendations 2.1 and 2.2.			

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

- The major change is that pumping was discontinued at the lone extraction well, pending the results of the pumping test at NP1-S1. Therefore, there is currently no ongoing ground water extraction.

- The RPM indicates she may ask the evaluation team for technical assistance to evaluate the statement of work and cost estimates for the work plan that will address recommendations 2.1 and 2.2. The RPM hopes the work assignment will be in place by September 2005.

NEW OR UPDATED RECOMMENDATIONS FROM THIS FOLLOW-UP - HIGHEST PRIORITY

None.

NEW OR UPDATED RECOMMENDATIONS FROM THIS FOLLOW-UP - OTHER

None.

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	In progress	$20,000		$0	
2.2 Characterize Area Near NP1-S1 Initially with a Pump Test (In Place of Planned Packer Test)	Protectiveness	In progress	$40,000		$0	
2.3 Consider Need for Further Characterization	Protectiveness	Delayed (Contingent)	Not quantified		Not quantified	
4.1 Improve Semi-Annual Monitoring Reports	Technical Improvement	In progress	$5,000		$2,000	
4.2 Revise Pumping Strategy at GKM Well	Technical Improvement	Implemented	$5,000	Not quantified	$0	Not quantified
5.1 Consider Options for In-Situ Remediation Near NP1-S1	Site Closeout	Delayed (Contingent)	$20,000		Not quantified	
New or Updated Recommendations from Follow-up #1, July 20, 2005						
None.						
New or Updated Recommendations from Follow-up #2, November 7, 2005*						
None.						

Costs in parentheses imply cost reductions.

** Although the ROET (including the optimization contractor) was present for follow-up meeting #2, the RPM was not available and other site team members (e.g., the hydrogeologist) reported that no additional progress had been made since the previous follow-up meeting. In addition, the site hydrogeologist noted that there was no need for further technical assistance at this point.*

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

North Penn Area 1 Superfund Site
Souderton
Montgomery County, Pennsylvania

EPA Region III

August 5, 2005

SECTION 1:

BASELINE SITE INFORMATION FORM

Date: 3/21/05 Filled Out By: GeoTrans

A. Site Location, Contact Information, and Site Status

1. Site name	2. Site Location (city and State)	3. EPA Region
North Penn Area 1	**Souderton, Montgomery County, PA**	**3**

4a. EPA RPM	5a. State Contact
Maria Garcia (Angie)	**April Flipse**
4b. EPA RPM Phone Number	5b. State Contact Phone Number
215-814-3199	**484-250-5721**
4c. EPA RPM Email Address	5c. State Contact Email Address
garcia.maria@epa.gov	**april.flipse@state.pa.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)
9/30/94 OU2-Interim	**ESD#1 (10/29/97), ESD #2 (9/24/98)**
2a. Date of O&F	2b. Date for transfer to State
9/24/98	**September 2008**

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? **2.2 gpm**

7. How many active extraction wells (or trenches) are there?	**1**	8. How many monitoring wells are regularly sampled?	**4**
9. How many samples are collected from monitoring wells or piezometers each year? (e.g., 40 if 10 wells are sampled quarterly)	**8**	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)	**2**

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

☐ Air stripping	☐ Metals precipitation
☐ Carbon adsorption	☐ Biological treatment
☐ Filtration	☐ UV/Oxidation
☐ Off-gas treatment	☐ Reverse osmosis
☐ Ion exchange	☒ Other **direct discharge to POTW**

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	**$2,980**	**$5,489**	
Labor: system operation			
Labor: ground water sampling	**$3,393**	**$1,013**	
Utilities: electricity	**$753**	**$669**	
Utilities: other			
Consumables (GAC, chemicals, etc.)			
Discharge or disposal costs	**$5,100**	**$8,793**	
Analytical costs			
Other (parts, routine maintenance, etc.)	**$9,930**	**$8,524**	
O&M Total	**$22,156**	**$24,668**	

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			

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:

Costs are based on costs for EPA's contractor who is conducting the LTRA.

Direct labor is contractor's personnel costs, excluding sampling labor.

Other costs include: sampling supplies, equipment, shipping of samples, sampling report, and contractor's indirect costs and fees.

Sampling analysis conducted by EPA's lab.

Costs for FY05 are difficult to predict at this point given the fact that further investigation will be conducted at the site, and pumping strategy may be modified.

D. Five-Year Review

1. Date of the Most Recent Five-Year Review	**September 26,2003**

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

The site is considered protective in the short-term, but fluctuating high concentrations at monitoring well NPA1-S1 should be investigated further before determining the remedy is protective in the long-term. The 5-year review recommended that such an investigation be performed to detrmine the source.

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.

The active pumping well produces water with very low concentrations of PCE (several ug/l), the prime contaminant of concern. In contrast, monitoring well NPA1-S1, located downgradient of the sole extraction well, has concentrations in the ppm range for PCE.

SECTION 2:

STREAMLINED OPTIMIZATION EVALUATION FINDINGS AND RECOMMENDATIONS

North Penn Area 1 Superfund Site

Date of Evaluation Meeting: February 8, 2005 Date of Final Report: August 5, 2005

ROET MEMBERS CONDUCTING THE STREAMLINED OPTIMIZATION 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
Peter Rich	GeoTrans, Inc.	410-990-4607	prich@geotransinc.com
Rob Greenwald	GeoTrans, Inc.	732-409-0344	rgreenwald@geotransinc.com
Steve Chang	U.S. EPA OSRTI		Chang.steve@epamail.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
Maria Garcia (Angie)	U.S. EPA Region 3 (RPM)	215-814-3199	Garcia.Maria@epa.gov

1.0 SIGNIFICANT FINDINGS BEYOND THOSE REPORTED ON SITE INFORMATION FORM

The evaluation team observed an RPM who appears to be an effective 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:

- There are 2 Operable Units – OU1 (soil) and OU2 (ground water). This review pertains to OU2.

- The "site" consists of the following three properties in proximity to each other:
  - Gentle Cleaners (former dry cleaner)
  - Granite Knitting Mills (GKM), active, operations have included use of PCE
  - Parkside Apartments, once included a dry cleaning establishment

- The primary ground water contaminant is PCE.

- All of the residences in the area are reportedly on public water. The nearest supply well is approximately a half-mile away.

- Five wells are routinely sampled (semi-annually), including four monitoring wells and the sole extraction well.
  - The extraction well on the GKM property is called GKM well.
  - Monitoring well NP1-S1 is also on GKM property, about 200 feet southwest of GKM extraction well.
  - NP1-S2 is a deeper monitoring well, approximately 1,000 feet south of the GKM extraction well.
  - NP1-S3 and NP1-D3 are an even greater distance from the extraction well, near the Parkside Apartments.

- Originally there was to be a second recovery well (S-9), which was a production well for the North Penn Water Authority located near the Parkside Apartments where contamination was originally discovered. ESD #1 in 1997 eliminated potential recovery from S-9 because of low concentrations (< 10 ug/l PCE), indicated there would be direct discharge to POTW without onsite treatment, and also changed cleanup levels from background to MCLs. Well S-9 was eventually abandoned, and monitoring well NPA1-S3 is in the same general area where S-9 was located. ESD #2 in 1998 made the interim remedy for OU2 the final remedy.

- There is no on-site treatment. The extracted water is discharged to the POTW.

- The extraction well (GKM well) consistently pumps approximately 2.2 gpm, but only produces PCE concentrations generally under 10 ug/l. However, nearby monitoring well NP1-S1 (open hole 15 to 59 feet) has ppm levels of PCE. Other monitoring wells have very low VOC concentrations for several constituents (several ug/l).

- During the Remedial Investigation there was a packer test at the GKM well testing intervals to 187 ft bgs, and the upper interval (< 28 ft) had the highest concentration of 330 ug/l PCE. The intent was to pump from that interval. However, during the optimization evaluation meeting, it was noted that the pump is currently set at 53 feet, and the packing off for remediation pumping was never implemented.

- It was noted during the optimization evaluation meeting that the routine monitoring reports do not include tabulations or figures indicating historical data or trends.

- During the optimization evaluation meeting it was reported that the contractor is planning a packer test at monitoring well NP1-S1, the most impacted well.

- During the optimization evaluation meeting, the site hydrogeologist, indicated that downgradient well NP1-D3 has a long open hole and is artesian. The hydrogeologist is concerned that sampling this well from near the surface, without packing off the deep interval, could potentially obscure higher concentrations in deeper intervals of the well.

- Water levels do not appear to be routinely evaluated.

2.0 RECOMMENDATIONS TO IMPROVE SYSTEM PROTECTIVENESS

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

The site conceptual model is not clearly laid out in recent documents such as monitoring reports or the five-year review. An effort should be made to update the conceptual model to clearly summarize well construction, geologic cross-sectional information, interpreted flow patterns (horizontal and vertical), and likely fate and transport of contaminants. This conceptual model should also attempt to explain the observed concentration differences between the GKM well and NP1-S1, and including the influence of packering during the remedial investigation and during the remediation. The influence of precipitation variation over time on concentrations should also be evaluated. The site hydrogeologist has a history of hydrogeologic evaluation with this particular bedrock setting and will be a valuable resource for this exercise. It is estimated that this effort, which does not involve any field work or data collection, might cost $20,000.

2.2 CHARACTERIZE AREA NEAR NP1-S1 INITIALLY WITH A PUMP TEST (IN PLACE OF PLANNED PACKER TEST)

It was noted during the optimization evaluation meeting that the contractor was planning a packer test of NP1-S1. Given that this is a relatively shallow well (open only to 59 feet) the likely benefits of a packer test are limited. Instead, it is recommended that a pump test be performed at NP1-S1 with the goal of determining how much water this well can produce, at what concentrations, and how those concentrations will sustain over time. If desired, the pump from the GKM well could potentially be used for this test. Given that discharge is to

the POTW, which likely has a standard of 2.13 mg/L Total Toxic Organics, and PCE concentrations higher than 2.13 mg/L have been observed at this well, consideration can be given to storing this water in a tank and testing the water prior to discharge (with a mobile lab or a fast turnaround from a fixed-based lab) or treating the water through GAC.

If NP1-S1 does not produce much water, the observed contamination may be very localized. If it does produce water, and that water can be discharged to the POTW without treatment, the pumping should continue and concentrations of pumped water should be monitored over time (perhaps weekly for a month, monthly for a year) to see the trends. If the concentration declines quickly, there likely is no major contamination problem, and the need for additional characterization is diminished. However, if high concentrations (perhaps 50 ug/l or higher for PCE) are sustained over a year, then additional characterization of the source area and contamination extent may be appropriate.

Initial pump testing of NP1-S1 (several days) should cost on the order of $25,000. If pumping then continues at NP1-S1 (likely in place of the GKM well), and discharge directly to the POTW can continue, then long-term costs should be similar to the existing system, though there may be higher POTW fees if pumping rate is higher, and there may be added costs for sampling and evaluating concentration trends over the course of a year. The site team could assume additional costs of $15,000 might occur over one year of extended testing, relative to the costs of the current system. Thus, a total of $40,000 of additional cost is estimated for this activity.

2.3 CONSIDER NEED FOR FURTHER CHARACTERIZATION

Based on the results of Recommendations 2.1 and 2.2, additional characterization may still be needed. It was noted during the optimization evaluation meeting that, if this site was currently in the RI phase, more characterization would likely be performed. Since the need and potential scope for such characterization will depend on the results of Recommendations 2.1 and 2.2, costs are not estimated at this time.

3.0 RECOMMENDATIONS TO REDUCE SYSTEM COST

None.

4.0 RECOMMENDATIONS FOR TECHNICAL IMPROVEMENT

4.1 IMPROVE SEMI-ANNUAL MONITORING REPORTS

These reports should include a more clear statement of the site conceptual model (developed as part of Recommendation 2.1), and also include historical data so that trends can be presented and evaluated. This may increase cost of these reports by $4,000 for the first report, and perhaps $1,000 for each subsequent report (i.e., for semi-annual reporting, $5,000 the first year and $2,000 each subsequent year).

4.2 REVISE PUMPING STRATEGY AT GKM WELL

Based on results of Recommendations 2.1 and 2.2, pumping at the GKM well should either be eliminated or limited to the top interval (< 40 feet) as originally conceived. The costs of implementing this, assuming pumping continues at the GKM well, are approximately $5,000.

5.0 RECOMMENDATIONS TO SPEED SITE CLOSEOUT

5.1 CONSIDER OPTIONS FOR IN-SITU REMEDIATION NEAR NP1-S1

An alternate approach to P&T may include in-situ chemical oxidation or injection of zero valent iron at well NP1-S1. This would only be potentially appropriate if the well does produce sustained water during the recommended pumping test or if high concentrations requiring treatment prior to discharge continue during long-term pumping. Depending on the volume of the subsurface to be treated, a relatively small ISCO or ZVI treatment might cost $200,000 to $500,000 to implement. A focused evaluation of these alternatives might cost $20,000. A cost-benefit analysis for implementing a full-scale system, versus the cost of continued P&T (which might include treatment if very high concentrations are sustained under long-term pumping) should be performed prior to deciding to whether or not to invest $20,000 to evaluate alternatives.

PRIORITIZATION AND SEQUENCING OF RECOMMENDATIONS

Recommendation 2.1 should be implemented first, followed by 2.2. Recommendation 4.1 should be implemented with the next semi-annual report. Recommendations 2.3, 4.2, and 5.1 should be considered based on the results of Recommendations 2.1 and 2.2.

OTHER ACTION ITEMS

None.

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	$20,000	$0
2.2 Characterize Area Near NP1-S1 Initially With A Pump Test (In Place Of Planned Packer Test)	Effectiveness	$40,000	$0
2.3 Consider Need for Additional Characterization	Effectiveness	Not quantified	Not quantified
4.1 Improve Semi-Annual Monitoring Reports	Technical Improvement	$5,000	$2,000
4.2 Revise Pumping Strategy at GKM Well	Technical Improvement	$5,000	$0
5.1 Consider Options for In-Situ Remediation Near NP1-S1	Site Closeout	$20,000	Not quantified

Costs in parentheses imply cost reductions.