TECHNICAL MEMORANDUM

October 28, 1997

To: David Paley

From: Jim Kyles, Scott Versluice

Subject: Buffalo Color "Area D" Excavation of Wetland Area Waste Mterial

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In response to recent conditions observed along the wetland shoreline and NYSDEC desire to remove wastefill outside the limits of the slurry cutoff wall at the Area "D" site, Parsons ES performed a focused feasibility evaluation to remove this wastefill while maitaining the integrity of the slurry cutoff wall. This memorandum briefly presents the results of our evaluation along with a recommended course of action to pursue

Alternative Evaluation Criteria

Several alternatives for wastefill removal will evaluated against three main criteria categories including effectiveness, implementability, and cost. A detailed discussion of the criteria is presented below:

Effectiveness

This criteria addresses the remedial action in terms of its permanence and quantity/nature of any remaining wastefill in the wetland area. The effectiveness and permanence of a long-term remedial alternative includes consideration of the following:

- Protection of human health and the environment;
- Magnitude of the risk during and after remediation; and
- Compatibility with future land use.

Implementability

This evaluation criteria addresses the technical and administrative feasibility of implementing an alternative and the availability of the services and materials required for implementation. The implementability criterion considers technical feasibility, availability of materials and/or equipment, and administrative feasibility.

Cost

This evaluation criteria typically includes capital costs, and long term operation and maintenance costs. However, only direct capital costs will be considered for this evaluation.

Alternatives that fail to meet effectiveness or implementability criteria will not be evaluated for cost. Once costs have been established for each individual alternative, they will be compared respectively among the selected alternatives in order to identify which alternative provides the best relative balance.

Selected Alternatives

Technologies or process options identified and screened are presented in Table ___. These technologies or options include the following:

- Sheet piling between the slurry cutoff wall and the river enbankment, excavation of wastefill, and restoration of the embankment to design grades to stabilize the slurry cutoff wall;

- Dredging of wastefill with simultaneous backfill/restore to design grades with clean fill to stabilize the slurry cutoff wall:

- Cement stabilization of wastefill;

- Groundwater level controls to stabilize the wall during wastefill excavation and backfill/restore to design grades; and

- ???????.

Sheet Piling

Kevin Ernst/Scott Versluice

Simultaneous Dredging/Backfilling

This option would involve excavation of the wastefill in short segments to reasonable/practicable limits of the slurry cutoff wall followed by backfiling with clean fill to design grades of 3H:1V. This method does not employ any measures to prop up the embankment to prevent potential failure of the remaining embankment or slurry cutoff wall. The operation would involve excavating the wastefill in short segments (ie. 30 to 50 foot increments) followed by placing the clean backfill. The concept of this operation is to remove the wastefill in a relatively short time and then restore with clean fill to shore the embankment before any potential failures of the remaining embankment and slurry cutoff wall can occur. The excavation of the wastefill could accomplished with conventional hydraulic track mounted excavators from either on land or on a barge. If necessary, excavation could be accomplished with dragline bucket, bucket excavator, or clam shell dredge. However, use of these equipment may be subject to local availability and short mobilization schedule. The effectiveness ranking of this option is relatively high in that it is protective of human health and the environment by removing the wastefill and source of contaminants that could be released to the environment.

The nature of this option raises several concerns. The option involves unbraced excavation adjacent to the slurry cutoff wall, which can be a risky endeavor. Previous attempts to remove wastefill in the embankment adjacent to the river resulted in slumping of the embankment into the river. The extent of excavation necessary to remove the wastefill from the wetland area could result in slumping of the excavated embankment, potentially jeopardizing the integrity of the slurry cutoff wall. Excavating in short segments and backfilling as soon as the segment is completed lessens the probability of slumping of the embankment. However, the probability of slumping is not eliminated. Another concern involves overlap losses of clean fill. The overlap losses occur when clean fill overlaps wastefill from a succeeding section, and the clean fill must be removed to excavate the underlying wastefill. Also, clean fill already placed in the preceding section may slump onto the adjoining area undergoing waste excavation. These factors serve to increase the amount of waste material that must be removed, handled, and disposed , subsequently adding to the cost of the option. There are other concerns as well, including the willingness of the contractor to proceed with option knowing what the risks are, obtaining any specialized equipment, and the logistics of quickly excavating wastefill followed by immediate backfilling with clean fill. The limited size of the site, restricted access to the embankment for excavation and backfilling will severely hamper logistics of this operation.

Based upon the concerns and uncertainty of a potential embankment slumping and resulting impact to the integrity of the slurry cutoff wall, this option fails to meet minimum implementability criteria. Therefore, this option will not undergo further consideration or cost evaluation

Cement Stabilization

Kevin Ernst/Scott Versluice

Groundwater Control

Kevin Ernst/Scott Versluice

Any Other???????

Kevin Ernst/Scott Versluice

Conclusions/Recommendations

Go with sheet piling!

If you have any further questions, feel free to contact me and (716) 633-7074.

cc: Project File

TECHNICAL MEMORANDUM

April 29, 1998

To: David Paley

From: Jim Kyles, Scott Versluis, Kevin Ernst

Subject: Buffalo Color "Area D" Excavation of Wetland Area Waste Material

In response to recent conditions observed along the wetland shoreline and NYSDEC's desire to remove wastefill outside the limits of the slurry cutoff wall at the "Area D" site, Parsons ES performed a focused feasibility evaluation to remove this wastefill while maintaining the integrity of the slurry cutoff wall. This memorandum briefly presents the results of our evaluation along with conclusions for possible further action. The following is conceptual and is not intended for design.

Statement of the Problem

A request was made to evaluate alternatives for excavating contaminated soils outside of the Buffalo Color "Area D" slurry wall between Station 19+00 and 24+00. The excavation would be conducted in alluvial soils along a bank of the Buffalo River at a location of a prior landslide. Approximately, 3900 cubic yards of waste material would require excavation. Attachment A provides a plan view of the area to be excavated and cross sections of the river bank at approximate 50 foot intervals between Stations 19+00 and 24+00. These cross-sections, associated nearby boring logs, and geotechnical laboratory data for site soils provide the basis for evaluation of the alternatives.

Alternative Evaluation Criteria

Three alternatives for wastefill removal are evaluated against three criteria which are effectiveness, implementability, and cost. Definition of each criterion is presented below:

Implementability

This evaluation criterion addresses the technical and administrative feasibility of implementing engineering measures to allow removal of contaminated sediments/waste adjacent to a slurry wall along the Buffalo River. The implementability criterion considers technical feasibility, availability of materials and/or equipment, and administrative feasibility.

Effectiveness

This criterion evaluates the ability to maintain the integrity of the wall while excavating contaminated sediment/waste immediately adjacent to the wall.

Cost

This evaluation criteria typically includes capital costs, and long term operation and maintenance costs. However, only direct capital costs will be considered for this evaluation. Alternatives that fail to meet effectiveness or implementability criteria will not be evaluated for cost. Once costs have been established for each individual alternative, they will be compared respectively among the selected alternatives in order to identify which alternative provides the best relative balance.

Selected Alternatives

Technologies or process options identified and screened are the following:

- Sheet piling between the slurry cutoff wall and the river embankment, excavation of wastefill, and restoration of the embankment to design grades to stabilize the slurry cutoff wall;

- Cement stabilization of wastefill;

- Dredging of wastefill with simultaneous backfill/restore to design grades with clean fill to stabilize the slurry cutoff wall.

Evaluation of Alternatives

Sheet Pile Wall and Excavate

This alternative consists of constructing a conventional steel sheet pile wall that would be installed between approximately Stations 18+00 and 24+00 (600 lineal feet). The wall would be driven from the working bench about 10 to 15 feet from the centerline of the existing slurry wall trench. The purpose of sheet pile wall would be designed to provide for stability of the slurry wall while contaminated sediments are excavated from the outboard side of the sheetpile wall. From review of the cross-sections found in Attachment A, the depth of the waste material to be excavated varies between Stations 18+00 and 24+00. For evaluation of the Sheet Pile Wall alternative, conditions at Station 20+50 were used since this section represented the area of deepest excavation immediately outside of the slurry wall. The estimated elevations of waste to be excavated range between about Elevation 574 and Elevation 551. Based on the waste geometry at this station, vertical excavation depths measured from the working bench at Elevation 583 would be about 32 feet. The horizontal extent of the excavation measured from the outside edge of the working bench at Elevation 583 would be about 32 feet.

Ability to Be Implemented

Based on the geometry of the waste and river bank, an anchored sheet pile wall would be required. The wall would be installed immediately adjacent to the slurry wall to maximize the removal of contaminated soil. A cantilevered wall design would not be possible for sections with deep excavation depths (e.g., Station 20+50) since cantilevered steel sheet piling is restricted to a maximum height of 15 feet. Lateral support for a cantilevered wall comes from passive pressure exerted on the embedded portion. Deflection in the wall may jeopardize the slurry wall integrity. A cantilever design could be used along sections of shallow excavation (e.g., Station 19+00). The height of the sheet pile wall would vary depending on the depth of excavation. The required height at Station 20+50 would be about 32 feet. Thus, an anchored sheet pile wall that derives support by means of passive pressure on the front of the embedded portion of the wall and anchor tie rods near the top of the piling would be required. This method is generally suitable for heights up to about 35 feet, depending on soil conditions.

The overall stability of anchored sheet pile walls and the stresses in members depends on the interaction of a number of factors, such as the relative stiffness of the piling, the depth of penetration , the relative compressibility of the soil, the amount of anchor yield, etc. These items would need to be considered in the detailed design of the wall but are not considered in this evaluation . In general, the greater the depth of penetration the lower the resultant flexural stresses and therefore less disturbance to the slurry wall. The detailed design should minimize deflections of the wall and provide additional anchors. For purposes of this evaluation, the estimated embedment depth for the wall will likely be about 1 to 2 times the wall height. Thus for a 32 foot height required at Station 20+50, the sheet piling wound be driven about 60 to 90 feet below the elevation of the working bench. Also for purposes of the evaluation, it was assumed that the tie rods would be held by deadman anchors. The exact configuration of this system would be determined during detailed design. Tie rods locations along shallow sections (e.g. 3 - 5 deep by 5 feet wide) of the existing slurry wall would pass through the slurry wall for anchoring within the landfill. This may compromise slurry wall permeability requirements.

Excavation of the waste soils would likely be accomplished by equipment working from the construction bench. For purposes of this evaluation, the use of a crane with a clamshell bucket would be suitable. The majority of the excavation would be performed on sediments underwater. Upon completion of backfilling the river bank to design grade, the tie rods would be remove and the appropriate sections of the slurry wall repaired. The sheet piling would be abandoned in-place.

Materials, equipment and labor for design and construction of this alternative are assumed to be available locally. The alternative can administratively be implemented.

Based on the descriptions above, constructing a sheet pile to stabilize the slurry wall can be technically, logistically and administratively implemented. A detailed engineering design activity would be required to further evaluate and design the sheet pile wall and excavation activities.

Effectiveness

Overall, the construction of a sheet pile wall will likely provide an effective means to stabilize the slurry wall and allow for excavation of waste material adjacent to the wall. However, the following is a list of concerns that relate to this alternative's effectiveness:

- Deeper excavations will likely require tie backs. Installation of the tie backs will likely require excavation of shallow trenches throughout the top of the slurry wall to allow the tie rods to be anchored within the landfill. This could compromise the permeability requirements for the slurry wall and would require repair to sections of the slurry wall.

- The integrity of the slurry wall could be compromised due to deflections of a cantilevered retaining wall.

- The integrity of the slurry wall could be compromised due to placement of the retaining wall (e.g., driving or jetting).

- Previously placed river bank fill, geotextile fabric and rip rap stone will have to be removed to excavate the waste soils, and then be replaced after excavation of the contaminated soils.

Cost

A rough order of magnitude cost estimate assumed 27,000 sq. ft (45 ft. average depth x 600 lineal feet) of sheet pile would be installed. The estimated cost for installation of the sheet pile wall stabilization system is approximately $650,000. This estimate includes the cost of the materials, equipment and labor to install the sheet pile wall only. It does not include the costs associated with design of the wall, excavation of material to reach the zone of contaminated waste, excavation and placement of the waste, and river bank restoration by backfilling. The activities would result in additional costs that would have to be considers in the total cost of the alternative.

Cement Stabilization

This alternative consists of using available technologies and equipment to cement stabilize the contaminated sediment/waste in situ. The object is to immobilize the contaminants in the sediment/ waste immediately adjacent to the wall through fixation using a cement reagent. Two categories of cement stabilization were considered: Soil Mixing and Injection Grouting. Soil Mixing is a technology that has been reintroduced into the U.S. in the last ten years. A large arrangement of paddles or augers is drilled into the ground as a reagent fluid is pumped down the shaft. The fluid acts as an aid to the drilling and is mixed into the drilled soil column, creating a "soil-crete" mass. The process can be used with specialized cementing agents for hazardous waste fixation. Injection Grouting uses a rig to pressure-inject a chemical grout into the ground through relatively small diameter penetrations to stabilize a subsurface zone of interest. The injection grouting process is best suited for stabilizing granular soils.

Ability to be Implemented

For the Soil Mixing option, a crane working on the bench would use soil mixing augers to mix the contaminated sediment/wastes in situ. The crane required would be relatively large since a reach of about 30 feet from the edge of the working bench would be required. The depths of contamination can be reached with the soil mixing equipment. The process would require that any rock recently placed on the surface of the river bank be removed to provide access for the soil mixing augers. This could be accomplished with a clam shell bucket, prior to the soil mixing . Some modification to the underwater river slope/bottom might also be required to soil mixing to improve soil confinement for augering (e.g. construction of a berm). Upon completion of the soil mixing, the rock armoring system would be replaced.

For the cement injection, a crane mounted rig would again be required in order to reach the extent of the contaminated zones. From review of borings 19+33 @24' offset, 20+00 @ 18'offset, 20+70 @ 20' offset, 22+30 @ 30' offset, and 24+00 @30' offset, the "waste" is described as predominately silt, sand and gravel material with debris. Additionally the presence of some wood and clay lenses are described. The size of the debris is not indicated. From the logs, the material appears to be conducive to grouting. For this option, complete removal of the rock armoring would not be need. It is likely that that the only small areas of the rip rap rock at various locations of the grouting scheme would have to be removed to provide access for the injection grouting penetrations. Upon completion, these areas would be restored, if required.

Materials, equipment and labor for design and construction of these alternatives are assumed to be available in the Northeastern U.S . The alternative can administratively be implemented. A detailed design would have to be undertaken. The design would likely include tests to establish the appropriate reagent mixture to mixing or grouting.

Effectiveness

Both of these options would be effective in maintaining the overall stability and integrity of the slurry wall. Precautions would have to be taken to preclude the potential for localized damage to the wall due to the mixing of grouting process (e.g., hydrofracturing the wall by grouting nearby) To preclude such occurrences, the design might require a minimum "standoff" distance from the slurry wall. Both processes have some inherent drawbacks because the operations are performed in situ, thus there are not readily available direct visual observations that can be made to assure that all the waste material has been cemented. The following is a list of concerns that relate to this alternative's effectiveness:

- The ability of injection grouting technique to completely cement the entire waste volume is anticipated to be somewhat less effective than the soil mixing since the grout may seek preferential paths, especially if the waste is heterogeneous and contains cohesive material.

- The size and amount of debris present could potentially effect the ability to soil mix the material

- Treatability studies required for design would ultimately determine the effectiveness in immobilizing the contaminants

Cost

The rough order of magnitude costs estimated for this alternative are as follows.

Based on geometry considerations to reach the contaminated soils using a shallow soil mixing process, it was assumed that about 7,000 Cubic yard of mixing would be required to accomplish the remediation. A unit cost for shallow soil mixing is typically about $50/cubic yard. Therefore the cost to shallow soil mix the contaminated waste is estimated to be about $350,000. This does not include the costs associated with design, underwater slope modifications to facilitate mixing, and restoration of the geotextile and rip rap on the river bank.

For the injection grouting process, 3,900 cubic yards of waste material was assumed to be grouted. The typical unit cost of about $150/ cubic yard. The estimated cost for grout injection is about $585,000 .

Simultaneous Dredging/Backfilling

This option would involve excavation of the wastefill in short segments to reasonable/practicable limits of the slurry cutoff wall followed by backfilling with clean fill to design grades of 3H:1V. This method does not employ any measures to prop up the embankment to prevent potential failure of the remaining embankment or slurry cutoff wall. The operation would involve excavating the wastefill in short segments (i.e. 30 to 50 foot increments) followed by placing clean backfill. The concept of this operation is to remove the wastefill in a relatively short time and then restore with clean fill to shore the embankment before any potential failures of the remaining embankment and slurry cutoff wall can occur.

Ability to be Implemented

The excavation of the wastefill could accomplished with conventional hydraulic track mounted excavators from either land or on a barge. If necessary, excavation could be accomplished with dragline bucket, bucket excavator, or clam shell dredge. However, use of these equipment may be subject to local availability and short mobilization schedule.

The nature of this option raises several concerns. The option involves unbraced excavation adjacent to the slurry cutoff wall, which can be a risky endeavor. Previous attempts to remove wastefill in the embankment adjacent to the river resulted in slumping of the embankment into the river. The extent of excavation necessary to remove the wastefill from the wetland area could result in slumping of the excavated embankment, potentially jeopardizing the integrity of the slurry cutoff wall. Excavating in short segments and backfilling as soon as the segment is completed lessens the probability of slumping of the embankment. However, the probability of slumping is not eliminated. Another concern involves overlap losses of clean fill. The overlap losses occur when clean fill overlaps wastefill from a succeeding section, and the clean fill must be removed to excavate the underlying wastefill. Also, clean fill already placed in the preceding section may slump onto the adjoining area undergoing waste excavation. These factors serve to increase the amount of waste material that must be removed, handled, and disposed , subsequently adding to the cost of the option. There are other concerns as well, including the willingness of the contractor to proceed with the option knowing the risks. The logistics of quickly excavating wastefill followed by immediate backfilling with clean fill can be challenging. The limited size of the site, restricted access to the embankment for excavation and backfilling will severely hamper logistics of this operation.

Based upon the concerns and uncertainty of a potential embankment slumping and resulting impact to the integrity of the slurry cutoff wall, this option fails to meet minimum implementability criteria. Therefore, this option will not undergo further consideration of effectiveness or cost evaluation

Conclusions

Based on the evaluation of the remaining three alternatives, the ability to implement each option is roughly the same. The range of effectiveness between each alternative however is varied. Sheet piling is the most effect in maintaining stability of the slurry wall when removing sediments, but is the most expensive option, possibly over $1 million dollars for a total project cost. Soil mixing and grout injection are almost equally effective depending on types of soil, contaminants to be immobilized and debris encountered. The cost of these cementation options are in the range of approximately $600,000 to $750,000. In light of these costs, a no action cost-benefit analysis should be performed, and the risk associated with a no action alternative should be included into the decision making process. Since any of these alternatives appear to approach

10% of the current slurry wall remediation cost, a no action alternative may be justifiable. The risk of leaving remaining contaminants in the soil could indeed drive the final solution. Aside of this, on a pure engineering basis, soil stabilization/cementation is the least costly, moderately effective approach.

If you have any further questions, feel free to contact me at (716) 633-7074.

cc: Project File

Attachment: Parsons ES Memorandum by Jeffrey Poulsen dated October 14, 1997 re: Buffalo Color "Area D" Waste Volume Estimate (Sta. 19+00 to 24+00)

Author: Kevin Ernst at FEFE-27-ERAFS1-A
Date: 11/4/97 9:51 AM
Priority: Normal
TO: ,"Paley, David" <David.Paley@alliedsignal.com> at -FABRIK/Internet
CC: Scott Versluis, James Kyles at PARMOBIL, Eugene W. Melnyk at PARMOBIL, "Emil Walerko" <Emil.Walerko@AlliedSignal.com> at -FABRIK/Internet
Subject: Re[4]: Buffalo Color "Area D" Site Alternatives Evaluati

The estimated costs associated with reconstructing the shoreline are considered in the rough order of magnitude costs presented in the evaluation. Not including the cost of shoreline reconstruction to the injection grouting option does not make a significant difference in the comparison of the rough order of magnitude costs of injection grouting to soil mixing. To summarize and clarify:

1. For Sheet Piling:

A. Estimated cost for installation of the sheet pile wall system: $700,000 to $800,000

B. Total estimated cost: possibly greater than $1,000,000 (see "Conclusions")

This total estimated cost reflects the order of magnitude of additional anticipated costs associated with design, shoreline excavation and river bank reconstruction.

2. For Soil Mixing:

A. Estimated cost to shallow soil mix waste: $350,000
B. Estimated cost for design, and to implement underwater slope modifications and restore geotextile and rip rap on river bank: $300,000
C. Thus, the Total estimated cost: $650,000

3. For Injection Grouting:

A. Estimated cost to injection grout the waste: $600,000
B. Estimated cost for design and slope modification/restoration: $150,000
C. Thus, the Total estimated cost: $750,000

If the costs of Item 3.B. above are not considered, then the Total cost would be $600,000. This cost is still roughly equivalent to the costs associated with the soil mixing.

Therefore, from a rough order of magnitude cost perspective, not adding the cost of shoreline reconstruction to the injection grouting option does not make a significant difference when comparing it to the soil mixing option.

4. Summary:

Based on the total estimated costs described in the evaluation, a cementation option (soil mixing or injection grouting) is less expensive than the sheet piling option. In terms of rough order of magnitude costs the estimated total costs of soil mixing and injection grouting are roughly equivalent (i.e., in the range of about $650,000 to $750,000).

Author: ,"Paley, David" <David.Paley@alliedsignal.com> at -FABRIK/Internet
Date: 11/3/97 1:21 PM
Priority: Normal
CC: Scott Versluis at FEFE-27-ERAFS1-A, James Kyles at PARMOBIL,
Eugene W. Melnyk at PARMOBIL
TO: Kevin Ernst at FEFE-27-ERAFS1-A
CC: "Emil Walerko" <Emil.Walerko@AlliedSignal.com> at -FABRIK/Internet
Subject: RE: Re[2]: Buffalo Color "Area D" Site Alternatives Evaluati

From: Paley, David
Date: Mon, Nov 3, 1997 1:21 PM
Subject: RE: Re[2]: Buffalo Color "Area D" Site Alternatives Evaluation
To: Kevin_Ernst
Cc: Eugene_W_Melnyk; James_Kyles; Scott_Versluis; Walerko, Emil

So should we add the cost of reconstructing the shoreline for soil mixing and sheet piling and not for cementation? Does that make it significantly more attractive than the others?

Jim Kyles: Parsons should get busy scoping and giving us a proposal for evaluating no-action - the comments below make it look worthy of further consideration, especially compared with $750K.

From: Kevin_Ernst
To: Paley, David
Cc: Walerko, Emil; Scott_Versluis; James_Kyles; Eugene_W_Melnyk
Subject: Re[2]: Buffalo Color "Area D" Site Alternatives Evaluation
Date: Saturday, November 01, 1997 4:10PM

From: Paley, David
Date: Mon, Nov 3, 1997 5:58 AM
Subject: RE: Buffalo Color "Area D" Site Alternatives Evaluation
To: Kevin_Ernst
Cc: Eugene_W_Melnyk; James_Kyles; Scott_Versluis; Walerko, Emil

another question: Of the two alternatives under consideration, it would seem that cementation/soil mixing could be done after the shoreline stabilization is finished, whereas the sheet-piling alternative cannot, at least without undoing a lot of completed work. Is this correct, or would cementation also undo the shoreline?

From: Paley, David
To: Kevin_Ernst
Cc: James_Kyles; Scott_Versluis; Eugene_W_Melnyk; Walerko, Emil
Subject: RE: Buffalo Color "Area D" Site Alternatives Evaluation
Date: Monday, November 03, 1997 8:35AM

my initial reaction is I think we need to get Julie S. involved to say what's so bad about leaving the stuff i.e evaluate no-action alt. It's covered by rip-rap, can it also be covered by some fabric to further isolate from river?

From: Kevin_Ernst
To: Paley, David
Cc: James_Kyles; Scott_Versluis; Eugene_W_Melnyk
Subject: Buffalo Color "Area D" Site Alternatives Evaluation
Date: Friday, October 31, 1997 7:19PM

Attached for your review is a copy of the subject document in MS WORD format.

<<File Attachment: WETLAN~1.doc>>

Received: from green6.fabrik.com by persia.fabrik.com
with ESMTP (Fabrik F07.1-000)
id SINN.4234205@persia.fabrik.com ; Mon, 3 Nov 1997 06:03:03
-0800
Received: from tmpil001.tmp.allied.com by green6.fabrik.com with SMTP
(Microsoft Exchange Internet Mail Service Version 5.0.1458.49)
id TWFVCCZK; Mon, 3 Nov 1997 06:02:14 -0800
Received: by tmpil001.tmp.allied.com id AA11100
(InterLock SMTP Gateway 3.0); Mon, 3 Nov 1997 06:58:52 -0700
Received: by tmpil001.tmp.allied.com (Internal Mail Agent-1);
Mon, 3 Nov 1997 06:58:52 -0700
Message-Id:
<c=US%a=_%p=ALLIED%l=ALLIED/NAGLOBAL/0005BE71@tmpcn510.wins.allied.com>
From: "Paley, David" <David.Paley@alliedsignal.com>
To: Kevin_Ernst <kevin_ernst@parsons.com>
Cc: "Walerko, Emil" <Emil.Walerko@AlliedSignal.com>,
Eugene_W_Melnyk
<eugene_w_melnyk@parsons.com>,
James_Kyles
<james_kyles@parsons.com>,
Scott_Versluis
<scott_versluis@parsons.com>
Subject: RE: Buffalo Color "Area D" Site Alternatives Evaluation
Date: Mon, 3 Nov 1997 06:58:00 -0700
X-Mailer: Microsoft Exchange Server Internet Mail Connector Version
4.0.995.52
Encoding: 28 TEXT

In response to your questions:

1. Yes, the no action alternative should be considered. An individual with experience performing contaminant risk assessments should be able to evaluate the risks to potential receptors for the case where the 3,900 cy of waste is left in place.

2. Adding geofabric in addition to the existing fabric will not further improve the situation. Any additional fabric would have to reduce advection/dispersion and diffusion of contaminants into the river. Geomembranes do not function effectively in this application. The existing rip rap and geofabric in the stabilization system will significantly reduce erosion of the contaminated bank. The rip rap as well as a large quantity of clean backfill soil would have to erode prior to erosion of any of the contaminated soils that are left in place. Thus, the primary transport mechanisms for contaminants to reach the river are reduced. Thus, credit for these conditions should be considered in the risk evaluation. Using a fabric such as a geomembrane to isolate the waste from the river is not likely to be effective or practical in this application, and would probably be relatively expensive to install. Some severe difficulties arise such as installation of such a system underwater (e.g., welding seams requires dry conditions, construction of underwater anchors) at the depths that the waste is located; and providing for complete isolation of the waste.

3. Yes, sheet piling would result in "undoing" a lot of already completed work. For the soil mixing option, any rip rap and geofabic previously placed would have to be removed to prevent

"fouling" of the soil mixing augers. The injection grouting option would result in the least disruption of the installed shoreline stabilization system. For this option, only small areas of rip rap where the grouting penetrations were made would potentially require repair at completion of the grouting.

Received: from tmpil001.tmp.allied.com by persia.fabrik.com
with SMTP (Fabrik F07.1-000)
id SINN.4245022@persia.fabrik.com ; Mon, 3 Nov 1997 13:23:13 -0800
Received: by tmpil001.tmp.allied.com id AA15022
(InterLock SMTP Gateway 3.0); Mon, 3 Nov 1997 14:23:03 -0700
Received: by tmpil001.tmp.allied.com (Internal Mail Agent-1);
Mon, 3 Nov 1997 14:23:03 -0700
Message-Id:
<c=US%a=_%p=ALLIED%l=ALLIED/NAGLOBAL/0005E20A@tmpcn510.wins.allied.com>
From: "Paley, David" <David.Paley@alliedsignal.com>
To: Kevin_Ernst <kevin_ernst@parsons.com>
Cc: "Walerko, Emil" <Emil.Walerko@AlliedSignal.com>,
Eugene_W_Melnyk
<eugene_w_melnyk@parsons.com>,
James_Kyles
<james_kyles@parsons.com>,
Scott_Versluis
<scott_versluis@parsons.com>
Subject: RE: Re[2]: Buffalo Color "Area D" Site Alternatives Evaluation
Date: Mon, 3 Nov 1997 14:21:00 -0700
X-Mailer: Microsoft Exchange Server Internet Mail Connector Version 4.0.995.52
Encoding: 115 TEXT

Author: Kevin Ernst at FEFE-27-ERAFS1-A
Date: 11/1/97 3:19 PM
Priority: Normal
TO: ,"Paley, David" <David.Paley@alliedsignal.com> at -FABRIK/Internet
CC: Scott Versluis, James Kyles at PARMOBIL, Eugene W. Melnyk at PARMOBIL, "Emil Walerko" <Emil.Walerko@AlliedSignal.com> at -FABRIK/Internet
Subject: Re[2]: Buffalo Color "Area D" Site Alternatives Evaluation

1. Regarding the dewatering option:

Upon further technical review of this option, it was determined that pumping from inside the landfill would not achieve the stability necessary to excavate contaminated soil adjacent to the wall. Therefore, evaluation of this option was not carried forward.

Author: ,"Paley, David" <David.Paley@alliedsignal.com> at -FABRIK/Internet
Date: 11/3/97 11:27 AM
Priority: Normal
CC: Scott Versluis at FEFE-27-ERAFS1-A, James Kyles at PARMOBIL,
Eugene W. Melnyk at PARMOBIL
TO: Kevin Ernst at FEFE-27-ERAFS1-A
CC: "Emil Walerko" <Emil.Walerko@AlliedSignal.com> at -FABRIK/Internet
Subject: RE: Buffalo Color "Area D" Site Alternatives Evaluation

From: Paley, David
Date: Mon, Nov 3, 1997 11:27 AM
Subject: RE: Buffalo Color "Area D" Site Alternatives Evaluation
To: Kevin_Ernst
Cc: Eugene_W_Melnyk; James_Kyles; Scott_Versluis; Walerko, Emil
still another question: what happened to the alternative Scott suggested in meeting Oct 1 in which more material can be removed by dewatering inside slurry wall to reduce lateral forces.

From: Paley, David
To: Kevin_Ernst
Cc: James_Kyles; Scott_Versluis; Eugene_W_Melnyk; Walerko, Emil
Subject: RE: Buffalo Color "Area D" Site Alternatives Evaluation
Date: Monday, November 03, 1997 8:58AM

another question: Of the two alternatives under consideration, it would seem that cementation/soil mixing could be done after the shoreline stabilization is finished, whereas the sheet-piling alternative cannot, at least without undoing a lot of completed work. Is this correct, or would cementation also undo the shoreline?

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From: Kevin_Ernst
To: Paley, David
Cc: James_Kyles; Scott_Versluis; Eugene_W_Melnyk
Subject: Buffalo Color "Area D" Site Alternatives Evaluation
Date: Friday, October 31, 1997 7:19PM

Attached for your review is a copy of the subject document in MS WORD format.

<<File Attachment: WETLAN~1.doc>>

Received: from tmpil001.tmp.allied.com by persia.fabrik.com
with SMTP (Fabrik F07.1-000)
id SINN.4242174@persia.fabrik.com ; Mon, 3 Nov 1997 11:33:45 -0800
Received: by tmpil001.tmp.allied.com id AA22102
(InterLock SMTP Gateway 3.0); Mon, 3 Nov 1997 12:33:35 -0700
Received: by tmpil001.tmp.allied.com (Internal Mail Agent-1);
Mon, 3 Nov 1997 12:33:35 -0700

Message-Id:
<c=US%a=_%p=ALLIED%l=ALLIED/NAGLOBAL/0005D974@tmpcn510.wins.allied.com>
From: "Paley, David" <David.Paley@alliedsignal.com>
To: Kevin_Ernst <kevin_ernst@parsons.com>
Cc: "Walerko, Emil" <Emil.Walerko@AlliedSignal.com>,
Eugene_W_Melnyk
<eugene_w_melnyk@parsons.com>,
James_Kyles
<james_kyles@parsons.com>,
Scott_Versluis
<scott_versluis@parsons.com>
Subject: RE: Buffalo Color "Area D" Site Alternatives Evaluation
Date: Mon, 3 Nov 1997 12:27:00 -0700
X-Mailer: Microsoft Exchange Server Internet Mail Connector Version 4.0.995.52
Encoding: 38 TEXT

Author: ,"Paley, David" <David.Paley@alliedsignal.com> at -FABRIK/Internet
Date: 11/3/97 5:58 AM
Priority: Normal
CC: Scott Versluis at FEFE-27-ERAFS1-A, James Kyles at PARMOBIL,
Eugene W. Melnyk at PARMOBIL
TO: Kevin Ernst at FEFE-27-ERAFS1-A
CC: "Emil Walerko" <Emil.Walerko@AlliedSignal.com> at -FABRIK/Internet
Subject: RE: Buffalo Color "Area D" Site Alternatives Evaluation

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Date: Mon, Nov 3, 1997 5:58 AM
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Received: from green6.fabrik.com by persia.fabrik.com
with ESMTP (Fabrik F07.1-000)
id SINN.4234205@persia.fabrik.com ; Mon, 3 Nov 1997 06:03:03 -0800
Received: from tmpil001.tmp.allied.com by green6.fabrik.com with SMTP
(Microsoft Exchange Internet Mail Service Version 5.0.1458.49)
id TWFVCCZK; Mon, 3 Nov 1997 06:02:14 -0800
Received: by tmpil001.tmp.allied.com id AA11100
(InterLock SMTP Gateway 3.0); Mon, 3 Nov 1997 06:58:52 -0700
Received: by tmpil001.tmp.allied.com (Internal Mail Agent-1);
Mon, 3 Nov 1997 06:58:52 -0700
Message-Id:
<c=US%a=_%p=ALLIED%l=ALLIED/NAGLOBAL/0005BE71@tmpcn510.wins.allied.com>
From: "Paley, David" <David.Paley@alliedsignal.com>
To: Kevin_Ernst <kevin_ernst@parsons.com>
Cc: "Walerko, Emil" <Emil.Walerko@AlliedSignal.com>,
Eugene_W_Melnyk
<eugene_w_melnyk@parsons.com>,

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Date: 11/3/97 5:35 AM
Priority: Normal
CC: Scott Versluis at FEFE-27-ERAFS1-A, James Kyles at PARMOBIL,
Eugene W. Melnyk at PARMOBIL
TO: Kevin Ernst at FEFE-27-ERAFS1-A
CC: "Emil Walerko" <Emil.Walerko@AlliedSignal.com> at -FABRIK/Internet
Subject: RE: Buffalo Color "Area D" Site Alternatives Evaluation

From: Paley, David
Date: Mon, Nov 3, 1997 5:35 AM
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with SMTP (Fabrik F07.1-000)
id SINN.4233794@persia.fabrik.com ; Mon, 3 Nov 1997 05:36:49 -0800
Received: by tmpil001.tmp.allied.com id AA07796
(InterLock SMTP Gateway 3.0); Mon, 3 Nov 1997 06:36:42 -0700
Received: by tmpil001.tmp.allied.com (Internal Mail Agent-1);
Mon, 3 Nov 1997 06:36:42 -0700
Message-Id:
<c=US%a=_%p=ALLIED%l=ALLIED/NAGLOBAL/0005BCE8@tmpcn510.wins.allied.com>
From: "Paley, David" <David.Paley@alliedsignal.com>
To: Kevin_Ernst <kevin_ernst@parsons.com>
Cc: "Walerko, Emil" <Emil.Walerko@AlliedSignal.com>,
Eugene_W_Melnyk
<eugene_w_melnyk@parsons.com>,
James_Kyles
<james_kyles@parsons.com>,
Scott_Versluis
<scott_versluis@parsons.com>
Subject: RE: Buffalo Color "Area D" Site Alternatives Evaluation
Date: Mon, 3 Nov 1997 06:35:00 -0700
X-Mailer: Microsoft Exchange Server Internet Mail Connector Version 4.0.995.52
Encoding: 16 TEXT

Author: Kevin Ernst at FEFE-27-ERAFS1-A
Date: 11/1/97 1:10 PM
Priority: Urgent
Receipt Requested
TO: ,"Paley, David" <David.Paley@alliedsignal.com> at -FABRIK/Internet
CC: Scott Versluis, James Kyles at PARMOBIL, Eugene W. Melnyk at PARMOBIL,
"Emil Walerko" <Emil.Walerko@AlliedSignal.com> at -FABRIK/Internet
Subject: Re[2]: Buffalo Color "Area D" Site Alternatives Evaluation

From: Paley, David
Date: Mon, Nov 3, 1997 5:58 AM
Subject: RE: Buffalo Color "Area D" Site Alternatives Evaluation
To: Kevin_Ernst
Cc: Eugene_W_Melnyk; James_Kyles; Scott_Versluis; Walerko, Emil
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Subject: RE: Buffalo Color "Area D" Site Alternatives Evaluation
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Cc: "Walerko, Emil" <Emil.Walerko@AlliedSignal.com>,
Eugene_W_Melnyk
<eugene_w_melnyk@parsons.com>,

James_Kyles
<james_kyles@parsons.com>,
Scott_Versluis
<scott_versluis@parsons.com>
Subject: RE: Buffalo Color "Area D" Site Alternatives Evaluation
Date: Mon, 3 Nov 1997 06:58:00 -0700
X-Mailer: Microsoft Exchange Server Internet Mail Connector Version 4.0.995.52
Encoding: 28 TEXT

Author: Karen Peluso at PARSYR1
Date: 10/23/97 10:07 AM
Priority: Normal
TO: Donald DelNero, Eugene W. Melnyk at PARMOBIL
CC: William Long, Edward W. Roberts
Subject: Re[3]: Buffalo Color

Gene,

We are currently working on a limited sediment removal (apprx. 500 CY) project for PP&L which involves near-shore sediment excavation. We are planning on using a Porta-dam to dewater area for dry sediment removal. Also, at Queensbury, they used a berm constructed of Jersey barriers and poly sheeting along the shoreline to dewater area. An earthen berm is also an option. However, all of these options will only work in shallow (<10 feet) of water. If your water depth is greater than 10 feet, we have extensive references on dredging technologies/projects and sediment treatment options.

______________________________ Reply Separator ______________________________

Subject: Re[2]: Buffalo Color
Author: Eugene W. Melnyk at Parmobil
Date: 10/23/97 08:24 AM

Don/Karen

Thanks for the followup. I'm not certain the work is really dredging, but rather "underwater excavation" limited to a short stretch of the river bank along the site. The alternatives evaluation will be very limited to several methods necessary to remove wastefill that slumped into the river. Jeff Poulsen has KAP's copy of EPA pub 905-R94-003 "Assessment and Remediation of Contaminated Sediments (ARCS) Program. If you have any other references worth looking into, please send them to my attention.

Thanks

Gene

______________________________ Reply Separator ______________________________

Subject: Re: Buffalo Color
Author: Donald DelNero at PARSYR1
Date: 10/22/97 11:00 AM

Gene,

I spoke with Kevin in Fernald on the Buffalo Color dredging issues. He wanted me to let you know that Karen Paluso and I have several references on dredging techniques that could be used for looking at alternatives at the site. Karen has the majority of the references; just give here a call if you need them.

Don

7

PARSONS ENGINEERING SCIENCE, INC.

180 Lawrence Bell Drive, Suite 100 • Williamsville, New York 14221 • Phone (716) 633-7074 • Fax (716) 633-7195

FACSIMILE TRANSMISSION COVER SHEET

PLEASE DELIVER THE FOLLOWING PAGES:

PROJECT NO.: 729710.01000 DATE: 10/27/97

TO: KEVIN ERNST COMPANY: PARSONS

FROM: GLENN MELNYK FAX NO.: 513-648-6892
6733

Note to receiving fax machine operator:
Please make and distribute copies to appropriate addressees, so that each individual receives his/her copy simultaneously.

NOTES/INSTRUCTIONS

KEVIN

THE ATTACHED CONSISTS OF LITERATURE REGARDING STABILIZATION / REMOVAL OF CONTAMINATED MATERIAL ALONG A RIVER BANK. THIS IS REFERENCE TO AN ARTICLE I REMEMBER SEEING AT ONE TIME THAT MAY BE OF INTEREST TO BUFFALO COLOR.

Glenn M.

PAGES: 2

FAX

SSM
SOIL
STABILIZATION

Case Study No. 2

Shallow Soil Mixing

APPLICATION

A former Manufactured Gas Plant (MGP) site adjacent to the Chattahoochee River was to be converted into a city park. A site assessment determined the extent of MGP materials, primarily coal tar, present in the soil and groundwater on the site. The assessment found petroleum hydrocarbons and other man-made materials present at depths ranging to 35 feet. The site soils consisted of fill materials and stream alluvium underlain throughout the site by saprolite, a relatively impervious ($K < 10^{-6}$ cm/sec) weathering product of igneous and metamorphic rock. The evaluation of remedial action alternatives for the site determined that the most appropriate technology was the in-situ stabilization of the soils containing MGP-related materials that were below and just above the water table. Total Poly-Aromatic Hydrocarbons (PAH) concentrations in soil ranged from 1545 ppm to 26,416 ppm.

The MGP site location and characteristics dictated that the in-situ stabilization technology should provide a uniform mix of the affected soils and have provisions to control organic vapors and dust. For these reasons Geo-Con's Shallow Soil Mixing (SSM) system was chosen to perform the in-situ soil stabilization.

SSM is a method of mixing soils or sludges with dry or fluid treatment reagents to produce a solidified or stabilized end product in an economically feasible manner. SSM can mix soils and sludges of varying moisture contents to depths of over 30 feet. The SSM system utilizes a crane-mounted mixing system. The mixing auger, 3 to 12 feet in diameter, is driven by a high torque turntable. Treatment reagents are precisely weighted then transferred pneumatically for dry chemicals, or measured volumetrically and pumped in cases where fluid reagents are utilized.

LOCALITY

Columbus, Georgia

WHAT HAD TO BE DONE

The remedial design called for the following treatment criteria:

1. The treated soils shall have a minimum Unconfined Compressive Strength (UCS) of 60 psi after 28 days.
2. The permeability of the treated soil shall be less than 1×10^{-5} cm/sec.
3. Leachate from the treated soil, obtained from TCLP extraction, must not contain total PAHs greater than 10 mg/l.

Bench scale treatability test results indicated that the treatment criteria would be met with a 10% (by dry weight of soil) addition of Portland Cement.

(over)

Geo-Con, Inc.
Geotechnical Construction

Corporate One-Bldg. II
Suite 400
4075 Monroeville Blvd.
Monroeville, PA 15146
(412) 856-7700

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CA (510) 887-2002
FL (813) 647-5888
TX (817) 383-1400
NJ (609) 772-1188

The first phase of the remediation included the construction of a cement stabilized soil-crete containment wall parallel with the river bank. Due to greater strength and permeability requirements, this section used a 25% cement addition. The 400 lineal foot, 8 foot wide barrier wall was keyed three feet into the saprolite and had permeability of 10^{-8} cm/sec and a 28 day UCS of over 300 psi. The barrier wall served two purposes; it acted as a retaining wall allowing for the removal of the contaminated soils on the riverside of the wall and it prevented any potential migration of contaminates from the site to the river.

A SHEET PILE WOULD SERVE THE SAME PURPOSE FOR BUFFALO COLOR

The remaining area (approximately 1.6 acres) was treated by SSM using a primary and secondary overlapping 8 foot diameter bore pattern. The stabilization columns ranged from 26 to 35 feet in depth. The photo shows the barrier wall and the construction work.

CONCLUSION

The 82,000 cubic yards of in-situ stabilization was accomplished within the 20 week fast track schedule by working around the clock, seven days a week. The effectiveness of the SSM stabilization system in providing the correct dosage, thorough mixing, and adequate coverage of the subsurface zone to be treated was confirmed by the fact that only one column out of over 1800 was remixed due to a questionable UCS test result. The analytical results of the stabilization QA/QC sampling program showed permeabilities in the 10^{-7} cm/sec range. UCS results averaged in the 100 to 200 psi range (Figure 1) and the total PAHs in the TCLP test were well below the 10 ppm limit set in the treatment criteria as shown in Figure 2.

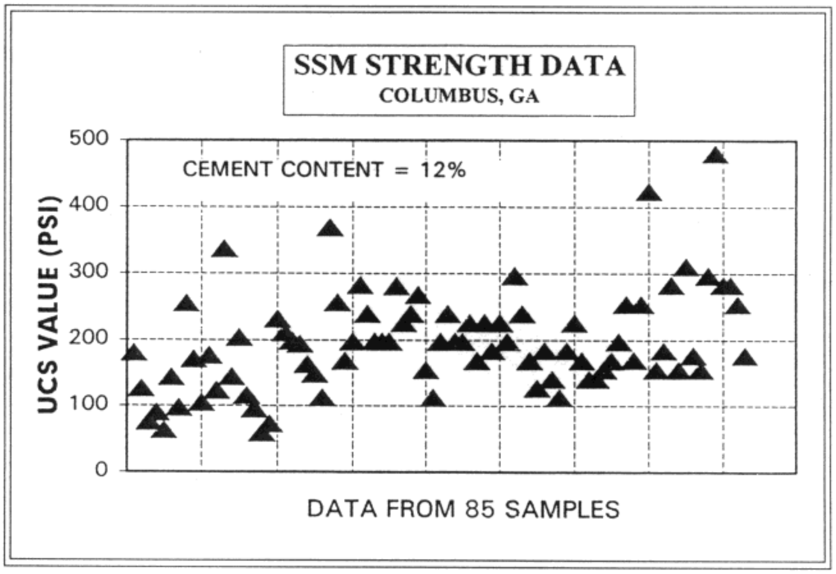

Figure 1

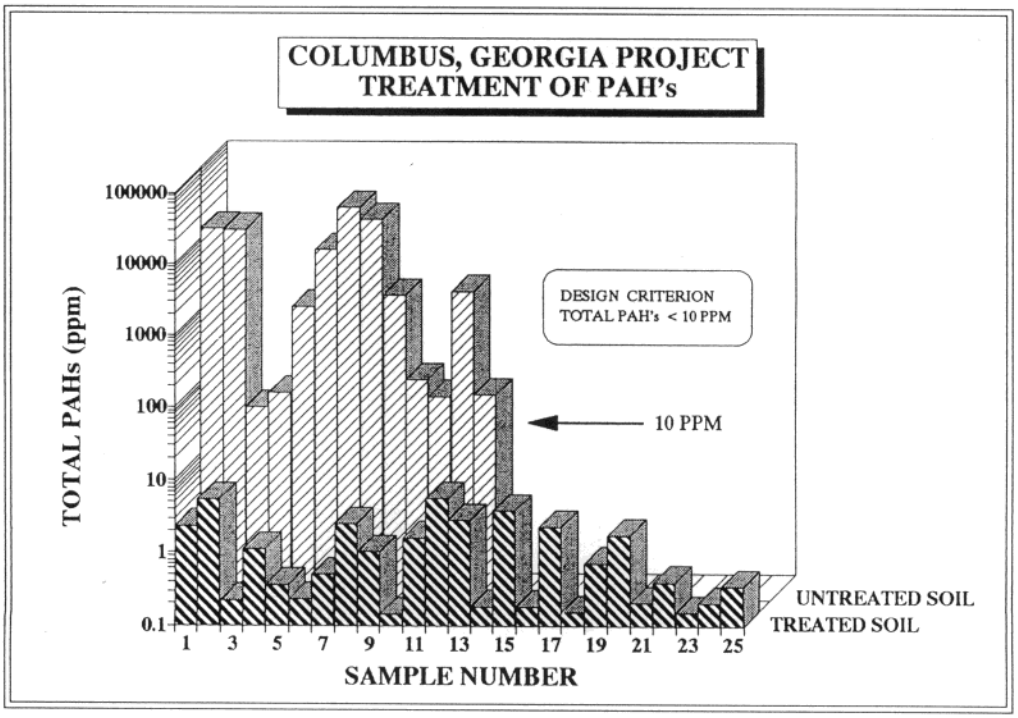

Figure 2

Buffalo Color -

- Criteria
  - Cost
  - Constructability
  - Effectiveness ??
  - Timelyness ??
- Options
  1. Sheet Piling (K. Ernst)
  2. Dredge/Backfill/Simultaneously (Ecm)
  3. Cement Stabilization of Waste - Insitu Immobilize
  4. Water level control to stabilize wall

- 3H : 1V Slopes
  Complete by DEC 12, 1997

- JHK 12/15/97 completion date
- Check RI reports regarding cement stabilization of materials

- Length of shoreline? Ask Poulsen