Southern Environmental Law Center

Evaluation of Proposed Congaree River Cap for Control of Coal Tar Sediments

April, 2017

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CONGAREE RIVER CORRECTIVE ACTION REVIEW

1.0 INTRODUCTION AND PURPOSE

The Southern Environmental Law Center has requested that NewFields provide a review of proposed capping of portions of the Congaree River in South Carolina to control a release of tar-like material (TLM) in sediments at the bottom of the river. The critical issue involves whether capping the contaminated sediments in place as opposed to removing the contaminated sediments is adequate to address the following:

- Is the proposed remedy protective of human health and the environment?
- Are the technical difficulties associated with the removal option insurmountable?
- What are the technical advantages/disadvantages of either remedy?
- Is the removal option not technically feasible, or is it merely too expensive?
- Are there other removal options other than the one proposed?
- What are the downsides of the capping remedy from both human exposure and environmental impact standpoints?

This evaluation was performed by Randall Grachek, P.E., Partner at NewFields, Atlanta Georgia.

2.0 BACKGROUND AND CURRENT CONDITIONS[1]

The Congaree River begins in Columbia where the Saluda River and Broad River join together. It is bordered on the east by the City of Columbia and on the west by the Cities of Cayce and West Columbia. It flows for approximately 47 miles until it merges with the Wateree River. Congaree National Park is located about halfway down the river's course.

The Congaree River is a popular area for swimming, canoeing, fishing and other recreational activities. There are several access points to the river near downtown Columbia. Official boat ramps include the Thomas Newman Boat Ramp on the Cayce Side of the river on Old State Road and the Jordan Memorial Boat Ramp. There are also public canoe/kayak access points at the West Columbia Riverwalk just below the Gervais Street Bridge and Granby Park below the Blossom Street Bridge. There is also an unofficial river access point at the end of Senate Street in the middle of the TLM affected area.

In June 2010, the South Carolina Department of Environmental Control (DHEC) responded to a report of tar-like material (TLM) in the sediments of the Congaree River. The affected area begins directly south of the Gervais Street Bridge, extending approximately 200-300 feet into the river from the eastern shoreline, and approximately 2,000 feet south downriver towards the Blossom Street Bridge. There are also smaller TLM deposits below the Blossom St Bridge. At that time, DHEC began an investigation that included collecting surface water and sediment samples. DHEC also posted metal signs warning against swimming or wading in the area as a precautionary measure.

[1] DHEC Website – Site History, Assessment, and Clean-up Options

Preliminary sample results indicated that the TLM had similar chemical and physical characteristics as coal tar, a by-product of Manufactured Gas Operations which were common in cities from the late 1800s until the 1950s. Additional research found that the most likely source of the TLM was a former Manufactured Gas Plant (MGP) located northeast of the river at 1409 Huger Street that operated from about 1906 until the mid-1950s.

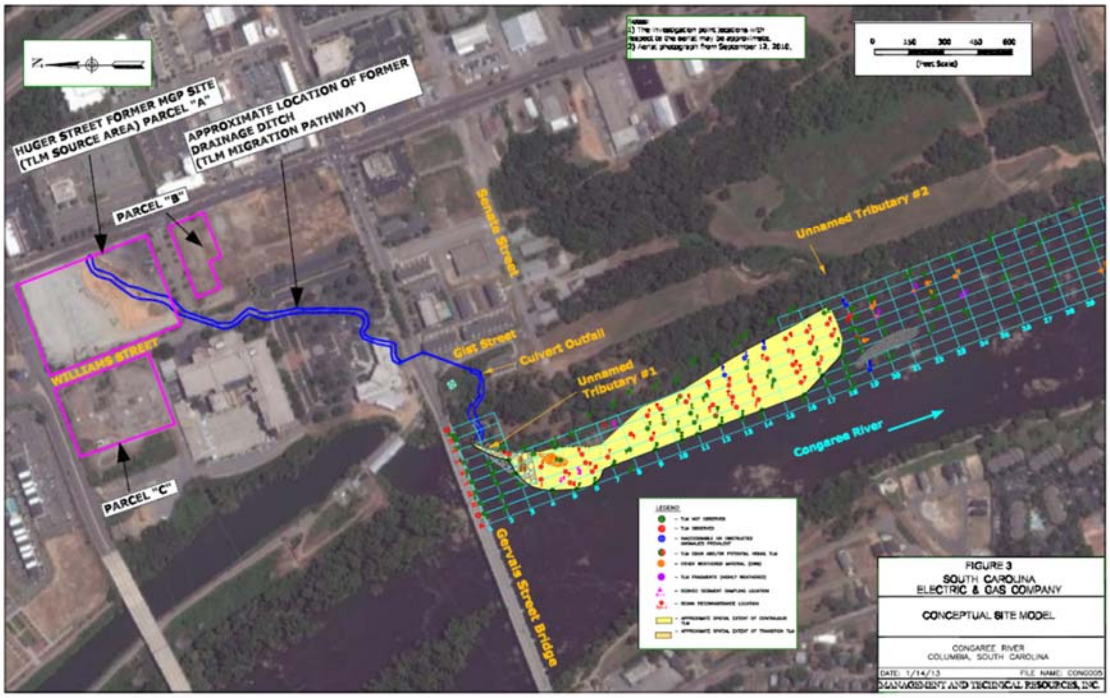
MGPs produced a flammable gas from coal that was used for heating, cooking and lighting purposes prior to the construction of interstate natural gas pipelines. The coal tar material was a waste product from coal-gas production. Once the gas was produced, the coal tar by-product was discharged into a former stream which originated at what we know today as Finley Park, past the MGP site, and into the Congaree River just below the Gervais Street Bridge. The Huger Street MGP was operated by South Carolina Electric & Gas (SCE&G) and predecessor companies beginning in the early 1900s and ending in the 1950s.

SCE&G had previously entered into a Voluntary Cleanup Contract (VCC) with DHEC in August 2002 to conduct environmental assessment and cleanup activities at the former Huger Street MGP site. SCE&G has worked with DHEC under its existing VCC to determine the extent of TLM in the Congaree River and to develop a plan for cleanup. DHEC has confirmed the presence of TLM in the sediments and soils of the Congaree River between the Gervais and Blossom Street bridges. DHEC has been overseeing the investigation and assessment of this site since June 2010.

SCE&G's investigation activities of the Congaree River consisted of 5 phases of preliminary surveys and sampling from September 2010 through March 2012. A total of 244 sediment and soil samples were collected to determine the depth and extent of the tar-like material (TLM). Of the samples collected, 40 were sent to a laboratory to be further analyzed. The analytical results indicated the presence of some volatile organic compounds (VOCs) in the samples. The dominant group of semi-volatile organic compounds (SVOCs) detected were polynuclear aromatic hydrocarbons (PAHs). The sediment layer containing TLM varies from approximately less than one inch to several feet in thickness. Water samples from the river were also collected and have been analyzed. The water samples have shown no tar-related chemicals of concern. It’s noted that only two water samples have been collected, both in 2010, and none after heavy rain events or flooding. It’s also noted that no fish or macroinvertebrate samples have been collected.

The map below shows the sampling points and grid lines used in the assessment of the affected area of the Congaree River.

Figure 1 – Conceptual Site Model



The unconsolidated sediments within the project area may range in thickness from about 0.2 feet to 6.0 feet and can be absent when the granite bedrock is exposed. Underlying the unconsolidated sediment, or exposed as outcrops, is resistant granite (Columbia) of Paleozoic (Cambrian) age. The granite forms the base of the Congaree River, and through differential weathering and erosion, an irregular bottom has developed.[2]

3.0 CLEANUP ALTERNATIVES[3]

The following cleanup alternatives were developed for the river sediments:

- Alternative 1, No Action – Leave the TLM in place. This option is primarily used as a baseline for comparison with other options. Estimated Cost: $0.00

- Alternative 2, Monitoring and Institutional Controls – Leave the TLM in place and restrict access to the area by placing signs in and along the river and installing a chain link fence along the eastern shoreline. 30-year annual monitoring of sediment conditions in and downstream of the affected area would be performed to detect any movement of the TLM. Estimated Cost: $677,000.00

- Alternative 3, Sediment Capping and Institutional Controls – Leave the TLM in place and "cap" it with a physical barrier on top of the sediment. The barrier would be designed to withstand routine flooding and would most likely include a geotextile

[2] EE/CA
[3] DHEC Website – Clean-up Alternatives

fabric overlaid by riprap stone. Institutional controls and monitoring similar to Alternative 2 would be included. Estimated Cost: $7,681,000.00

- Alternative 4, Removal of the TLM and Impacted Sediments – Physically remove the TLM from the river. This option would include construction of a temporary dam and dewatering of the affected area so that the TLM and sediments could be removed and taken to a licensed off-site facility for disposal. The ecological environment would be restored upon completion. Estimated Cost: $18,529,089.00

In general, the levels of protectiveness to human health and the environment, reduction in toxicity and mobility, and the level of regulatory compliance increase from zero for Alternative 1 progressing to the most protective option, Alternative 4. The reverse is true for implementability and cost as Alternative 1 requires no implementation and costs nothing whereas Alternative 4 is the most costly and most difficult to implement.

4.0 DHEC PREFERRED ALTERNATIVE[4]

In March 2013, DHEC identified a preferred cleanup alternative for the Congaree River sediments and soils as No. 4 - Removal of the TLM and Impacted Sediments. The DHEC Website then lists numerous permitting obstacles and issues with the construction of cofferdams and then indicates that they are re-evaluating the cleanup alternatives outlined in an Engineering Evaluation/Cost Analysis (EE/CA).

On March 21, 2013, DHEC held a public meeting to discuss the Engineering Evaluation/Cost Analysis (EE/CA) and presented Alternative 4 – Removal of the TLM and Impacted Sediments, as the preferred remedy for cleanup of the Congaree River sediments. All of the comments received during the public comment period were in favor of Alternative 4.

In October 2013, SCE&G began the design and permitting process for construction of a cofferdam to allow for excavation of sediments and tar-like material (TLM) in the Congaree River under dry conditions. From 2013 through the first half of 2015 meetings were held between numerous state and federal stakeholders - including DHEC, SCE&G, and the US Army Corps of Engineers (USACOE), in pursuit of the cofferdam design. During the permitting process, several significant design issues with the cofferdam were identified and caused the need for a re-evaluation of the proposed removal action. These issues included:

- Risk of increased erosion to the shoreline on the west bank;
- Risk of creating flooding on the west bank;
- Risk of overtopping of the cofferdam;
- Risk of catastrophic overtopping where cofferdam material and exposed tar material would be washed downriver; and
- Risk of construction, potential for leakage and concerns that the cofferdam could not be adequately removed when complete.

[4] DHEC Website – DEHC Preferred Cleanup Alternative and Updates

In July 2015, SCE&G submitted a Work Plan proposing to try an alternate removal approach of building a temporary dam using large sandbags to allow for excavation in the river. DHEC and the USACOE agreed to allow SCE&G to conduct a pilot test to see if this alternative could work. SCE&G began the pilot test on September 29, 2015. However, on October 4, 2015, historic flooding caused a breach in the Columbia Canal upstream of the removal area and deposited up to 5 feet of sediment over some of the areas to be excavated.

On July 12, 2016, SCE&G submitted a Field Demonstration Project Documentation Report on the pilot test to DHEC. The report concluded that the sandbag approach would not work. SCE&G requested that DHEC reconsider allowing capping of the area due to current river conditions and the negative effects of the proposed cofferdam.

On August 16, 2016, after careful evaluation of all the previously considered alternatives, DHEC sent a letter requesting SCE&G to evaluate if Alternative 3 - Sediment Capping and Institutional Controls would meet the USACOE permitting requirements. The purpose of this was to determine if the USACOE permit requirements could be met for the capping alternative, as they could not be met for the removal alternative.

On September 22, 2016, SCE&G submitted the Joint Federal and State Application to the USACOE for review of the capping alternative. This application is currently under review by the USACOE. Pending a decision by the USACOE, DHEC will pursue finalizing a cleanup alternative. Additional opportunities for public engagement will be provided by DHEC prior to selection of a final cleanup action.

5.0 REMOVAL ACTION ISSUES

The feasibility of the removal action relies on the ability to effectively isolate zones of the river for excavation and restoration under dry conditions. This involves the installation of a stone-filled cofferdam in phases to isolate the known occurrence of TLM to facilitate removal.

The stone-filled cofferdam was chosen from 10 alternative dam systems with 3 systems (Stone filled berm with liner, Portadam system, and cellular sheet pile) selected for further evaluation.[5] The Portadam system was not chosen because fill and leveling requirements before installation could not be met and the sheet pile system was not chosen because pilings could not be effectively driven into the streambed and they would not seal well with an irregular streambed.

Critical issues with the installation of a cofferdam were identified as follows:

- It is not feasible or practical to install cofferdams that can withstand all potential flooding events, meaning that the selected cofferdam elevation of 123.5 ft. (NGVD 29) runs the risk of overtopping and thus delaying the excavation work;
- The risks indicated in Section 4.0 including shoreline erosion, flooding, overtopping or catastrophic overtopping events, and concerns regarding dam constructability.

[5] February 18, 2018 letter to Mr. Lucas Berresford, Project Manager, State Remediation Section Division of Site Assessment and Remediation Bureau of Land and Waste Management, SCDHEC from Robert M. Apple, Remediation Project Manager, SCANA Services, Inc.

The risks and problems indicated above for the construction of a "large" cofferdam were considered in the development of an alternative approach for removal action, targeting only "thicker" deposits of contaminated sediments located closer the eastern shoreline, an area of greater probably of human contact. This alternative would result in a significantly reduced removal program using sandbags as an isolation dam alternative.

It was later determined, based on the results of a field demonstration project (FDP), that the sand bag option was not viable for isolating and dewatering areas for subsequent removal action.[6]

"One of the objectives of the FDP was to evaluate the effectiveness of utilizing Big Bags to construct a barrier to restrict river water infiltration into a work area and allow for simulation of a dewatering and excavation scenario. During the FDP, a long-reach excavator was utilized to place the bags a significant distance from the shoreline. The following was learned from the deployment of the Big Bags during the FDP:

- Filling the Big Bags, transporting them to the limited-access, river work area and placing them in position was a relatively slow process. Removing the Big Bags at the end of the project was a relatively time consuming task as well. This was primarily due to the need to handle each Big Bag separately. Bag placement and removal during a full-scale project would be so time consuming that it would take many construction seasons to complete the project, even in the reduced Modified Removal Action (MRA) area.

- Even with a long-reach excavator, placement of the Big Bags any significant distance from the shoreline was not possible without major access improvements, which would further increase the impact to the area and the time to complete the project.

- Placing the bags close enough together to create an adequate seal in deeper water is very difficult and allows for seams between bags that negate their water tightness. Big Bags are often effectively deployed on dryland before a flood and are more watertight and as a result, more effective, but placement within the water column at any depth is difficult to ensure a close, tight fit.

- The two to three Big Bag wide base and two Big Bag tall configuration utilized during this FDP was not adequate to control water intrusion/infiltration, leaking and overtopping. For actual work in the river, a wider base of staggered Big Bags (minimum five wide) and higher and wider top layers would be required to be at least minimally effective at controlling water. This drastically increases the amount of bags requiring placement in the deeper water and the resultant amount of bags that need to be removed, as well. Effectively deploying this amount of bags up to 200 feet into the river would be extremely difficult.

- Excavation of the sediment at the base of the Big Bags would result in a pathway for increased infiltration. Placement of additional Big Bags in this zone would likely be

[6] January 17, 2017 letter from SCANA to Mr. Lucas Berresford of the DEHC

required and increase the width of the sand bag base. A heavy-duty liner placed on the outboard side of the Big Bags would also provide added benefit, but would significantly increase the complexity of the project. In reality, use of the Big Bags would result in a structure of similar dimensions at the base in the deeper water areas as would the implementation of a stone cofferdam, with less effective water tightness.

- In order to keep the footprint of the bag placement area within realistic limits, the height of the bags would need to be limited and the overall height of the structure would also be limited, which would make the project more susceptible to overtopping. Overtopping increases the project timeframe, reduces the amount of actual work days available for removal operations and increases the potential for downstream migration of disturbed sediment. The risk of overtopping while the sediment is exposed (during excavation) represents a very real risk of mobilization of organics down river should such an event occur. The sand bag concept cannot adequately address this risk.

- Water infiltration through the sediment located between the base of the Big Bags and the bedrock interface was significant enough in even the small areas tested during the FDP to require continuous dewatering efforts. This infiltration, in deeper areas, would likely be much more severe and would be extremely difficult to manage.

As a result of these limitations, utilizing Big Bags for the isolation berm for the MRA would not be a viable alternative."

DHEC, prior to receiving the letter from SCANA regarding the unfeasible nature or the sand bag dewatering alternative, had in an August 16, 2016 letter to SCANA[7] requested that SCE&G pursue Alternative 3 – Sediment Capping and Institutional Controls as provided in the final EE/CA.

6.0 OPINION ON PROCESS TO GET TO ALTERNATIVE 3

In general, the process for determining the remedy, leading to the selection of the cap remedy, appeared to be directed toward a foregone conclusion. There are certainly technical and regulatory challenges associated with the dewatering of portions of the river for excavation, yet these challenges are not generally insurmountable for large works projects.

The relatively shallow nature of the river likely precludes dredging as an alternative and the thin sediment layer underlain by granite precludes several cofferdam options involving sheet piles. However, stone cofferdams are commonly used for applications of 18 to 36 inches of water depth retained. Also, crib cofferdams can be used where it is difficult to penetrate piles into bedrock.

The evaluation of the sand bag approach was based on an alternative excavation scenario where only a subset of the contamination in the river would be excavated. The issues cited regarding the sand bag approach included a number of "difficulties" associated with the

[7] DHEC letter to Mr. Robert Apple, SCANA Environmental Division – August 16, 2016.

process but no indication of significant infeasibility. Again, however, the implementation of the sand bag approach is unacceptable anyway because of the lessening of the scope of the excavation.

The regulatory difficulties dealing with the Army Corps of Engineers and DHEC/EPA are significant in that from an overall regulatory standpoint, a tradeoff is often assessed in situations of river sediment contamination where the risks to human health and the environment are balanced against the risks to the structure of the river and the risks of damage to several key river elements during the remedial activity.

It's fair to assume that the challenges in obtaining the needed permits to perform a removal action are quite significant, however, the challenges are exacerbated if the evaluation work is performed in a manner that always points to the infeasibility of one option and the feasibility of another. The 2013 EE/CA states in the executive summary that capping is a form of removal action. SCANA justifies this by citing the EE/CE guidance referring to a "removal action" including options other than physical removal (i.e. capping or in-situ treatment). Capping is not removal, but rather a containment remedy.

There is a considerable amount of non-specificity regarding the aerial extent of the capping system to be placed. In the Joint Application PCN Phase II Modified Removal Action Sediment Capping Project – September 2016 SCANA proposes to cap approximately 2.3 acres. However, the extent of TLM contaminated sediment described in the EE/CA is far more extensive (approximately 8.5 acres). Section 3.3 of the EE/CA says "*Figure 9 provides a potential sediment capping scenario. With this scenario, approximately 371,501 square feet of area would be capped".* This would suggest that approximately 8.5 acres will be capped, although it is clear in the document that this is a potential capping scenario.

7.0 COMPARISON OF REMOVAL AND CAPPING

This section provides a discussion regarding how Alternatives 3 and 4 from the EE/CA compare in regard to the critical issues stated in Section 1.0.

a. PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

Is the proposed remedy protective of human health and the environment?

A streamlined risk evaluation was included in the EE/CA. The evaluation considered three general approaches for determining the risk associated with TLM-impacted sediment observed within the Congaree River that included:

- Potential human health risks;
- "Site-specific" risk assessment comparison; and
- Sediment Quality Guidelines (SQGs).

The potential human health risks are associated with direct contact of the TLM-impacted sediment. The EE/CA indicated that TLM-impacted sediment within the Congaree River is presumed to be similar to or contains MGP constituents. The EE/CA did not indicate whether an actual risk assessment was performed on the sediments in the river, but rather indicated that risk evaluations were performed on sediments from the unnamed tributary #1.

Nonetheless, many of the constituents in the TLM samples collected exceed the EPA Region 9 Regional Screening Levels (RSLs) for residential soil and many potential constituents of concern (PCOCs) exceed the residential soil standards. The basic assumption with this approach is that the various inputs used in developing the quantitative risk assessment in the RI Report are applicable to the Congaree River sediments.

Based on the RI risk assessment, the outfall area sediments indicated that the cumulative 1×10^{-6} cancer risk was exceeded for the recreational user (1 to 6 year old child) using a benzo(a)pyrene exposure point concentration (EPC) of 3.1 mg/Kg. The TLM samples collected exceeded the 3.1 mg/Kg value for benzo (a) pyrene, therefore, it was concluded that the cumulative 1×10^{-6} cancer risk would be exceeded for the Congaree River sediments containing TLM. Further, it was determined that the Congaree River sediments within the project area exceed the sediment reference values by almost two orders of magnitude.

i. Alternative 3

Alternative 3 indicates a capping system using geotextile fabric overlaid by riprap stone. The remedy is protective of human health in that it eliminates direct contact between humans and the TLM. In the short term, the risk to damage of the river from leaching of PAHs and other constituents to the river would not be eliminated as geotextile fabric is not generally considered a cap barrier, but rather a stabilization material. Over time, new sediment would cover the stone and geotextile fabric, lessening the magnitude of potential release of constituents to the river. The proposed alternative does nothing to lessen risk of leaching constituents to the groundwater, and this environmental pathway was not considered in the EE/CA.

ii. Alternative 4

Alternative 4 indicates removal of TLM contaminated sediments and restoration of the stream bed. The remedy is protective of human health in that it eliminates direct contact between humans and the TLM. In the short term, there is a risk of mobilization of sediments to areas downstream during excavation/disturbance. Over the long-term, this alternative provides for complete mitigation of human health and environmental risks, including that to groundwater.

b. TECHNICAL DIFFICULTIES

Are the technical difficulties associated with the removal option insurmountable?

i. Alternative 3

There are no significant technical difficulties implementing the capping alternative. Care will be needed to assure that the geotextile fabric (or other materials) are properly placed and anchored and that the rip-rap cover is placed carefully so as not to damage the geotextile fabric. It would be beneficial to have a cushion layer of gravel placed above the geotextile to protect the material from tearing.

ii. Alternative 4

The information provided for review provides a considerable degree of argument that Alternative 4 poses insurmountable technical difficulties that preclude its implementation. It is true that there are technical challenges associated with the isolation of areas (cofferdam construction) for remediation and the associated regulatory issues, but these issues are not uncommon for projects of this type and there is nothing in the documentation that would preclude the implementation of this alternative.

The stream is not particularly deep and the surface features, side slopes, and river bottom characteristics are not particularly unique. The remediation process will be relatively slow and will be subject to delays, depending on the specific river flow conditions over the remediation period, however, this shouldn't be a reason to resort to another alternative that leaves contaminated materials in place.

c. TECHNICAL ADVANTAGES/DISADVANTAGES

What are the technical advantages/disadvantages of either remedy?

i. Alternative 3

The technical advantages to capping are clearly the speed of completing the remedy and the relatively straightforward manner in which the remedy would be implemented, avoiding many of the technical and regulatory challenges of Alternative 4. The obvious disadvantage is that Alternative 3 leaves the contaminated materials in the river and provides a synthetic cover that is not normally used as a barrier material in a cap. According to the EE/CA, the cost to implement this remedy is approximately 40% of Alternative 4.

ii. Alternative 4

The main obvious technical advantage of Alternative 4 is the complete removal of the contaminated sediments from the river. The technical disadvantages are the above mentioned long remediation timeframe, the risk of mobilizing contaminated sediments, and risks of degradation to river banks and uncontaminated areas. According to the EE/CA, the cost to implement this remedy is approximately 250% of Alternative 3.

d. REMOVAL OPITION FEASIBILITY

Is the removal option not technically feasible, or is it merely too expensive?

The removal option (Alternative 4) is technically feasible. Cofferdams are routinely installed in waterbodies where excavation work is required and there is no reason to believe that this application is particularly unique. The regulatory hurdles are likely more severe than the actual technical issues, but review of the documentation leads to the conclusion that cost is the overriding factor in promoting Alternative 3.

The Yorkville – Bristol Sanitary District in Illinois, as part of the removal of Blackberry Creek Dam in 2013 built installed coffer dams, removed sediments and stabilized the channel. The following photos show the coffer dam and removal of streambed sediments for the project.

Figure 2 - Temporary creek bypass with Coffer Dam located to the right

Figure 3 - Removal of stream bed sediment

The following photos are successful applications of coffer dams in major streambeds.

Figure 4 – Coffer Dam Application

Figure 5 – Coffer Dam Application

Figure 6 – Coffer Dam Application

The following photos show a coffer dam that was constructed in a river upstream of a main dam at the Merian Mine Site in Suriname South America for Newmont Mining Corporation. In the second photo the cofferdam is to the left of the large orange Hitachi excavator. The cofferdam was constructed to prevent stormwater runoff water and seepage water from flowing into the dam work area. The contained water was then be pumped downstream of the work area.

Figure 7 – Merian Mine Site

Figure 8 – Merian Mine Site

e. OTHER REMOVAL OPTIONS

Are there other removal options other than the one proposed?

For a deeper river, dredging would be a more attractive option. However, this is not an option for this application. There seem to be no other apparent and feasible options for sediment removal for this site.

f. RISK ISSUES WITH CAPPING

What are the downsides of the capping remedy from both human exposure and environmental impact standpoints?

Based on the analysis of the unnamed tributary #1 sediments, in relation to the actual sediments in the river, these sediments pose a defined human health and environmental risk regarding direct contact risk and water quality risks in the river. There was little to no information in the EE/CA regarding detailed ecological risk evaluations or acute exposure human health risks. Also, no information was included in the EE/CA regarding long-term effects to groundwater.

The capping remedy does eventually eliminate the TLM direct contact risk for humans, albeit resulting in a hazard for direct contact with the jagged rip-rap on top of the cap. The environmental risks that remain include leaching of PAHs through the geotextile fabric to the river and potential groundwater impacts of leaving the contaminated sediments in place.

8.0 CONCLUSION AND OVERALL OPINION

The overall theme of the approach by SCANA on this project can be gleaned from the Executive Summary of the EE/CA, where they purport that all of the four alternatives proposed are "Removal Action" alternatives. Whether the EE/CA Guidance indicates capping as a removal action or not, capping is not a removal action. Capping is a containment remedy, as the wastes are contained, not removed. The Federal Remediation Technologies Screening Matrix, Section 3.7, indicates caps as containment for soil, sediment, bedrock, and sludge.[8]

The approach to the analysis in the documentation clearly steers the project towards the capping remedy and away from the more complete removal remedy. The motivations are likely cost and an unwillingness to deal with the specific technical challenges and risks of pursuing a complete clean-up of the river.

In my opinion, the cost, technical, and regulatory challenges of the removal remedy do not outweigh the benefit of removal and disposal of the contamination from the river and the removal option should be the first option considered.

Further, if the capping option is eventually selected, the capping system should consist of a geotextile fabric overlain with an impermeable barrier (HDPE liner or similar), followed by a sand gravel cushion layer and then the minimum amount of rip-rap to secure the cap in place. Also, the capping option, as well as the excavation and removal option, should include the entire aerial extent of the contaminated sediment, not a subset of the area as suggested in the Joint Application PCN.

[8] https://frtr.gov/matrix2/section3/3_7.html

ATTACHMENTS

NewFields
Perspective. Vision. Solutions.

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Professional Engineer: Nebraska, Florida, Arkansas

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MS (1985) Civil/Environmental Engineering - University of Nebraska, Lincoln Nebraska

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HAZWOPER 40-hr. Health and Safety Certified

NewFields GIS and Statistical Methods Training

Professional Summary

Mr. Grachek has over 30-years of experience in the Civil/Environmental Engineering Field and has managed over his career the technical and regulatory aspects of a diverse portfolio of engineering and environmental projects. Mr. Grachek has specific expertise in environmental remediation, water/wastewater process design, investigations and strategy for CERCLA, RCRA, State Lead, industrial facility, landfill, wood treating, and pesticide waste projects.

Experience Summary

Mr. Grachek has specific experience and expertise in the following Engineering/Environmental Disciplines:

- Environmental Engineering
- Remedial Design/Remedial Action Management
- Landfill Closure Design and Construction
- Civil Engineering/Engineering Design
- Environmental Cost Analysis
- Data Analysis and Evaluation
- Water and Wastewater Engineering
- Remedial Investigation/Feasibility Study Management
- RCRA Facilities Investigations/Corrective Action and Designs
- HSRA Studies and Design
- Litigation Support Engineering

- Civil Engineering Management
- Wood Treating Facility RD/RA

Project Experience/Summary

NewFields, Atlanta GA (1997 – Present).

Responsible for the execution, management and direction of Engineering Investigation, Design, and Construction activities. Selected current projects and past experience with NewFields include:

- Lead Engineer and Manager for the design and implementation of a landfill closure for the Bayer Woodbine Facility in Woodbine Georgia. The project includes economic analysis, design and construction management for the closure of a solid waste landfill.

- Manager of a RCRA corrective Program for Hercules, Inc. at Hercules' Brunswick, Georgia facility. This project includes the performance of a RCRA Facilities Investigation (RFI) and the development of a Corrective Measures Study (CMS); Corrective Action Plans (CAP); Groundwater Remediation; Risk Analysis and detailed cost estimates for this toxaphene affected plant and the surrounding area.

- Lead Engineer and Manager for the design and remediation of the Saraland Superfund Site in Saraland, Alabama. This project involves the demolition and remediation of a government housing project that was built on land contaminated with waste sludge and materials from a former trucking operation. This site was excavated to remove soils that cause an exceedance in the 90% UCL concentrations of constituents in soil protective of groundwater and surface exposure. Groundwater on the site is naturally attenuating to background conditions.

- Lead Engineer and Manager for the design of the selected remedial action for the Virginia Wood Preserving Site in Richmond, Virginia. This project involves the remediation of a former wood treating facility including such technologies as horizontal directional well installation, surface and groundwater treatment, slurry wall design and construction, wetland mitigation, and design and construction of RCRA capping systems. Performed as Owner's agent, cost control manager and construction manager for the site remedial action.

- Environmental Engineer for the analysis of alternatives for the remediation of a major gulf coast sea terminal on the Gulf of Mexico. This project involves the evaluation of engineering and environmental data and the coordination of pre-design work, potentially leading to design and remediation.

- Cost Analysis Engineer for remediation of several manufacturing sites in locations around the world for a confidential client.

- Lead Engineer and Manager for the delisting of the Rentokil Norcross site from the Georgia Hazardous Sites Inventory. This project involved the investigation and remediation of chromium contaminated soils from this office/warehouse facility in Norcross Georgia, including CSR and CMS development. Detailed soils and groundwater analysis were performed and the site. Guided the project through the HSRA delisting process with the Georgia EPD.

- Design Engineer and Construction Engineer for the remediation of the Bayer Sao Leopoldo pesticides site in Sao Leopoldo, Brazil. Developed design documents and performed bidding, contractor selection, and construction over-site for the excavation and disposal project.

- Design Engineer and Construction Engineer for the Bayer Woodbine Landfill Leachate System Improvements. Developed design documents and performed bidding, contractor selection, and construction over-site for the project.

- Lead Engineer and Manager for the Hercules Savannah HSRA site in Savannah Georgia. This project involved the investigation and development of CSR and CMS documents for the site as well as management of field data.

- Engineer involved in the development of remedial elements for the Bofors-Nobel Superfund Site in Muskegon, Michigan. This project involves the installation of a RCRA Cap and Barrier Wall on a former chemical manufacturing facility. Other involvement on the project includes evaluation of the operation and maintenance of the existing groundwater treatment plant for the site.

- Engineer for the remedial program at a major petroleum terminal facility. Responsibilities include engineering design and analysis of environmental control and remediation plans and the development of cost estimates for the environmental program. Included in this evaluation is the closure of several RCRA units and the potential for the use of barrier and containment technologies in their closure. This project also includes evaluation of previous contractor's plans and cost estimates.

- Technical lead for legal support on closed municipal landfill litigation for a confidential client.

- Consultant to the Lake Lanier Association for the evaluation of existing wastewater treatment operations in the vicinity of Lake Lanier.

Engineering Manager, Dames & Moore, Inc., Atlanta GA (1993-1997)

Environmental Engineering and Engineering Management for major PRP lead Superfund Site Remedial Action Programs, Site Investigations and Environmental Process Engineering.

- Developed with other team members the Remedial Design/Remedial Action Work Plan for the Aberdeen Pesticides Dumps Site in Aberdeen, North Carolina. Reviewed the site Record of Decision and developed a strategic plan to perform the specified remedial action of the former pesticide manufacturing facility.

- Managed the RD/RA program for the Virginia Wood Preserving Superfund Site in Richmond Virginia. Developed the Remedial Action Work Plan and performed the preliminary remedial design for the ROD selected remedy. This project involves the remediation of a former wood treating facility including such technologies as horizontal directional well installation, surface and groundwater treatment, slurry wall construction, wetland mitigation, and RCRA capping. Performed post ROD Risk Analysis for reduction of RA scope and cost.

- Performed an analysis of a potential catastrophic tank spill involving tall oil and black liquor for the Mead Paper Company in Mahrt, Alabama. Evaluated the ability of the current activated sludge treatment plant to handle a large tank spill through the treatment system.

- Manager of the Remedial Program at the Newport Wellfield Site in Newport Ohio. Developed RD Work Plans and detailed cost estimates, conducted the site investigation, and was the lead engineer and consultant during the site removal action and the attainment of a natural attenuation remedy for groundwater. This site is a State of Ohio lead involving soil and groundwater contaminated with BTEX, TCE and its breakdown products and PAHs.

- Lead Environmental Engineer for RCRA corrective action analysis and design of an aquifer pump and treat system for pesticide (toxaphene) contaminated groundwater at the Hercules-Brunswick plant in Brunswick, GA.

- Project Manager and Lead Engineer for development of a CERCLA Feasibility Study for Beazer East/DuPont at the former Koppers Wood Treatment Facility in Newport, DE. The site involves creosote and PCP contamination of soils and groundwater as well as sensitive ecological and wetland issues.

- Project Manager and Lead Engineer on a Feasibility Study for a HSRA site in Americus, GA. This former manufactured gas plant is undergoing a HSRA Corrective Action process.

- Project Manager for the RCRA compliance and Corrective Action at the Beazer/Koppers Wood Treatment Project facility in Montgomery, Alabama. This project involves corrective action for creosote; PCP and CCA contaminated soil and groundwater. Developed a corrective action strategy for the plant involving the conceptual design of sheet pile and jet grouted barrier walls with hydraulic containment support.

Project Manager, U.S. Army Corps of Engineers, Omaha District, Omaha NE (1988-1993).

Managed and performed Engineering work on numerous major hazardous waste sites for USEPA and the U.S. Department of Defense. Responsibilities included the development of remedial investigation and remedial action (construction) scope of services documents and cost estimates for execution of environmental projects. Projects include:

- Fort Ord Federal Facility, Monterey, CA. Performed preliminary assessments, site investigations and RCRA investigations at numerous military HTRW sites within the military reservation. Developed the draft work plan for the installation wide RI/FS. Sites included municipal/industrial landfills, fire training areas, motor pools, USTs and an abandoned wastewater treatment facility. Key member of the Army's negotiating team during Federal Facility Agreement negotiations with state and local agencies and EPA Region IV.

- Dover AFB Federal Facility, Dover, DE. Managed the development of a treatability work plan and laboratory and field testing of an air sparging/soil vapor extraction system for a TCE contaminated aquifer on base. This work was in response to a state RCRA Notice of Violation (NOV) to Dover AFB involving remediation of this aquifer. Supported Base personnel in negotiation of a resolution to the NOV. Results of this program in EPA Region III indicate successful remediation of groundwater using this technology.

- Morgantown Ordinance Works, Morgantown, WV. Supported the Army and the PRP group in negotiations with EPA regarding the remedial program at this former ordnance plant. Served as the lead technical coordinator for all technical work on the project. Developed the scope and managed the performance of a legal, historical and cost recovery study for the Army involving their roles as a PRP on the site. Represented the Army with the site PRP group (Olin, DuPont, and Tenneco) in negotiations with EPA Region III regarding potential site remedies and the site RI/FS.

- Operating Industries Superfund Site, Monterey Park, CA. Developed and managed an operation & maintenance program for a 192-acre hazardous/municipal landfill in east Los Angeles, California. Issues addressed included gas production and destruction, toxic volatile gas emissions, landfill subsidence, underground fires and slope stability. Performed a detailed analysis of the existing cap and barrier elements of the landfill including subsidence monitoring and cap integrity analysis.

- Rhinehart Tire Fire Superfund Site, Winchester, VA. Managed the design of a remedial system for the site of a 1983 tire fire involving the burning of over 7,000,000 tires, producing over 800,000 gallons of oil/sludge. This work included design and construction of a containment dam, slope stabilization using shot-crete, oil collection, oil/water separators and a 100-gpm water/leachate treatment system for metals. The water treatment system utilized chemical precipitation of zinc, aluminum and other metals as well as clarification and sand filtration. This site is a major EPA lead site in Region III.

- Southern Maryland Wood Preservers Superfund Site, Hollywood, MD. Managed and performed pre-design, design and design reviews for the remedial action program at a major former wood treating site involving over 150,000 cubic yards of creosote and PCP contaminated soil and contaminated groundwater. The first phase of the project involved the design and construction of a sheet pile barrier wall system for the containment of the area for the site containing DNAPL creosote. The second phase involved the design of a thermal treatment remedy, excavation and associated civil engineering, groundwater treatment and air emissions control. The water treatment design included pretreatment (Oil/Water Separation, flocculation, clarification, filtration), UV/Oxidation treatment, post aeration and sludge handling. Wetland restoration design was a key element to this project. Also involved were extensive thermal (soil) and groundwater treatability tests to support design.

- Norwood PCB Superfund Site, Norwood, MA. Evaluated the feasibility of using the BEST Technology soil washing system for use at this PCB contaminated site. The BEST technology is a solvent extraction system utilizing a mobile solvent (triethylamine (TEA)) to separate contaminants from soils and sludges.

- Kane and Lombard Superfund Site, Baltimore, MD. Managed the design and the construction of a soil-bentonite slurry wall and RCRA cap system for this inner city Baltimore Superfund Site. Site contaminants included priority pollutant metals.

- Auto Ion Superfund Site, Kalamazoo; MI. Supported EPA Region V in evaluating plans (implemented by site PRPs) for the remediation of arsenic and chromium contaminated soils at this former battery and plating facility.

Managed and developed an innovative project management system for the Omaha District's environmental programs. This system included aspects of project management philosophy as well as total quality management.

Managed a section of environmental project managers in the Environmental Branch, Omaha District. Duties included supervision and monitoring of junior staff as well as appraisals of performance and budget considerations.

Project Engineer, HDR Engineering Inc., Omaha NE (1985-1988).

Project Engineer on various municipal wastewater treatment system projects including:

- Batavia WWTP, Batavia, IL. Performed a sanitary sewer system evaluation using computer modeling for this Chicago area city. This computer model allows the city to predict flow variations and to size appropriate piping systems for their municipal sewer.

- Gillette WWTP, Gillette WY. Project engineer for the design of a 2-mgd activated sludge treatment plant. Responsible for development of drawings, specifications and the bid package for competitive bidding of this project. Designed unit processes included screening, grit removal, activated sludge, clarification, disinfection and sludge digestion.

- Texarkana WWTP, Texarkana, TX. Performed a value engineering study during the design of this activated sludge treatment plant. Focus was on innovative sludge management systems.

- Papio WWTP, Omaha, NE. Performed shop drawing reviews and construction oversight on this large activated sludge treatment plant. Review included primary clarification, settling basins and sludge handling/Incineration.

- Sidney WWTP, Sidney, NE. Prepared bid documents and provided construction oversight on this 1 mgd trickling filter plant. Designed unit processes including screening, grit removal, clarification, sludge digestion, trickling filters and disinfection.

Project Engineer on various hazardous waste projects including:

- Basin F, Rocky Mountain Arsenal Federal Facility, Denver, CO. Lead engineer in the development of the remedial action design for the 93-acre hazardous waste lagoon at the arsenal. Engineer for the elements of the remedial design including soil excavation and treatment, water treatment and storage, enhanced evaporation, waste pile and RCRA Cap installation. Contaminants included pesticides, demilitarized nerve gas agents and mustard gas. Also unexploded ordnance situations were encountered.

- Monroe Plant, Cozad, NE. Field engineer during the installation of recovery wells in a TCE contaminated aquifer. Project engineer for construction of an Air Stripping System to remove TCE from groundwater. Provided field oversight for sludge dewatering and closure of waste lagoons contaminated with TCE and heavy metals. This was a PRP Lead Project in EPA Region VII.

- Rural Ridge Nike Site, Pittsburgh, PA. Performed site investigation activities at this former Nike Missile site to characterize contamination from military operations including propellants, BTEX and TPH.

Graduate Assistant - University of Nebraska - Lincoln, NE (1983-1985)

- Assisted in teaching environmental/sanitary engineering courses and laboratories to undergraduate students. Teaching concentrated on chemical and biological water and wastewater treatment.

- Performed research involving Biological Denitrification of Water Supplies using Packed Bed Reactors. This Thesis research involved the use of facultative Aerobic (Anoxic) Microorganisms to convert Nitrate in water to nitrogen gas through microorganism's metabolic pathways.

PUBLICATIONS

MS Thesis, "Biological Denitrification using Packed Bed Reactors," (1985). Presented to Nebraska State AWWA Conference in Lincoln, NE.

"Sheet Pile Barrier Walls as an alternative to Slurry Walls for Temporary Containment at Hazardous Waste Sites," (1990). Presented to HMCRI's "Superfund 90" conference in Washington, D.C.

"Case Study, Rhinehart Tire Fire Superfund Site," (1991). Presented to AWMA's annual conference in Vancouver, BC.

"Community Relations Actions at Federal Facilities," (1992). Presented at the ADPA annual environmental symposium in Alexandria, VA.