S.C. Department of Health and Environmental Control

Proposed Plan for Site Remediation
Marsh Lumber Sawmill

119 West Sixth Avenue, Pamplico, South Carolina

July 2021

ANNOUNCEMENT OF PROPOSED PLAN

The South Carolina Department of Health and Environmental Control (DHEC or the Department) has completed an evaluation of cleanup alternatives to address source area contamination at Marsh Lumber Sawmill (the Site). This Proposed Plan identifies DHEC's Preferred Alternative for cleaning up the contaminated area and provides the reasoning for this preference. In addition, this Proposed Plan includes summaries of the other cleanup alternatives evaluated. These alternatives were identified based on information gathered during environmental investigations conducted at the Site since 1991.

The Department is presenting this Proposed Plan to inform the public of our activities conducted at the Site, gain public input, and fulfill the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (National Contingency Plan or NCP). This Proposed Plan summarizes information that can be found in greater detail in the Feasibility Study-Revision #1 (November 2020) and other documents contained in the Administrative Record. The Department encourages the public to review these documents to gain an understanding of the Site and the activities that have been completed.

The Department will select a final cleanup remedy after reviewing and considering comments submitted during the public comment period. The Department may modify the Preferred Alternative or select another response action presented in this Proposed Plan based on new information or public comments. Therefore, the public is encouraged to review and comment on all the alternatives presented in this Proposed Plan.

DHEC's Preferred Cleanup Summary
Alternative 4: Air Sparging

DHEC's preferred remedial option is:

- Air Sparging, through injection of air into the ground to enhance reduction of contaminant concentrations.
- Promote aerobic bio-degradation;
- Pilot testing has proved this technology is effective.

MARK YOUR CALENDAR

❑ PUBLIC MEETING:

DHEC has recorded a presentation and it is available at the website below. If requested, DHEC will hold a meeting to further explain the Proposed Plan and all the alternatives presented in the Remedial Alternatives Evaluation and answer questions.

http://www.scdhec.gov/MarshLumberSawmill

❑ PUBLIC COMMENT PERIOD:

September 9, 2021 – October 9, 2021

DHEC will accept written comments on the Proposed Plan during the public comment period. Please submit your written comments to:

Kimberly Kuhn, Project Manager
SC DHEC Bureau of Land & Waste Management
2600 Bull Street
Columbia, SC 29201
kuhnkm@dhec.sc.gov

❑ FOR MORE INFORMATION:

Call: Kimberly Kuhn, Project Manager, 803-898-0722

See: DHEC's website at:
http://www.scdhec.gov/MarshLumberSawmill

View: The Administrative Record at the following locations:

Pamplico Public Library
100 East Main Street, Pamplico, SC

Hours: Monday, Wednesday, Friday 10 am - 5 pm
Tuesday, Thursday 10am - 7 pm
Saturday 10 am - 1 pm
Sunday CLOSED

DHEC Freedom of Information Office
2600 Bull Street, Columbia, SC
(803) 898-3817
Hours: Monday - Friday: 8:30 AM - 5:00 PM

Or

http://www.scdhec.gov/MarshLumberSawmill

SITE HISTORY

Marsh Lumber property is located at 119 Sixth Avenue, Pamplico, Florence County, South Carolina. The Property includes approximately 15 acres of an approximate 28-acre parcel. The current owner is Marsh Furniture Company, Inc. (MARSH). The property is zoned industrial and occupied by MARSH operations. The site is zoned as light industrial in Florence County, South Carolina.

On May 17, 1946, MARSH acquired the property from H.M Propst. MARSH constructed and began operation of the first sawmill in 1953. Following 1953, MARSH activities on the property have included lumber handling and storage, saw and dimension milling, and lumber treating and drying. The lumber treatment for the purpose of preventing mold and insect infestation included the use of a dip tank containing liquid sodium pentachlorophenol (PCP) and a drip pad located in the "Green Chain Area." This was a common process for lumber mills to treat wood during this period of operation.

A concrete pad was constructed beneath the conveyor in the Green Chain Area and a portion of the temporary wood drying/storage area in the late 1980's. The concrete drip pad beneath the Green Chain was reportedly designed to channel residual wood preservative chemicals to a sump where excess liquids were pumped back into a storage unit in the dip tank area.

The use of PCP-containing products was discontinued by MARSH in 1986 prior to EPA listing of certain wood preserving wastes as hazardous under RCRA in 1990. The MARSH sawmill operations and associated non-PCP wood treatment activity ceased in 2007. Subsequently, the sawmill building and associated structures were dismantled. MARSH currently operates a dimension mill on the subject site. MARSH receives lumber for processing which is already kiln dried, and no treatment is conducted at the site.

In 1991 a Preliminary Environmental Site Assessment performed on behalf of MARSH identified the Green Chain Area, shop area, and former underground storage tank (UST) areas as potential areas of concern.

1. **Shop Area**: In 1992 and 1993, Total Petroleum Hydrocarbons (TPH) were detected in the soil in the shop area; however, petroleum constituents were not detected in the groundwater.

2. **Former UST**: In 1992, benzene, toluene, ethylbenzene, and xylenes were detected in the soil at the former UST area and groundwater results indicated benzene, toluene, and ethylbenzene in this area. The notice of this release was forwarded to SCDHEC's UST section in September 1993. Further assessment of the UST release was conducted between 2002 and 2004. The UST incident was closed by SCDHEC in 2004 and the monitoring wells were properly abandoned.

3. **Green Chain Area**: Beginning in 1992, the soil and groundwater were analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, tentatively identified compounds, and the eight Resource Conservation and Recovery Act (RCRA) metals. Multiple soil samples were collected in the Green Chain Area and the treated wood storage area to assess source and secondary source area contamination. The soil samples were analyzed for base-neutral/acid extractable (no target compounds including PCP were detected) and metals (no results exceeding background). Several tentatively identified compounds (TICs) were reported, however. PCP was detected in the groundwater at concentrations exceeding the Maximum Contaminant Levels (MCL).

After 1993, MARSH conducted assessments to identify the source, nature, and extent of PCP contamination at the site and implemented remedial measures to address the contamination. Between 1998 and 2016, multiple additional soil and groundwater assessment activities were conducted to refine an understanding of the source, nature, and extent of contamination at the site. These reports can be found in the administrative record located on the website. In October 2016 a bio-sparge pilot test was initiated to evaluate the potential of this technology as a cleanup alternative. The pilot test was modified in 2018, to include five additional bio-sparge injection wells, and continues to date.

The bio-sparging pilot study has been operating from 2009 to present day. Based on the data collected over the years from the pilot study, the concentrations of PCP have declined in the groundwater.

SUMMARY OF SITE RISKS

The planned future use of the site will remain industrial. PCP has been identified as the constituent of concern and has limited impact to the soil and groundwater. Surficial soil impacts were limited and only detected in the former dip-tank in the Green Chain Area. Groundwater contamination of PCP has been detected at concentrations that exceed the EPA Maximum Contaminant Levels. There is no confirmed PCP impact to the surface water.

Due to the limited extent of surface soil PCP impacts and the site remaining industrial, site worker exposure scenarios area low risk and could be managed with institutional controls. Based on the topography being relatively flat and sandy soils, and low concentrations at the site, surface runoff PCP impacted from soils is an unlikely. The primary potential exposure route for PCP would be from a potential drinking water source. Considering

that the PCP plume is contained within the subject site and the nearest known active water supply wells are approximately 0.5 mile away, the receptor pathway is currently incomplete.

CLEANUP GOALS

Remedial action objectives (RAOs) are developed to set goals for protecting human health and the environment. The goals should be as specific as possible but should not unduly limit the range of remedial alternatives that can be developed. The remedial action objectives for the site are to reduce the mass of chemicals of concern in groundwater and to reduce the potential for off-site migration of chemicals of concern in groundwater to adjacent surface water. Accordingly, the following RAOs were developed for the Site:

Reduce the potential for soil leaching to groundwater.

Reduce source area groundwater impacts to further mitigate/control impacts to downgradient groundwater and streams.

Restore groundwater to maximum contaminant levels.

SCOPE AND ROLE OF THE ACTION

The proposed action in this Proposed Plan will be the final cleanup action for the Site. The remedial action objectives for this proposed action include reducing the potential for soil leaching contamination to groundwater and to further mitigate and control the migration of contaminants through groundwater and into surface water. As contamination will remain onsite a 5-year review will be required once the remedial action is conducted to evaluate the effectiveness of the remedy.

SUMMARY OF REMEDIAL ALTERNATIVES

Based on information collected during previous investigations, *a Feasibility Study-Revision # 1* (S&ME Inc., November 2020) was conducted to identify, develop, and evaluate cleanup options and to address the contamination at the Site. This evaluation considered the nature and extent of contamination and associated potential human health risks developed during the remedial investigations and associated studies to determine and evaluate potential remedial alternatives and their overall protection of human health and the environment. Each remedial alternative evaluated by the Department is described briefly below.

Remedial Alternatives	Description
No Action	This alternative would require conditions to stay the same without any active treatment or monitoring.
Monitoring Natural Attenuation	MNA relies on the natural physical, chemical, and/or biological processes to achieve site-specific goals within a reasonable time. Groundwater monitoring is also included in this alternative.
Groundwater Extraction and Pre-Treatment by Granular Activated Carbon (GAC)	This Alternative involves extraction/recovery wells equipped with submersible pumps used to withdraw contaminated groundwater. The contaminants are not destroyed by the GAC, but are captured and suspended in the media, requiring periodic replacement of the GAC media.
Air Sparging	Air sparging can be used for boundary control and reduction of dissolved-phase contaminants of concern. Air sparging can stimulate aerobic biodegradation with the sparge system area of influence.
Bio-enhancement	Bio-enhancement techniques involves injecting either microbes that are known to break down the contaminant of concern, or nutrients to increase the population of naturally-occurring microbes in the subsurface promoting reduction of contaminate.

DESCRIPTION OF ALTERNATIVES

Alternative 1 - No Action

The No Action alternative is included as a baseline for comparison with other Alternatives. Under this Alternative, no action is taken to treat or prevent potential exposure to contaminated groundwater, or reduce volume, toxicity, or mobility of contaminants. This action would rely on natural attenuation processes to reduce contaminant concentrations over time. This action does not include any institutional controls (e.g., deed restrictions) or monitoring to evaluate natural attenuation or contaminants of concern (CoCs) extent and the Site would be uncontrolled. The cost associated with the No Action alternative is $25,000. This cost includes abandonment and removal of all monitoring wells, remediation wells and equipment associated with the existing remediation pilot system, and preparation of a site closure report.

Alternative 2– Monitoring Natural Attenuation (MNA)

MNA is a passive approach in which monitored groundwater is to track the natural degradation or reduction of CoCs in groundwater. A typical MNA approach centers on monitoring groundwater regularly to evaluate and confirm that site conditions are supportive of CoC degradation. Additionally, land use controls would be implemented to protect human health and the environment by restricting development and groundwater use. PCP has been shown to aerobically degrade but usually at a lower rate than other volatile and semi-volatile contaminants. The persistence of PCP and its degradation products are prolonged in the groundwater. The annual cost for the MNA alternative would be about $25,000 a year for about 30 to 40 years. The total cost of this alternative is estimated at $1,025,000.

Alternative 3 – Groundwater Extraction and Pre-Treatment by Granular Activated Carbon (GAC)

The groundwater extraction and ex-situ treatment alternative involves extraction of groundwater using recovery wells. Groundwater would be recovered through a piping network and routed to a pre-treatment area, then the groundwater would pass through GAC treatment system causing mass transfer of contaminants from water to the filter media. The pre-treatment system would require permits from DHEC industrial wastewater program. The GAC does not destroy the contaminants, it just captured and suspended in the media, which requires periodic replacements of the carbon. Groundwater would be monitored for 30 years. The estimated total cost would be $3,980,000 to implement the groundwater extraction and pre-treatment by GAC and monitor groundwater for 30 years.

Alternative 4 – Air-sparging

Air-sparing involves the injection of air into the groundwater aquifer to strip contaminants from the groundwater. It provides a source of oxygen to promote aerobic biodegradation. Air-sparging can be used for boundary control and reduction of dissolved-phase contaminants of concern in the source and stimulate aerobic biodegradation. This alternative also involves groundwater monitoring for 10 years and institutional controls. The total estimated cost to implement air-sparging is $630,000. This cost includes system expansion costs, sampling, reporting and operating cost per year for ten years.

Alternative 5- Bio-enhancement

Bio-enhancement involves the remediation of groundwater contamination through injection of microbes that are known to metabolize the contaminant of concern, or nutrients to increase the population of naturally occurring microbes in the subsurface. Bio-enhancement would be useful for source area mass reduction or as polishing treatment in persistent area where contaminant mass reduction is not occurring. Groundwater monitoring for 20 years and institutional controls would also be a component of this remedy. The duration of this remediation would take between five to ten years. The total cost of bio-enhancement as the remedial alternative would be $945,000. This cost includes capital cost of $420,000, sampling and reporting cost of $25,000 per year for 20 years, with $25,000 for well abandonment at the project termination.

EVALUATION OF ALTERNATIVES

The National Contingency Plan requires the Department use specific criteria to evaluate and compare the different remediation alternatives individually and against each other to select a remedy. This section of the Proposed Plan profiles the relative performance of each alternative against the criteria, noting how it compares to the other options under consideration. The criteria are:

1. Overall protection of human health and the environment;
2. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs);
3. Long-term effectiveness and permanence;
4. Reduction of toxicity, mobility, or volume through treatment
5. Short-term effectiveness;
6. Implementability;
7. Cost; and
8. Community acceptance

The main objectives for the preferred remedial action are to be protective of human health and the environment and to comply with State and Federal regulations. These two objectives are considered *threshold criteria*. Threshold criteria are requirements each alternative must meet to be eligible for selection.

The following measures are considered *balancing criteria*: long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; and cost. These criteria are used to weigh the technical feasibility, strengths and weaknesses, and cost advantages and disadvantages of each alternative.

Community acceptance of the cleanup alternative is a *modifying criterion* that will be carefully considered based on public comments sent to the Department during the public comment period.

COMPARATIVE ANALYSIS OF ALTERNATIVES

A comparative analysis of each alternative was performed and can be observed in the EPA Performance Criteria table included. The alternatives were evaluated in relation to one another for each of the evaluation criteria. The purpose of the analysis is to identify the relative advantages and disadvantages of each alternative.

Overall Protection of Human Health and the Environment

When evaluating alternatives in terms of overall protection of human health and the environment, consideration is given to the way site-related risks are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

Air-sparging received the highest score for protection of site-specific exposure pathways because the technology has been successfully pilot tested at the Site and has been shown to result in a sustained decrease contaminant concentration. Bio-enhancement received a moderate score for providing protection of human health and the environment, due to its short-term effectiveness receiving a low score. The No Action and MNA does not provide for overall protection of human health and the environment on site as there will be no decrease in contaminants in the source areas. The potential for off-site impacts to protect human health and the environment are uncontrolled. Groundwater Extraction and Pre-treatment by GAC received the lowest score to protect human health and the environment by extracting groundwater and removing contaminants through the GAC and eliminates exposure pathways due to the implementation and cost of this alternative.

Compliance with ARARs (Applicable or Relevant and Appropriate Requirements)

This evaluation criterion evaluates whether an alternative meets federal and state environmental statutes and regulations that pertain to the site. Each alternative is evaluated with respect to its ability to comply with such requirements.

All of the alternatives listed would require a period of natural attenuation for the groundwater downgradient of the treatment area to reach regulatory limits with all of the alternatives received high to moderate scores for meeting the chemical specific ARARs, with the exception of No Action and MNA. The No Action and MNA alternative received the lowest score because regulatory limits would not be achieved in any portion of the plume during implementation.

Long-Term Effectiveness and Permanence

The magnitude of residual risk remaining from untreated impacted media or treatment residuals and the adequacy and reliability of containment systems and institutional controls are evaluated under this criterion.

Air-sparging received the highest score for long-term effectiveness and permanence because the pilot test demonstrated that Air-sparging will results in a sustained decrease in contaminant concentrations. Bioremediation received a moderate score for potential residual risk because the naturally occurring anaerobic conditions for anaerobic bioremediation to successfully be implemented. Groundwater extraction and pretreatment by GAC received a moderate score due to physical and chemical properties of the contaminant and geologic formation, extraction and pre-treatment of dissolved contaminants is often unsuccessful in restoring groundwater concentrations to established target concentrations. The No Action and MNA alternatives received the lowest score because the source mass is not removed or destroyed and consequently the long-term risks remain.

Reduction of Toxicity, Mobility, or Volume through Treatment (TMV)

The degree to which an alternative employs treatment to reduce the harmful effects of contaminants, their ability to move in the environment, and the amount of contamination present is evaluated by this criterion.

Air-sparing received the highest score for reduction in toxicity, mobility, or volume of contamination because it has been demonstrated to effectively treat contamination by stimulating the naturally occurring micro-organisms in the aquifer allowing for breakdown of the contamination through biological processes. Bio-enhancement and groundwater extraction had moderate ratings. Bio-enhancement would reduce the contaminant where mass reduction is not occurring. Groundwater extraction and pretreatment by GAC would capture the contaminants and not destroy them. The No Action and MNA alternatives received lowest ranking because the remedies do not promote active treatment of contamination.

Short-Term Effectiveness

The short-term effectiveness evaluation takes into consideration any risk the alternative poses to on-site workers, the surrounding community, or the environment during implementation, as well as the length of time needed to implement the alternative.

Air-sparging received the highest score of the active remedies because it has the shortest active remediation implementation period and does not cause disturbance of, or the handling of chemicals and majority of the infrastructure is already in place from the pilot study. Groundwater Extraction received a moderate score by achieving hydraulic control and mass reduction of the contaminants. Bio-enhancement, No Action and MNA received low scores due to the unable to protect human health and the environment in the short-term period.

Implementability

The analysis of implementability considers the technical and administrative feasibility of remedy implementation, as well as the availability of required materials and services needed for implementation.

Air-sparging received the highest score since the air-sparing system framework is already in place from the pilot study. Bio-enhancement received moderate score since an underground injection control permit must be obtained, and additional site information will need to be collected. Groundwater Extraction received the lowest score as it would require new infrastructure to be installed.

Cost

The following table presents the probable cost for each alternative:

Alternative	Cost
1. No Action	$25,000
2. Monitored Natural Attenuation	$1,025,000
3. Groundwater Extraction and Pre-treatment by Granular Activated Carbon (GAC)	$3,980,000
4. Air Sparging	$630,000
5. Bio-enhancement	$945,000

Community Acceptance

Community acceptance of the preferred remedy will be evaluated after the public comment period. Public comments will be summarized, and responses provided in the Responsiveness Summary Section of the Record of Decision document that will present the Department's final alternative selection. The Department may choose to modify the preferred alternative or select another remedy based on public comments or new information.

SUMMARY OF THE DEPARTMENT'S PREFERRED ALTERNATIVE

The Department has identified a preferred alternative to address the contamination in both the soil and groundwater at the Site. The preferred remedial alternative is Alternative 4, Air Sparging.

Alternative 4, Air Sparging is groundwater remediation technology in which air is injected into the groundwater aquifer using system made up with a series of vertical or horizontal injection points. The injections points are located based on the expected area of influence of each well and the groundwater flow direction.

This Alternative was further developed for detailed analysis from the installation and field pilot testing of air sparging system. The pilot study concluded reduction of PCP concentration in the groundwater and has acted like a barrier to downstream migration. The system will be operated for approximately five (5) years or until the groundwater contamination has been adequately treated.

The total estimated net present worth of this alternative combination is approximately $630,000. It is the Department's judgment that the Preferred Alternative identified in this Proposed Plan is necessary to protect public health and the environment.

USE THIS SPACE TO WRITE YOUR COMMENTS

Your input on the Proposed Plan for the Marsh Lumber Facility Site is important. Comments provided by the public are valuable in helping DHEC select a final cleanup remedy.
You may use the space below to write your comments, then fold and mail. Comments must be postmarked by October 9, 2021. If you have any questions, please contact Kim Kuhn 803-898-0722. You may also submit your questions and/or comments electronically to: kuhnkm@dhec.sc.gov

Name _____ Telephone _____

Address _____ Email _____

City _____

State _____ Zip _____

Alternatives 1-5 are compared against each other for groundwater cleanup. The final remedy will be a combination of remedies to address both medias. The tables below rank the alternatives from 0-5 based off their effectiveness for each category. The remedy with the highest total score is considered the best alternative for each media.

Comparative analysis of Alternatives Table:

Criterion	Alternative 1 No Action	Alternative 2 Monitored Natural Attenuation	Alternative 3 Groundwater Extraction and Pretreatment by GAC	Alternative 4 Air Sparging	Alternative 5 Bio-enhancement
Protection Human Health and the Environment	2	3	3	4	3
Compliance with ARARs	2	2	3	4	3
Short-Term Effectiveness	2	2	3	4	2
Long-Term Effectiveness	3	3	3	5	4
Reduction of toxicity, mobility, & volume through Treatment	2	2	3	4	3
Implementability	5	5	1	3	4
Costs	5	3	1	4	3
Total Score	21	20	17	28	22