FINAL SITE REASSESSMENT REPORT
FOR THE
NEW KENT WOOD PRESERVATIVES, INC. SITE
PROVIDENCE FORGE, VIRGINIA

Prepared for

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1.0 INTRODUCTION

The Virginia Department of Environmental Quality (VDEQ) tasked blueskies to complete a site reassessment report under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended by the Superfund Amendments and Reauthorization Act (SARA) for the New Kent Wood Preservatives, Inc. site located in Providence Forge, Virginia. The site is identified in the U.S. Environmental Protection Agency's (EPA) Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) database as the New Kent Wood Preservatives, Inc. site, EPA ID No. VAD089028963.

This site reassessment was conducted in accordance with EPA's "Guidance for Performing Preliminary Assessments Under CERCLA" and "Guidance for Performing Site Inspections Under CERCLA (References [Ref.] 1 and 2). The objective of the site reassessment is to determine if additional work under CERCLA may be warranted at the site and to provide the data necessary to assess the site under the Hazard Ranking System (HRS). The HRS is the scoring system used by EPA to assess the relative threat associated with actual or potential releases of hazardous substances from sites. The HRS is the primary screening tool for determining whether a site is to be included on the National Priority List (NPL), EPA's list of sites that are priorities for further investigation and, if necessary, response action under CERCLA. The HRS assesses the relative threat posed by a site to four potential pathways, groundwater migration, surface water migration, soil exposure or air migration. The HRS also assesses the potential risk posed by the migration of site-related contaminants to targets (receptors) associated with each pathway, such as drinking water, direct contact with contaminated media or eating contaminated fish.

To meet the objectives of the site reassessment, blueskies completed a review of all available information for the site, performed a windshield assessment of the site vicinity and updated the target information for each HRS migration pathway.

This report summarizes site background information in Section 2.0; describes the source characteristics, and groundwater and surface water migration pathways in Sections 3.0, 4.0, and 5.0, respectively; discusses soil and air migration pathways in Section 6.0, and presents summaries and conclusions in Section 7.0. A reference list is Section 8.0. All figures are

provided in Appendix A. A photographic documentation log is provided as Appendix B and a copy of the field logbook notes are included in Appendix C. Blueskies has extracted pages from some of the reports reviewed during this reassessment and has provided the extracted pages as attachments to this report. Attachment 1 is the sampling location map extracted from the 1988 SI (Ref. 7), Attachment 2 is the sample location map extracted from the EPA 1992 sampling assessment (Ref. 11), Attachment 3 is the site sketch extracted from the Emergency Special Services report (Ref. 9) and Attachment 4 is the New Kent County Public Facilities Map.

2.0 SITE BACKGROUND

This section describes the site's location, operational history, and waste characteristics.

2.1 LOCATION

The New Kent Wood Preservatives, Inc. site is located at 4101 South Mountcastle Road, Providence Forge, Virginia (see Appendix A, Figure 1, Site Location Map). The geographic coordinates for the approximate center of the site are 37.453611 degrees north latitude and 77.091667 degrees west longitude (Ref. 4). The site is located approximately 1,500 feet south of the intersection of U.S. Route 60 East and Route 615 in a rural area of New Kent County, Virginia; land use in the site vicinity is mixture of industrial, agricultural and residential. Currently, the site is occupied with two active businesses, McNeil Sales and Service Co. Inc. and Museum Resources. According to information obtained from the internet, McNeil Sales and Service Co. specializes in refractory supplies and services and Museum Resources specializes in historic woodwork and forest product manufacture for museums and 18th century restorative work (Ref. 3; Ref. 4; Ref. 5).

Directly surrounding the site to the north is undeveloped forested land and wetlands, to the east are wetlands, to the south are active railroad tracks and to the west is undeveloped, cleared land. An active tire recycling facility (Virginia Recycling Corporation) is located 0.14 mile northeast of the site and an active asphalt manufacturer and recycling plant (Lee Hy Paving Corporation) is located south of the railroad tracks. The nearest residential property is located 0.30 mile to the southwest. The nearest surface water is Schiminoe Creek, located 0.14 mile east of the site;

Schiminoe Creek flows through wetlands which border the eastern side of the site. Crawford State Forest is located 0.24 mile southeast of the site.

2.2 OPERATIONAL HISTORY AND INVESTIGATIVE SUMMARY

Blueskies obtained the operational and investigative history summarized in this section from reports included in the VDEQ site file; no site representatives were interviewed during the site reassessment. In 1977, Paul Thiele, Fred Ellis, and Tom Powell founded New Kent Wood Preservatives, Inc. The company pressure treated lumber with a pressure/vacuum system that impregnated wood with a chromate copper arsenate (CCA) solution. Lumber was placed in a cylinder into which a pre-mixed solution of CCA and water was forced. Once the cylinder was filled excess solution was vacuumed off and the treated wood was removed from the cylinder and stored on a drip pad until dry. Any CCA solution not retained by the wood drained into a sump and was recycled back into the treatment system (Ref. 6; Ref. 7; Ref. 8). The drip pad was located in the center of the site; see Attachment 1 for the site layout.

In August 1978, New Kent Wood applied for and received a Discharge Certificate IW-ND-991 in accordance with the Virginia Water Control Law. In August 1983, the company was sold to Larry Silver and C.L. Walker and renamed Midland Timber Company. In February 1985, Mrs. Myrtle Holland purchased the company and renamed it Holland Forest Products, Inc. The VWCB contacted Mrs. Holland in September 1985 to notify her that additional information must be submitted before transferal of certificate IW-ND-991 could occur. On September 25, 1985, VWCB inspected the property. No indications of chemical spillage were noted during the inspection; however, the treated wood was stored on the drip pad for only 24 hours rather than the required 48 hours and the drip pad was not bermed. The VWCB recommended that a National Pollutant Discharge Elimination System (NPDES) permit be issued so that a determination could be made if the drainage ditch located in the area of the drip pad contained pollutants. VWCB sent letter to Holland Forest Products requesting the completion of a NPDES permit application . (Ref. 8).

In August 1985, the Virginia Department of Health (VDH) performed a CERCLA preliminary assessment (PA) of the site. During the PA, representatives of Holland Forest Products indicated that surface drainage was reportedly so bad when it was operated by New Kent Wood Preservatives that during wet periods the woodyard would be a sea of mud; however, there was no evidence noted that this drainage was contaminated. The subsequent owners of the property (Midland Timber) regraded the property to address the discharge issue. Subsequent to the site reconnaissance performed as part of the PA, VDH was contacted by an employee of Holland Forest Products that alleged that CCA sludge had been dumped in the woods in the past. VDH completed a second site reconnaissance on October 10, 1985 to determine if there was any evidence that on-site sludge dumping had occurred. According to a long-term employee interviewed by VDH during this second site visit, no sludge dumping had occurred during the six years that he had been an employee (Ref. 6; Ref. 8).

In 1986, Holland Wood Preservers obtained EPA small quantity generator ID number VAD089028963, allowing for the transport and disposal of sludge removed from the treatment cylinder (Ref. 8).

In May 1986, Emergency Special Services developed and installed a groundwater monitoring well system to acquire data for the area around the drip slab. A piezometer was installed at each corner of the property (a total of four) to determine the groundwater gradient. Three monitoring wells were subsequently installed downgradient of the drip pad and one upgradient well as a background well. The wells were 15 to 18 feet deep. Groundwater samples were collected from each monitoring well and one surface water sample was collected from a pond identified as the beaver pond located west of the site. The samples were analyzed for arsenic, copper, and chromium. Analytical results indicated elevated levels of chromium (up to 20 milligrams per liter [mg/l]) and arsenic (up to 0.80 mg/l) in the downgradient wells relative to the concentrations detected in the background well (chromium reported at 0.08 mg/l and arsenic reported at 0.40 mg/l). Elevated metals were not detected in the surface water sample. In September 1986, Emergency Special Services returned to the site to conduct an extended development of one the monitoring wells (M-1) that contained the highest concentration of chromium. The objective of the investigation was to determine if the high level of chromium detected in that well in May

1986 was accurate. The well was pumped for a 24-hour period and groundwater samples were collected every six hours and submitted for total chromium, total arsenic and total copper analysis. The October 10, 1986 Emergency Special Services report concluded that the shallow aquifer was contaminated with chromium in a concentration of at least 16 mg/l and that the chromium concentrations did not decline over the time the aquifer was pumped. An additional sample collected from the drain sump on the drip pad revealed a total chromium concentration of 23 mg/l and arsenic of 0.38 mg/l (Ref. 9).

In 1987, Kel-wood Timber Products purchased the property from Mrs. Holland. Subsequently, in May 1988, L Wood Forest Products began leasing the property from trustees of Kel-wood. On June 7, 1988, VWCB performed a no-discharge inspection. VWCB observed the drip pad to be open and unbermed. CCA solution was observed at the perimeter of the pad and wood fragments were noted in the drainage ditches leaving the property.

A review of EPA's Resource Conservation and Recovery Act (RCRA) Information System (RCRA Info) indicates that in 1988 RCRA Handler ID number VAD981944945 was issued for L-Wood Inc. The facility name listed on RCRA Info is L-Wood Industries Southern Pine Specialists, Inc. The handler names listed for this ID number are Thomas J. Liesfeld and James Halstead. Chemicals used by this facility are arsenic, copper, and chromium compounds and the North American Industry Classification System (NAICS) code and descriptions are 44411, Home Improvement and 321114, Wood Preservation. RCRA Information for this facility are listed for the years 1988 through 1992 (Ref. 10).

In October 1988, the Virginia Department of Waste Management performed a CERCLA site inspection (SI) of the property (Ref. 7). Soil samples were collected from around the drip pad and wood storage yard, groundwater samples were collected from the on-site monitoring wells and water supply well, and surface water and sediment samples were collected from on-site drainage ditches and the wetlands associated with Schiminoe Creek. Analytical results indicated significant levels of aluminum, chromium, iron and vanadium in one or more of the groundwater monitoring well samples. All soil samples collected adjacent to the drip pad contained

significant levels of arsenic, copper and chromium and numerous organic polycyclic aromatic hydrocarbons (Ref. 7).

The Virginia Water Control Board (VWCB) performed an inspection of the site in September 1991; VWCB observed that the operating area was diked correctly and that treated wood was held on the drip pad for two days before storage. Run-off from the pad was reportedly collected and recycled through the treatment process (Ref. 8).

In December 1992, a CERCLA Expanded Site Inspection (ESI) field investigation was conducted by the Virginia Department of Waste Management (Ref. 8). James Halstead, the previous plant manager was interviewed during the ESI investigation. According to Mr. Halstead, CCA solution was received at the facility as 50% concentrate and was stored in a 4,000 gallon above ground storage tank. This concentrate was delivered in tanker trucks which held 44,000 pounds of chemical per load. The solution was supplied to the facility by Supplied Research Company of Charlotte, North Carolina. According to Mr. Halstead, during the winter months the company used less than one truck load of solution per month; during the summer months up to three loads of solution may have be used each month. Mr. Halstead indicated that 21 drums of hazardous waste had been shipped off site since L Wood began leasing the property in 1988. Because of the recycling process, no liquid waste was generated during the lumber treatment process. The ESI noted that dirt tracked onto the drip pad by a forklift was also washed into the sump, collected in drums, allowed to dry and hauled off site by Environmental Options for disposal. Mr. Halstead further stated that chips knocked off of the wood by the forklifts were washed into the on-site drainage ditches. In response to a VWCB complaint, gravel filters were placed in the ditches to remove the chips which were placed in drums for off-site disposal by Environmental Options. As of 1989, approximately two drums of hazardous waste were generated by the facility each year (Ref. 8).

On-site soil samples were collected during the ESI from waste/source areas and surface water and sediment samples were collected from Schiminoe Creek and associated wetlands. Groundwater samples were not collected during the ESI. The ESI concluded that based on the analytical results, a potential existed for on-site workers to be exposed to soils contaminated with

inorganic and organic compounds. Elevated levels of aluminum, arsenic, barium and chromium were also found in an aqueous sample collected from the wetland (Ref. 8).

On April 9 through 11, 1996, EPA Region 3's Site Assessment and Technical Assistance (SATA) team completed a sampling assessment of the site (Ref. 11). Eleven soil samples, 11 groundwater samples, three surface water and three sediment samples were collected from the site during the assessment. Analytical results indicated elevated concentrations of arsenic and chromium in the soil samples collected from onsite and also the groundwater samples indicating that these compounds were leaching into the underlying groundwater. Arsenic was also detected at an elevated concentration in the surface water and sediment samples collected from Schiminoe Creek at the discharge point of an on-site drainage ditch indicating that the arsenic had migrated from the site into adjacent surface waters (Ref. 11).

In May 1995, the Virginia Waste Management Board on behalf of VDEQ issued an enforcement order to L-Wood, Inc (Ref. 12). According to the findings outlined in the enforcement order, on June 25, 1993, VDEQ staff conducted a Compliance Evaluation Inspection at the facility. Following the inspection, VDEQ sent L-Wood a Notice of Violation letter documenting four violations; L-Wood subsequently addressed two of the violations (failure to minimize the tracking of hazardous wastes off of the drip pad and failure to make arrangements with the VA Department of Emergency Services for assistance in an emergency) but failed to obtain the requested professional engineer certification of the drip pad and failed to prepare a closure plan and contingent post-closure plan for the drip pad. A schedule of compliance was prepared and included in the enforcement order which ordered L-Wood to evaluate the drip pad within 60 days and within 90 days submit to VDEQ a closure plan for the drip pad. L-Wood was also ordered to pay a civil penalty of $6,400 to the VA Environmental Emergency Response Fund (Ref. 12).

On May 24, 1996, VDEQ sent a letter to L-Wood indicating that none of the activities identified in the enforcement order had been completed and outlined the steps VDEQ attempted to contact Mr. Liesfeld to address these issues (Ref. 13). During the only contact VDEQ was able to make with Mr. Liesfeld to discuss the issues, he indicated that he was in a negative cashflow situation and was restructuring L-Wood. VDEQ requested that copies of tax returns be submitted in order

to assess his ability to pay the civil fine; however, these documents were never received (Ref. 13).

On April 25, 2000, VDEQ completed an inspection of the site. According to the inspection report, Mr. Liesfeld operated a trucking company on the site after closure of the wood preserving company. At the time of the inspection, the facility was deserted and a sign advertising the property for lease was posted at the entrance; the condition of the on-site structures and their contents could not be determined (Ref.14).

In September 2000, Mr. Liesfeld contacted VDEQ to request an on-site meeting to determine what steps he needed to complete to close the site (Ref. 15). Mr. Liesfeld postponed the meeting and a new meeting was never scheduled (Ref. 15). VDEQ completed another inspection of the site on June 5, 2002. At the time of this inspection the facility was occupied by Higgins Sales (currently McNeil Sales and Service Co. Inc.) and Museum Restorations which was using the office space and storage facilities. The operations were reportedly "dry" and did not require permitting. The inspection report further indicates that the actions requested in the enforcement order were never completed. The inspection revealed abandoned equipment on the site including one horizontal tank which contained a small quantity of liquid which reportedly smelled faintly of solvents/chemicals and a large vertical tank which appeared to be empty (Ref. 16). A copy of this inspection report was sent to the address on record for Mr. Liesfeld but could not be delivered; VDEQ requested that EPA take the lead on completing further assessments of the site (Ref. 17; Ref. 18). There is no indication in the VDEQ site files that any soil remediation or closure of the drip pad has occurred to date.

Blueskies reviewed the New Kent County Property Information Database to acquire the current information for the property. The property is owned by L-Wood Industries, in care of Thomas J. Liesfeld of Waynesboro Georgia (Ref. 19). A sign observed by blueskies during the windshield assessment indicates that the property is currently occupied by McNeil Sales and Service Co. Inc. and Museum Resources (Ref. 3). According to information obtained from the internet, McNeil Sales and Service Co. specializes in refractory supplies and services and Museum

Resources specializes in historic woodwork and forest product manufacture for museums and 18th century restorative work (Ref. 4; Ref. 5).

2.3 SITE DESCRIPTION

The descriptions provided in all of the investigations completed at the site indicate that where lumber was treated and the location of the drip pad remained unchanged during the time wood preservation activities occurred on the site. The site sketches provided in the 1989 SI and 1996 EPA assessment are included as Attachment 1 and 2, respectively. Site drainage was noted to be through ditches that are recorded in the same locations in all of the investigations. The lumber treatment building was located in the center of the site and the drip pad was located adjacent to the pad. Product storage areas were located to the east of west of the treatment area. The facility office was located in the treatment building and two sheds were noted north of the treatment area. Site drainage from the treatment pad was observed to be conveyed off site through drainage ditches. A drainage ditch located east of the drip pad discharged into the wetlands located adjacent to Schiminoe Creek. A second ditch was observed that flowed from the northeastern corner of the drip pad and discharged to the wooded area located to the north of the property, and a third drainage ditch was observed to the west of the production shed that discharged through a pipe into the wooded area located north of the site. A fourth drainage ditch was observed along the southern boundary of the site adjacent to the railroad tracks; this drainage ditch discharged into the Schiminoe Creek wetlands but does not appear to convey drainage from the drip pad. The property was surrounded by a fence that restricted vehicular and pedestrian traffic.

On January 19, 2012 , blueskies and VDEQ completed a windshield assessment of the site (see Appendix B, Photographic Log). Blueskies and VDEQ did not enter the site, all observations were recorded from the property driveway; access could not be attained to observe conditions in the eastern and western portion of the site. A fresh wood chip pile and new logs were noted along the northern fence line. Equipment such as trailers, boats, and trucks were parked throughout the property. Along the southern fence line stacks of wood, logs, scrap metal and pieces of pipe were observed. The site was noted as being located in a swampy area (Ref. 3).

The New Kent County Property Summary for the site location indicates that there are numerous structures that currently occupy the property including a 3,000 square foot steel warehouse, a 256 square foot office, a 4,000 square foot shed, a 18,040 square foot steel warehouse and a 5,100 square foot metal garage (Ref. 19).

3.0 SOURCE CHARACTERISTICS

3.1 SOURCE AREA

The source identified for this site is contaminated soil. As detailed in the sections below, sampling results reported from the VDEQ SI and ESI and EPA investigations indicate that soils surrounding the drip pad and within drainage ditches located on the site were contaminated with arsenic, chromium and copper at the time of the sampling events. The site sketches documenting the sampling locations (see Attachments 1 and 2) are not drawn to scale; therefore, the exact source area cannot be determined with the available information.

3.2 SAMPLING LOCATIONS

On October 27 and 28, 1988, VDEQ collected samples during the field investigation portion of the SI. Nine soil samples were collected from sources areas and drainage ditches identified on the site; in addition one background soil sample was collected outside the area expected to have been impacted by the wood preservation activities. Table 1 provides a summary of the samples collected during the SI and the sampling locations are provided in the figure included asAttachment 1.

TABLE 1
SOURCE SAMPLING SUMMARY – 1988 SI

Sample Identifiers	Matrix	Date	Description	Sample Location
S-1	Soil	10/27/1988	Medium brown silt with some sand and gravel.	Adjacent to drip pad
S-2	Soil	10/27/1988	Medium brown silty sand with pebbles and twigs. Duplicate sample of S-3.	Adjacent to drip pad, duplicate sample of S-3.
S-3	Soil	10/27/1988	Duplicate sample of S-2.	Adjacent to drip pad, duplicate sample of S-2.
S-4	Soil	10/27/1988	Brown sandy silt with pebbles and twigs, slight green tint.	Adjacent to drip pad
S-5	Soil	10/27/1988	Not provided.	Collected in drainage ditch along eastern fence line.
S-6	Soil	10/27/1988	Not provided.	Collected from small mounded area just outside fence at the northwest corner of the property to document background concentrations.
S-7	Soil	10/27/1988	Not provided.	Collected from drainage ditch that flows north from the northeastern corner of the drip pad; sample collected from deepest point of the ditch.
S-8	Soil	10/27/1988	Not provided.	Collected from drainage ditch located west of the production shed. Collected adjacent to fence where drain pipe discharges.
S-9	Soil	10/27/1988	Silty sand with many pebbles.	Collected in treated wood storage area located in southeastern portion of the site.

On December 12, 1992, VDEQ collected samples during the field investigation portion of the ESI. Six soil samples were collected from sources areas and drainage ditches identified on the site. Table 2 provides a summary of the samples collected during the SI; there is not a figure included in the ESI that presents the source sampling locations.

TABLE 2
SOURCE SAMPLING SUMMARY – 1992 ESI

Sample Identifiers	Matrix	Date	Depth	Sample Location
S-1	Soil	12/16/1992	Surface	Adjacent to drip pad.
S-2	Soil	12/16/1992	Surface	Adjacent to road.
S-3	Soil	12/16/1992	Surface	Across from storage shed.
S-4	Soil	12/16/1992	Surface	Drainage area 1
S-5	Soil	12/16/1992	Surface	Western drainage area.
S-6	Soil	12/16/1992	Surface	Drainage area into wetland.

3.3 ANALYTICAL RESULTS

All source samples collected by VDEQ during the SI and ESI were analyzed under EPA's Contract Laboratory Program (CLP) in accordance with EPA CLP protocols for organic and inorganic parameters. In accordance with the HRS, representative background levels of compounds are established for comparison to the source soil samples to determine which compounds are present at levels three times the level detected in the background sample; or if the compound is not detected in the background sample, detected above the CLP contract required quantitation limit (CRQL) or sample quantitation limits. Soil sample S-6 was identified as the background soil sample for the 1988 SI sampling event. The only two organic compounds reported in the background soil sample, S-6 were the common laboratory contaminants methylene chloride and acetone. These compounds were also reported in the laboratory blanks at similar concentrations, therefore their presence in the sample is not attributable to the site. Table 3 summarizes the organic compounds detected above the CRQL in soil samples collected during the VDEQ 1988 SI sampling event.

TABLE 3
SOURCE ORGANIC ANALYTICAL RESULTS SUMMARY – 1988 SI

Organic Compound	Sample ID	Concentration (µg/kg)	Location
Phenanthrene	S-2	460	Adjacent to drip pad.
	S-5	290 J	Adjacent to drip pad.
Fluoranthene	S-3	320 J	Adjacent to drip pad.
	S-5	360 J	Adjacent to drip pad.
	S-7	180 J	Drainage ditch that flows from northeastern corner of drip pad.
	S-8	190 J	Drainage ditch along northern fenceline.
	S-9	490 J	Wood storage area in southeastern portion of site.
Pyrene	S-8	180 J	Drainage ditch along northern fenceline.
	S-9	360 J	Wood storage area in southeastern portion of site.
Benzo(a)anthracene	S-5	200 J	Adjacent to drip pad.
Bis(2-ethylhexyl)phthalate	S-4	460 J	Adjacent to drip pad.
	S-5	450 J	Adjacent to drip pad.
Chrysene	S-5	290 J	Adjacent to drip pad.
	S-8	250 J	Drainage ditch along northern fenceline.
	S-9	370	Wood storage area in southeastern portion of site.
Benzo(b)fluoranthene	S-3	170 J	Adjacent to drip pad.
	S-5	600 J	Adjacent to drip pad.
	S-8	340 J	Drainage ditch along northern fenceline.
	S-9	430 J	Wood storage area in southeastern portion of site.
Benzo(k)fluoranthene	S-3	170 J	Adjacent to drip pad.
	S-5	600 J	Adjacent to drip pad.
	S-8	340 J	Drainage ditch along northern fenceline.
	S-9	430 J	Wood storage area in southeastern portion of site.
Benzoic Acid	S-5	190 J	Adjacent to drip pad.

Notes: µg/kg = micrograms per kilogram
J = Analyte is present, reported value may not be accurate or precise.

As shown in Table 3, the majority of organic compounds reported in the soil samples collected during the SI were polycyclic aromatic hydrocarbons (PAH). PAHs above the CRQL were reported in every soil sample collected during the SI with the exception of S-1.

The inorganic compounds reported in source samples collected during the SI at concentrations at least three times the concentration reported in the background sample, S-6 are summarized in Table 4.

TABLE 4
SOURCE INORGANIC ANALYTICAL RESULTS SUMMARY – 1988 SI

Inorganic Compound	Background Concentration (S-6) (mg/kg)	Sample ID	Source Sample Concentration (mg/kg)	Source Sample Location
Aluminum	2,680	S-5	15,000	Adjacent to drip pad.
Arsenic	1.9	S-1	3,450	Adjacent to drip pad.
		S-2	2,200	Adjacent to drip pad.
		S-3	2,300	Adjacent to drip pad.
		S-4	3,910	Adjacent to drip pad.
		S-5	922	Adjacent to drip pad.
		S-7	220	Drainage ditch that flows from northeastern corner of drip pad.
		S-8	16.6	Drainage ditch along northern fenceline.
		S-9	81.8	Wood storage area in southeastern portion of site.

TABLE 4
SOURCE INORGANIC ANALYTICAL RESULTS SUMMARY – 1988 SI
(continued)

Inorganic Compound	Background Concentration (S-6) (mg/kg)	Sample ID	Source Sample Concentration (mg/kg)	Source Sample Location
Chromium	4.2	S-1	2,690	Adjacent to drip pad.
		S-2	1,440	Adjacent to drip pad.
		S-3	2,000	Adjacent to drip pad.
		S-4	2,860	Adjacent to drip pad.
		S-5	699	Adjacent to drip pad.
		S-7	134	Drainage ditch that flows from northeastern corner of drip pad.
		S-8	32.2	Drainage ditch along northern fenceline.
		S-9	79.4	Wood storage area in southeastern portion of site.
Cobalt	1.2 B	S-1	4.7	Adjacent to drip pad.
		S-2	5.6	Adjacent to drip pad.
		S-3	8.0	Adjacent to drip pad.
		S-4	6.9	Adjacent to drip pad.
		S-5	29.7	Adjacent to drip pad.
		S-7	4.9	Drainage ditch that flows from northeastern corner of drip pad.
		S-9	16.0	Wood storage area in southeastern portion of site.
Copper	23.2 LJ	S-1	1,270 LJ	Adjacent to drip pad.
		S-2	794 LJ	Adjacent to drip pad.
		S-3	1,120 LJ	Adjacent to drip pad.
		S-4	1,390 LJ	Adjacent to drip pad.
		S-5	391 LJ	Adjacent to drip pad.

TABLE 4
SOURCE INORGANIC ANALYTICAL RESULTS SUMMARY – 1988 SI
(continued)

Inorganic Compound	Background Concentration (S-6) (mg/kg)	Sample ID	Source Sample Concentration (mg/kg)	Source Sample Location
Iron	2,680	S-3	8,630	Adjacent to drip pad.
		S-5	35,200	Adjacent to drip pad.
		S-7	11,500	Drainage ditch that flows from northeastern corner of drip pad.
		S-9	11,700	Wood storage area in southeastern portion of site.
Lead	5.1 L	S-3	16.2 L	Adjacent to drip pad.
		S-5	47.2 L	Adjacent to drip pad.
		S-7	18.4 L	Drainage ditch that flows from northeastern corner of drip pad.
		S-9	27.1 L	Wood storage area in southeastern portion of site.
Manganese	16.5	S-1	116	Adjacent to drip pad.
		S-2	130	Adjacent to drip pad.
		S-3	161	Adjacent to drip pad.
		S-4	167	Adjacent to drip pad.
		S-5	542	Adjacent to drip pad.
		S-7	115	Drainage ditch that flows from northeastern corner of drip pad.
		S-8	55.6	Drainage ditch along northern fenceline.
		S-9	222	Wood storage area in southeastern portion of site.
Vanadium	6.2	S-5	45.9	Adjacent to drip pad.
Zinc	19.1	S-5	68.3	Adjacent to drip pad.

Notes: mg/kg = milligrams per kilogram
J = Analyte is present, reported value may not be accurate or precise.
L = Analyte is present. Concentration biased low; actual result is expected to be higher.

As shown in Table 4, the concentrations of compounds contained in the lumber treatment CCA solution (arsenic, chromium and copper) were reported at levels significantly above the concentrations reported in the background soil sample. The highest concentrations were reported in the samples collected adjacent to the drip pad. Elevated levels of arsenic and chromium were also detected in all of the samples collected from the on-site drainage ditches. The concentration of arsenic reported in all of the soil samples collected on the site were above the EPA Region 3 regional screening level (RSL) of 0.39 mg/kg established for residential soils and 1.6 mg/kg established for industrial soil.

A background soil sample was not collected during the ESI; therefore, the background soil sample, S-6 collected during the SI was used to document background soil concentrations. Table 5 summarizes the organic compounds detected above the CRQL in soil samples collected during the VDEQ 1992 ESI sampling event.

TABLE 5
SOURCE ORGANIC ANALYTICAL RESULTS SUMMARY – 1992 ESI

Organic Compound	Sample ID	Concentration (µg/kg)	Location
Phenanthrene	S-2	210 J	Adjacent to road.
Fluoranthene	S-2	350 J	Adjacent to road.
Pyrene	S-2	230 J	Adjacent to road.
Benzo(a)anthracene	S-2	170 J	Adjacent to road.
Chrysene	S-2	250 J	Adjacent to road.
Bis(2-ethylhexyl)phthalate	S-2	1,300	Adjacent to road.
	S-6	610 J	Drainage area into wetland.
Benzo(b)fluoranthene	S-2	350 J	Adjacent to road.

Notes: µg/kg = micrograms per kilogram
J = Analyte is present, reported value may not be accurate or precise.

The inorganic compounds reported in source samples collected during the ESI at concentrations at least three times the concentration reported in the background sample, S-6 are summarized in Table 6.

TABLE 6
SOURCE INORGANIC ANALYTICAL RESULTS SUMMARY – 1992 ESI

Inorganic Compound	Background Concentration (S-6 collected during SI in 1988) (mg/kg)	Sample ID	Source Sample Concentration (mg/kg)	Source Sample Location
Aluminum	2,680	S-2	5,080	Adjacent to road.
Arsenic	1.9	S-1	400 J	Adjacent to drip pad.
		S-2	7.3 J	Adjacent to road.
		S-3	80.1 J	Across from storage shed.
		S-4	169 J	Drainage area 1
		S-5	90.7	Western drainage area.
		S-6	13.8 J	Drainage area into wetland.
Chromium	4.2	S-1	415	Adjacent to drip pad.
		S-2	10.4	Adjacent to road.
		S-3	147	Across from storage shed.
		S-4	181	Drainage area 1
		S-5	62.6	Western drainage area.
		S-6	14.1	Drainage area into wetland.
Copper	23.2 LJ	S-1	305	Adjacent to drip pad.
		S-2	27.8	Adjacent to road.
		S-3	73.4	Across from storage shed.
		S-4	117	Drainage area 1
		S-5	44.2	Western drainage area.

TABLE 6
SOURCE INORGANIC ANALYTICAL RESULTS SUMMARY – 1992 ESI (continued)

Inorganic Compound	Background Concentration (S-6 collected during SI in 1988) (mg/kg)	Sample ID	Source Sample Concentration (mg/kg)	Source Sample Location
Iron	2,680	S-1	4,600	Adjacent to drip pad.
		S-2	6,920	Adjacent to road.
		S-3	6,050	Across from storage shed.
		S-4	5,430	Drainage area 1
		S-5	4,040	Western drainage area.
Lead	5.1 L	S-2	35.2 J	Adjacent to road.
		S-3	8.3 J	Across from storage shed.
		S-4	15.6 J	Drainage area 1
		S-5	5.6	Western drainage area.
Manganese	16.5	S-1	77.3	Adjacent to drip pad.
		S-2	147	Adjacent to road.
		S-3	69.7	Across from storage shed.
		S-4	87.8	Drainage area 1
		S-5	53.4	Western drainage area.
Vanadium	6.2	S-2	13.7	Adjacent to road.
Zinc	19.1	S-1	37.4 J	Adjacent to drip pad.
		S-2	52.6	Adjacent to road.
		S-3	47.9 J	Across from storage shed.
		S-4	106 J	Drainage area 1
		S-5	57.8	Western drainage area.

As shown in Table 6, the concentrations of compounds contained in the CCA solution (arsenic, chromium and copper) used to treat lumber were reported at levels significantly above the concentrations reported in the background soil sample. The highest concentrations were reported in S-1, which was collected adjacent to the drip pad. Elevated levels of arsenic, copper and chromium were also detected in soil samples collected from the on-site drainage ditches. The concentration of arsenic reported in all of the source soil samples collected on the site were

above the EPA Region 3 regional screening level (RSL) of 0.39 mg/kg established for residential soils and 1.6 mg/kg established for industrial soil.

In April 1996, EPA's SATA team completed a sampling assessment of the site. SATA collected 11 soil samples from on-site source areas. The samples were analyzed for EPA's target analyte list (TAL) metals. A specific background sample was not identified in the sampling assessment report; however, all of the samples collected contained elevated concentrations of arsenic, chromium, and copper when compared to the concentrations reported in the background sample collected during the 1988 SI. The highest concentrations were reported in a composite soil sample collected in the western portion of the drainage ditch that received drainage from the east side of the drip pad (S9); this sample contained 1,110 mg/kg of arsenic, 900 mg/kg of total chromium, 3.6 mg/kg of hexavalent chromium, and 602 mg/kg of copper. A significant level of arsenic was also reported in composite sample S-8, which was collected further east (closer to the wetlands). Arsenic was reported at 595 mg/kg in this sample. A composite sample collected in the ditch that received drainage from the northeast corner of the drip pad also contained elevated arsenic (393 mg/kg). The arsenic reported in these composite samples were above the EPA Emergency Removal Guidance (ERG) level of 160 mg/kg for arsenic in industrial soils.

3.4 SOURCE CONCLUSIONS

Analytical results reported for soil samples collected in 1988, 1992 and 1996 indicate that soils located adjacent to the drip pad are contaminated with arsenic, chromium and copper at concentrations significantly above the concentration reported in a background soil sample. These compounds were the constituents of the CCA solution historically utilized in this area to treat lumber. These compounds were also detected above the background concentration in on-site drainage ditches and lumber storage areas. The concentration of arsenic reported in all of the source soil samples is above the EPA Region 3 RSL established for industrial soils of 1.6 mg/kg and arsenic was reported at several sampling locations above EPA's ERG of 160 mg/kg.

4.0 GROUNDWATER MIGRATION PATHWAY

This section describes the site's hydrogeologic setting, the targets associated with the groundwater migration pathway, and conclusions that can be made for the groundwater migration pathway. Under the HRS, the hydrogeologic setting and targets are described for the 4-mile radius around the site.

4.1 HYDROGEOLOGIC SETTING

The aquifer nomenclature identified in the 2006 U.S. Geological Survey (USGS) publication, "The Virginia Coastal Plain Hydrogeologic Framework," was used to identify the aquifers underlying the site. Earlier USGS publications identify the aquifers by different names. Figure 3 of Reference 20 correlates former names of the aquifers with the current nomenclature (Ref. 20).

The hydrogeologic units or aquifers underlying the site include a complex network of Coastal Plain aquifers separated by clay and silt-confining units of various thicknesses and permeabilities. The various geologic formations and correlated hydrogeologic units (aquifers) are identified in Figures 2 and 3 of Reference 20.

The water table underling the site is within the river terrace deposits and is composed of tan to brown fine sand and gray to white coarse sand with a discontinuous basal course sand/gravel layer. This deposit is approximately 13 feet thick (Ref. 7). Based on the on-site shallow monitoring well boring logs, the river terrace deposits are underlain by the mid to late Eocene age Piney Point aquifer. The boring logs describe the Piney Point aquifer as green glauconitic fine sand with some clay and silt. The Piney Point aquifer is encountered at 13 to 14 feet bgs and is approximately 25 feet thick (Ref. 7; Ref. 20). The depth to groundwater measured from the monitoring wells is 12 feet below land surface (bls). The aquifer is homogeneous and is moderately used for a source of groundwater (Ref. 20).

Below the Piney Point aquifer is the late Paleocene to mid Eocene Nanjemoy-Marlboro Clay Confining Unit. The unit is widespread and is approximately 25 to 50 feet thick in the study area

and consists of marine, silty and clayey, fine-grained glauconitic quartz sands. The confining unit protects the underlying late Paleocene Aquia Aquifer which is approximately 50 feet thick and consists of glauconitic and quartz sands with minor shells and clay. The aquifer is widespread but sparsely used as a groundwater resource in the Virginia Coastal Plain. The aquifer is homogeneous; the sediments were deposited under relatively uniform sediment-transport conditions. Groundwater flows through the aquifer uninterrupted. The Aquia aquifer provides pubic water supplies to some small towns and private supplies for low-density residential development in some rural areas, mostly in northern Virginia (Ref. 20).

The Potomac Confining Unit underlies the Aquia Aquifer and is early Cretaceous in age and consists of an upper 10 feet of silty and sandy clays. The confining zone is widespread and is continuous thought the 4-mile radius of the site. The unit impedes groundwater flow into the underlying aquifers and is estimated to be 50 feet in thickness near the site (Ref. 20).

The Potomac Aquifer underlies the Potomac Confining Unit and consists of 500 to 750 feet of interbedded sands and clays. The Potomac aquifer is the largest, deepest, and most heavily used source of groundwater in the Virginia Coastal Plain. The aquifer supplies major industries, many towns and cities, and low-density residential developments in rural areas. The aquifer is a heterogeneous aquifer with sediments deposited by braided streams, meandering streams and delta. The Potomac aquifer is hydraulically continuous on a regional scale, but locally exhibits discontinuities where flow is impeded by fine-grained interbeds. Some studies of the Potomac aquifer divide the aquifer into the upper, middle, and lower aquifers separated by intervening confining units. The Potomac aquifer is underlain across its entire extent by basement bedrock consisting of mostly igneous and metamorphic rock (Ref. 20).

The Potomac aquifer has yields up to 100 to 500 gallons per minute. The sand within the aquifer has hydraulic conductivity values of 0.00059 to 2.8 feet per day. During 2002, the Potomac aquifer produced 76 percent of the groundwater used in Virginia Coastal Plain (Ref. 20). A review of information on the USGS website indicates the public water supply wells near the site obtain water from the Middle Potomac Aquifer (Ref. 20; Ref. 21X).

According to the New Kent County Comprehensive Plan, the site is underlain by a geology of clay, sand, marl, shell, and gravel strata. A cross-section of New Kent County hydrogeology

reveals an unconfined surface aquifer with a water table at or close to the soil surface. The surface aquifer is underlain by seven confined aquifers. These aquifers are underlain by hard granitic rock known as "basement," found at a depth of about 650 feet in the western part of the County and about 1,450 feet in the eastern part. Water for human consumption and other uses is withdrawn from these aquifers. Water can be found at depths of 100 to 200 feet, but the potential yield is much less than from deeper wells. The most prolific water-bearing zone in the is between 300 and 700 feet (Ref. 21).

The USGS has studied the groundwater resources of the Virginia Peninsula and found that withdrawal of groundwater has caused a lowering of water levels throughout the aquifer system, creating cones of depression centered on areas of concentrated groundwater use an expanding outward. A cone of depression affecting New Kent County originates from groundwater withdrawals by the Smurfit-Stone pulp mill in West Point, located over 10 miles northeast of the site. New Kent County is part of the Eastern Virginia Groundwater Management Area, regulated by the VWCB. Any non-agricultural groundwater user withdrawing more than 300,000 gallons per month is required to have a VWCB permit. If the VWCB determines that a proposed withdrawal will adversely affect the aquifer or existing groundwater users, the permit application will be denied. While this will prevent some development, the drilling of multiple small wells can have the same cumulative effect, particularly where wells are concentrated (Ref. 21; Ref. 22).

The New Kent County Public Works Department operates 12 small water systems to serve various residential, business, and institutional users. In 2001, there were 950 water customers. Most of the systems were constructed by private developers and others, and then taken over by New Kent County. The locations of these systems are indicated on the New Kent Public Facilities Map provided in Attachment 4. There is a mandatory connection policy requiring all structures on land abutting a water main to connect (Ref. 21). In addition to the public water systems, there are five private central water systems in New Kent County. These are found in five subdivisions: Woodhaven Shores, Brookwood Manor, Wedgewood, Five Lakes Brianwood, and Windsor Park. The Woodhaven Shores development is the only one of these community systems that is located within a 4-mile radius of the site (see Section 4.3 below and Appendix A, Figure 2). Information obtained from USGS for one of the two wells utilized for the Woodhaven

Shores system indicates that the well is 370 feet bls and is completed in the "coastal plan middle" aquifer (Ref. 23).

Charles City County is located within the southern portion of the 4-mile radius of the site. Charles City County maintains five county owned water systems. All the wells serving the systems are located outside the 4-mile radius of the site. The aquifer in which the Charles City wells are completed is not published. One of the wells, the Wayside well, is 300 drilled to a depth of 300 feet bls and is completed in the "coastal plan middle" aquifer according to the USGS (Ref. 23). This aquifer appears to be that Middle Potomac aquifer. The USGS maintains two wells in southern Charles City County; the wells are completed in the Patapsco Formation at 227 feet bls and in "sand" at 540 feet bls (Ref. 24; Ref. 25). The Patapsco Formation is not present within 4 miles of the site. The sand aquifer is most likely the Potomac aquifer (Ref. 20).

4.2 GROUNDWATER TARGETS

Under the HRS, drinking water wells located within a 4-mile radius around the site are identified to determine if there is a potential risk of contamination to these wells from uncontained sources of hazardous substances located on the site. Appendix A, Figure 2 shows the 4-mile radius area around the site. The entire population residing within a 4-mile radius of the site relies on groundwater for their potable supply. There are four community wells located within a 4-mile radius of the site. The Long Acres Mobile Home Park maintains one well located in the 0.5 to 1.0 mile radius ring that serves 48 persons. The depth of the well is unknown. A second 345 foot community supply well is located within the 2- to 3-mile radius ring and serves the 165 residents of the Minitree Glenn development. The Woodhaven Shores development maintains two community wells for the 1,428 residents of that development. The wells are located in the 3 to 4 mile radius ring and are 504 feet and 400 feet deep (Ref. 31). The location of the community wells are shown on Appendix A, Figure 2.

The remainder of the population surrounding the site rely on private domestic wells for their potable supply. To determine the number of domestic private wells within each of the 4-mile target distance categories a house count was completed on the 4-mile radius map (Appendix A, Figure 2). The number of individuals served by each well is estimated to be the average number

of persons per household for the two counties (New Kent and Charles City) that are located within a 4-mile radius of the site. The average persons per household for New Kent County in 2010 was 2.70 and the average number of persons per household for Charles City in 2010 was 2.46 (Ref. 26). The private domestic wells are typically shallow and are less than 50 feet deep (Ref. 8). There is a 100 foot well located on the site that was used for restroom and process water but was not utilized as potable water. The nearest residential well to the site is located 0.30 mile to the southwest. Table 7 summarizes the total population within a 4-mile radius of the site that relies on groundwater for their potable supply.

TABLE 7

TOTAL POPULATION SERVED BY GROUNDWATER WITHIN 4-MILE RADIUS

Radius (miles from center of site)	Domestic Wells New Kent County	Domestic Wells Charles City County	Population Domestic Wells*	Community Well	Community Well Population Served	Total Population
0 – 0.25	0	0	0	0	0	0
0.25 – 0.50	12	0	32	0	0	32
0.50 – 1.0	41	0	111	1	48	159
1.0 – 2.0	125	24	346	0	0	397
2.0 – 3.0	123	103	585	1	165	750
3.0 – 4.0	65	112	451	2	1,428	1,880

Note: * = The population is the average number of persons per household for New Kent (2.70) and Charles City County (2.46) in the year 2010 times the number of domestic wells (Appendix A, Figure 2; Ref. 26).

4.3 GROUNDWATER SAMPLING LOCATIONS

In May 1986, Emergency Special Services developed and installed a groundwater monitoring well system to acquire data for the area around the drip slab. A piezometer was installed at each corner of the property (a total of four) to determine the groundwater gradient. Groundwater was determined to flow in a southerly direction; after this determination three monitoring wells were installed downgradient of the drip pad (M-1, M-2 and M-3) and one upgradient well (M-4) as a background well (see figure included as Attachment 3). The wells were 15 to 18 feet deep. One groundwater sample was collected from each monitoring well and analyzed for arsenic, copper, and chromium (Ref. 9).

During the 1988 SI, VDEQ collected groundwater samples from three of the four on-site monitoring, one of the downgradient wells was dry and appeared to have collapsed and therefore could not be sampled. VDEQ also collected a groundwater sample from the on-site water supply well and one of the piezometers located in the northeast portion of the site, see Attachment 1 for the sampling locations. The groundwater samples were analyzed by an EPA CLP laboratory in accordance with EPA CLP protocols for organic and inorganic parameters (Ref. 7).

In April 1996, EPA's SATA team collected groundwater samples from six piezometers located on the site (sample identifiers P-1 through P-6). The piezometers were completed at depths from 13 to 18 feet bgs. The locations of the piezometers are shown in the figure included in Attachment 2. Seven samples, including a duplicate sample were analyzed for EPA's TAL total metals and hexavalent chromium, in addition, a sample collected from three of the piezometers (P2, P4 and P6) were filtered and analyzed for TAL dissolved metals.

4.4 GROUNDWATER SAMPLING RESULTS

Analytical results from the May 1986 sampling of four on-site monitoring wells are summarized in Table 8.

TABLE 8
GROUNDWATER ANALYTICAL RESULTS SUMMARY – 1986

	Monitoring Well Number			
	M-1	M-2	M-3	M-4 Background Well
Compound	Concentration (µg/l)			
Arsenic	370	800	510	400
Copper	100	180	240	90
Chromium	20,000	460	4,700	80

Notes: µg/l = micrograms per liter

As shown in Table 7, the concentration of chromium reported in all three downgradient wells was greater than three times the concentration reported in the background well. The levels of arsenic and copper reported in the downgradient wells were elevated above the background well but were not reported at levels that exceeded three times the background concentration.

Arsenic, chromium and copper analytical results for the groundwater samples collected during the 1988 SI are provided in Table 9.

TABLE 9

GROUNDWATER ANALYTICAL RESULTS SUMMARY – 1988 SI

Sample ID	GW-1	GW-1F	GW-2	GW-2F	GW-4	GW-4F	GW-5	GW-5F	GW-6	P-3
Location	Monitoring well (M-3)		Monitoring well (M-2)		Monitoring well (M-4) Background		Duplicate sample collected at M-3		On-site supply well	Piezometer located in northeast portion of site.
Compound	Concentration (µg/l)									
Arsenic	62.2	ND	ND	ND	ND	3.8	ND	ND	ND	ND
Chromium	1,500	146	37,800	35,100	275	6.2	671	153	8.0	1,200
Copper	167	26.5 B	167	20.4 B	112	34.0 B	117	19.9 B	15.8 B	406

Notes: µg/l = micrograms per liter
B = Not detected substantially above level reported in laboratory or field blanks.
F = Filtered sample.
ND = Not detected

As shown in Table 9, the concentration of chromium reported in every groundwater sample with the exception of the supply well (GW-6), was significantly elevated above the level reported in the background well.

The analytical results reported from the 1996 sampling assessment completed by EPA's SATA team are presented in Table 10.

TABLE 10
GROUNDWATER ANALYTICAL RESULTS SUMMARY – 1996 EPA ASSESSMENT

Sample ID	P1	P2	P2-F	W5 Duplicate of P2	W5-F	P3	P4	P4-F	P5	P6	P6-F
							Background				
Compound	Concentration (µg/l)										
Arsenic	34.8	47.3	ND	12.7	ND	767	71.4	ND	107	40.9	ND
Chromium (total)	130	6,840	916	2,940	959	947	531	ND	422	1,880	1,280
Chromium (hexavalent)	ND	760	NA	830	NA	ND	ND	NA	ND	1,310	NA
Copper	39.2	35.8	ND	17.6	8.6	892	172	ND	70.3	23.5	4.7

Notes: µg/l = micrograms per liter
B = Not detected substantially above level reported in laboratory or field blanks.
F = Filtered sample
NA = Compound not analyzed for.
ND = Not detected.

Based on the groundwater gradient map, piezometer P4 is upgradient from the drip pad. Compounds reported at three times the background level reported in P4 include arsenic in P3, total chromium in P2 and P6, hexavalent chromium in P2 and P6 and copper in P3. The concentration of dissolved total chromium was also three times above background in P2 and P6. Piezometer P6 was located directly adjacent to the drip pad, P2 was located along the southeastern border of the site and P3 was located along the northeastern boundary of the site.

4.5 GROUNDWATER CONCLUSIONS

VDEQ file information included groundwater analytical results for samples collected from the site in 1986, 1988 and 1996. Analytical results reported during each of these sampling events indicate that arsenic, chromium and copper have migrated from contaminated soil sources located adjacent to the drip pad and in on-site drainage ditches into the shallow water table that

underlies the site. No recent groundwater sample analytical results were available for review; therefore, the current level of contamination that exists in the shallow water table cannot be determined. Groundwater analytical results provide evidence of a release to the water table aquifer. The aquifer is not commonly used for drinking water supplies; however, residents in the area surrounding the site obtain drinking water from domestic wells and the aquifer from which residents draw drinking water is not known. The depths of domestic wells are estimated by the Virginia Department of Health to be 50 feet bls and therefore most likely completed in the Piney Point aquifer (estimated to be 14 feet bls and have a thickness of 25). The Piney Point aquifer is connected to the overlying water table; therefore, drinking water wells completed in the Piney Point aquifer may be threatened by the documented contamination of the water table underlying the site.

5.0 SURFACE WATER MIGRATION PATHWAY

This section describes the site's hydrologic setting, the targets associated with the surface water migration pathway, and conclusions made for the surface water migration pathway.

5.1 HYDROLOGIC SETTING

According to observations noted during the 1988 SI, 1992 ESI and 1996 EPA sampling assessment, drainage from the site flows to the east, southeast into wetlands that are contiguous with Schiminoe Creek. Schiminoe Creek flows in a southerly direction for 0.75 miles until it discharges into the Chickahominy River, which continues to flow in an easterly direction. Under the HRS, possible targets (receptors) are assessed within 15 miles downstream of the site. The 15-mile HRS target distance limit is completed within the Chickahominy River. Appendix A, Figure 3 shows the 15-mile target distance limit for the surface water migration pathway.

5.2 SURFACE WATER TARGETS

Targets associated with the surface water migration pathway include sensitive environments and fisheries. Sensitive environments adjacent to the site include the wetland with a perimeter of 0.36 mile into which site drainage flows and samples were collected from during previous investigations. As shown on Appendix A, Figure 3, wetlands are located along the entire length of the 15-mile downstream target distance limit on both banks of Schiminoe Creek and Chickahominy River. Approximately, 2 miles of wetland frontage are associated with Schiminoe Creek and 26 miles of wetland frontage are associated with Chickahominy River (Appendix A, Figure 3).

The New Kent County Geographic Information System (GIS) website identified the wetlands into which the site drains as Resource Protection Areas (RPA) (Ref. 20). According to the Chesapeake Bay Local Assistance Department in VA, RPAs are a component of the Chesapeake Bay Protection Act regulated by the Chesapeake Bay Preservation Ordinance and are comprised of "land adjacent to water bodies with perennial flow that have an intrinsic water quality value due to the ecological and biological processes they perform or are sensitive to impacts, which may result in significant degradation to the quality of state waters". RPAs are the corridors of environmentally sensitive land that lie alongside or near the shorelines of streams, rivers and other waterways which drain into the Potomac River and eventually into the Chesapeake Bay. (Ref. 27). Under the HRS, this sensitive environment is evaluated as "areas identified under the Coastal Zone Management Act".

Other sensitive environments identified within the 15-mile target distance limit include habitat for state or federally listed threatened species. A Virginia Natural Heritage database search for New Kent County identified the presence of a state threatened species, the Bald Eagle (*Haliaeetus leucocephalus*) and several state and federal threatened vascular plant species within New Kent County. The small whorled pogonia (*Isotria medeoloides)*, the sensitive joint vetch (*Aeschynomene virginica)*, and the Bald Eagle (*Haliaeetus leucocephalus)* (all State threatened species under Virginia law) have been observed with the 15-mile target distance limit (Ref. 27). The Chickahominy River is a State Scenic River east of New Kent County (Ref. 28).

Both the Schiminoe Creek and Chickahominy River are used for fishing within the 15-mile target distance limit. The nearest fishing location identified to the site is located on the Schiminoe Creek, approximately 0.73 mile from the site, directly upstream of its discharge point into the Chickahominy River (Ref. 29). The Chickahominy River is also utilized for fishing with the 15-mile target distance limit. According to the Virginia Department of Game and Inland Fisheries, the Chickahominy River has broad expanses of open marshes and cypress trees along much of its shoreline and supports a diversity of fish species and is nationally recognized as a largemouth bass (*Micropterus salmoides)* fishery. Other fish species include yellow perch (*Perca flavescens)*, white perch (*Morone americana*), black crappie (*Pomoxis negromaculatus*), chain pickerel (*Esox niger*), blue catfish (*Ictalurus furcatus*), channel catfish (*Ictalurus punctatus*), large-nose gar (*Lepisosteus osseus*), and alewife (*Alosa psuedoharengus*). Common carp and long-nose gar are large and plentiful. River herring including blueback herring and alewife are amount the fish species within the River (Ref. 28).

5.3 SAMPLING LOCATIONS AND ANALYTICAL RESULTS

Surface water and sediment samples were collected by VDEQ during the 1988 SI and 1992 ESI. In 1988, one downstream (SW-3/SED-3) and one upstream (SW-4/SD-4) surface water and sediment samples were collected from the wetland that is contiguous with Schiminoe Creek. There were no levels reported in the downstream surface water or sediment samples that were greater than three times the upstream sample and also above the CRQL.

In 1992 during the ESI, VDEQ collected three surface water and sediment samples from Schiminoe Creek and one surface water and sediment sample from the adjacent wetlands. Analytical results were compared to the upstream background sample collected during the SI. The surface water sample SW-4 collected in the wetlands located adjacent to the site and Schiminoe Creek contained significant levels of arsenic (1,230 µg/l), chromium (1,910 µg/l) and copper (1,320 µg/l). Arsenic and chromium were not detected in the upstream surface water sample; copper was detected at 18.2 µg/l in the upstream sample but the level reported was qualified with a “B” indicating that the level was not substantially above the concentration reported in laboratory or field blanks. The concentrations reported in the wetland surface water samples significantly exceed the Freshwater Screening Benchmarks established by EPA Region

3's Biological Technical Assistance Group (BTAG). The EPA BTAG benchmark for arsenic is 5 µg/l, for chromium is 8.5 µg/l and for copper is 9 µg/l.

The sediment sample (SD-4) collected from the wetland also contained arsenic (57.0 mg/kg), chromium (92.2 mg/kg) and copper (55.3 mg/kg) at levels that exceeded three times the levels reported in the background sediment sample. The downstream sediment sample, SD-3 collected from Schiminoe Creek contained arsenic at 61.7 mg/kg which exceeded three times the upstream concentration. The arsenic, chromium and copper levels reported in the wetland sediment sample and the arsenic reported in the downstream sediment sample also exceeded the EPA BTAG sediment benchmarks for arsenic of 9.8 mg/kg, chromium of 43.4 mg/kg and copper of 31.6 mg/kg.

In 1996, EPA's SATA team collected two downstream surface water and sediment samples and one upstream surface water and sediment sample from Schiminoe Creek. Surface water and sediment sample, SW-2/SD-2 was collected where the drainage ditch that conveyed drainage from the drip pad entered Schiminoe Creek. The surface water sample collected at this location (SW-2) contained arsenic at 113 µg/l and total chromium at 19.5 µg/l; these compounds were not detected in the background surface water sample. The sediment sample collected at this location (SD-2) also contained arsenic (89.3 mg/kg), total chromium (120 mg/kg), and copper (64 mg/kg) at concentrations that exceeded three times the background sediment sample. These concentrations also exceeded the corresponding EPA BTAG benchmarks.

5.4 SURFACE WATER CONCLUSIONS

Analytical results reported for surface water and sediment samples collected from wetlands located adjacent to the site and Schiminoe Creek indicate that arsenic, chromium and copper have migrated from the site via on-site drainage ditches and entered adjacent off site wetlands and Schiminoe Creek. Concentrations reported exceed EPA BTAG screening benchmarks established for freshwater ecoystems.

6.0 SOIL EXPOSURE AND AIR MIGRATION PATHWAYS

This section provides information regarding targets associated with the soil exposure and air migration pathways. The analytical results for soil samples collected at the site were discussed in Section 3.0.

6.1 PHYSICAL CONDITIONS

According to the Natural Resources Conservation Services (NRCS) soil resource report, the site is underlain by fine sandy loam and silty loam (Ref. 30). Descriptions of soil samples collected from site specific soil boring logs indicate that the soil underlying the site consists of sand, silty sand and sandy silt to approximately 14 feet bgs. At approximately 14 feet bgs the soil is described as sand mixed with clay (Ref. 7; Ref. 9).

6.2 SOIL AND AIR TARGETS

Under the HRS, potential targets such as workers on the site and residences, schools or daycare centers located within 200 feet of the site are identified. The site is currently occupied by two active businesses; the actual number of on-site workers is unknown. Based on the existing analytical data, these workers could potentially be exposed to soils contaminated with arsenic at levels that exceed EPA RSLs for residential and industrial soils. The population within a 4-mile radius of the site is determined under the HRS and is summarized below in Table 11 (Ref. 26). The nearest residential property is located approximately 0.30 mile to the southwest. In addition to the human population other HRS targets identified for the air migration pathway include approximately 528 acres of wetlands identified within a 4-mile radius of the site (see Appendix A, Figure 2).

TABLE 11
POPULATION WITHIN 4 MILES OF SITE

Radial Distance from Site (miles)	Population (number of persons)
0.00 - 0.25	0
0.25 - 0.50	32
0.50 - 1.0	159
1.0 - 2.0	397
2.0 - 3.0	750
3.0 - 4.0	1,880

6.3 SOIL AND AIR CONCLUSIONS

Analytical results indicate that soils located adjacent to the drip pad and in on-site drainage ditches are contaminated with arsenic, chromium, and copper. The level of arsenic detected in these samples exceeds EPA RSLs for residential and industrial soils.

7.0 SUMMARY AND CONCLUSIONS

Beginning in 1977 through approximately 1993 the New Kent Wood Preservatives, Inc. site was the location of a wood preserving facility. During this time period, lumber was treated in a cylinder with a chromate copper arsenate (CCA) solution and placed on an adjacent drip pad to dry. CCA solution contains chromium, copper and arsenic. Sampling investigations have been completed on the site in 1986, 1988, 1992 and 1996. Samples collected of soils located adjacent to the drip pad and along drainage ditches that convey surface water drainage from the site to adjacent wetland areas indicate the presence of elevated levels of arsenic, chromium , and copper. Results from the most recent sampling event completed by EPA's SATA team in 1996 indicated up to 1,110 mg/kg of arsenic, 900 mg/kg of total chromium, 3.6 mg/kg of hexavalent chromium, and 602 mg/kg of copper in an on-site drainage ditch. The arsenic level reported in a composite sample collected during this investigation east of the drip pad and in three composite samples collected from on-site drainage ditches were above EPA's Emergency Removal Guidance (ERG) level of 160 mg/kg for arsenic in industrial soils.

Groundwater samples have been collected from the shallow water table underlying the site in 1986, 1988 and 1996. Analytical results reveal that arsenic, chromium and copper have migrated from on-site contaminated soils into the underlying groundwater table. The 100 foot deep on-site supply well was sampled in 1988 and did not reveal elevated concentrations of any parameter. All residents within a 4-mile radius of the site obtain drinking water from wells. The aquifer from which the domestic wells are completed has not been determined; however, based on the estimated depth of the domestic wells (less than 50 feet), they are likely completed in the Piney Point aquifer. The Piney Point aquifer is interconnected to the contaminated shallow water table underlying the site.

Surface water and sediment samples collected from the site indicate that arsenic, chromium and copper have migrated into the adjacent wetlands and Schiminoe Creek. A surface water sample collected during the 1992 ESI completed by VDEQ indicated significant levels of arsenic (1,230 µg/l), chromium (1,910 µg/l) and copper (1,320 µg/l) in the wetlands that receive drainage from the drip pad. The levels of arsenic, chromium, and copper reported in surface water and sediment samples exceed EPA BTAG screening benchmarks established for freshwater ecoystems.

In May 1995, the Virginia Waste Management Board on behalf of VDEQ issued an enforcement order to L-Wood, Inc. and owner, Mr. Thomas Liesfeld. L-Wood, Inc. operated a wood preservation facility on the site from 1988 through at least 1993. The enforcement order outlined a schedule of compliance that ordered L-Wood to evaluate the drip pad within 60 days and within 90 days submit to VDEQ a closure plan for the drip pad. L-Wood was also ordered to pay a civil penalty of $6,400 to the VA Environmental Emergency Response Fund. To date, Mr. Liesfeld has not complied with the enforcement order and has not paid the civil penalty.

VDEQ completed a visual inspection of the site on June 5, 2002; at that time the property was occupied by Higgins Sales (currently McNeil Sales and Service Co. Inc.) and Museum Restorations, which was using the office space and storage facilities. The inspection revealed abandoned equipment on the site including one horizontal tank which contained a small quantity of liquid which reportedly smelled faintly of solvents/chemicals and a large vertical tank which appeared to be empty. A copy of this inspection report was sent to the address on record for Mr.

Liesfeld but could not be delivered; VDEQ requested that EPA take the lead on completing further assessments of the site. No further investigations of the property have been completed.

The property is currently owned by Mr. Thomas Liesfeld. Two active businesses currently occupy the property, McNeil Sales and Service Co. Inc and Museum Resources. It is not known the number of workers that are currently present on the site and may potentially be exposed to the contaminated soils documented to be present.

8.0 REFERENCES

1. U.S. Environmental Protection Agency. (EPA). 1991. Guidance for Performing Preliminary Assessments Under CERCLA. Hazardous Site Evaluation Division. Office of Solid Waste and Emergency Response. Washington, DC. September.

2. EPA. 1992. Guidance for Performing Site Inspection Under CERCLA. Hazardous Site Evaluation Division. Office of Solid Waste and Emergency Response. Washington, DC. September

3. Blueskies Environmental Associates, Inc. (blueskies). Site Reconnaissance Field Notes. January 19, 2012.

4. The McNeil Companies. On-Line Address: www.mcneilusa.com

5. Museum Resources. On-Line Address: www.museum-resources.com

6. Virginia Department of Health. Preliminary Assessment of New Kent Wood Preservers (Holland Forest Products, Inc. VA-325. October 31, 1985.

7. Virginia Department of Waste Management. Site Inspection of L Wood (New Kent Wood Preservers) VA-325. April 28, 1989.

8. Virginia Department of Environmental Quality (VDEQ). Expanded Site Inspection Report of New Kent Wood Preservers VA-325. April 28, 198EPA. September 22, 1993, revised June 7, 1994.

9. Emergency Special Services. Letter From J.E.McClure, Jr., Director Environmental Consulting Division To Daryl Kelso, Holland Forest Products Regarding Groundwater Monitoring System. October 13, 1986.

10. EPA. RCRAInfo Search Results Envirofacts. L Wood Inc. On-Line Address: www.epa.gov/enviro/

11. Roy. F. Weston. Trip Report, New Kent Wood Preservers – Assessment. TDD No. 9603-22. Undated.

12. Virginia Waste Management Board. Enforcement Order. L-Wood, Inc. EPA ID No. VAD981944945. May 10, 1985.

13. VDEQ. Letter From Cathie P. Franco, Enforcement Specialist To Tom Liesfeld, President L-Wood, Inc. May 24, 1996.

14. VDEQ – Piedmont Regional Office. Wood Preserving/Treating Industry Inspection Report. L-Wood Southern Pines Specialists. April 25, 2000.

15. VDEQ – Richmond Office. Electronic Mail From Christina M. Wood To Shawn E. Davis Regarding L-Wood Southern Pine Specialists Site Closure. September 19, 2000.

16. VDEQ – Piedmont Regional Office. Wood Preserving/Treating Industry Inspection Report. L-Wood Southern Pines Specialists. June 5, 2002.

17. VDEQ. Electronic Mail From Mohammad Habibi To Robert Timmins and Kevin Greene Regarding Summary of Acitivites at New Kent Wood Preservers. March 27, 2003.

18. VDEQ. Electronic Mail From Kevin Greene To Jim McCreary, EPA Regarding Work Share 2002 (VA). March 27, 2003.

19. The County of New Kent Assessors Online Database. Property Assessment. Parcel Summary, 4101 S Mountcastle Rd. On-Line Address: http://data.visionappraisal.com/NewKentCountyVA/

20. U.S. Geological Survey (USGS). Regional Aquifer-System Analysis – Northern Atlantic Coastal Plain. Hydrogeologic Framework of the Coastal Plain of Maryland, Delaware, and the District of Columbia. 1991.

21. New Kent County. New Kent County Existing Comprehensive Plan. Existing Facilities. June 6, 2002. Available On-Line at: http://www.co.new-kent.va.us/planningcomm/ExistingConditions.pdf

22. VDEQ. Virginia Ground Water Management Areas. June 20, 2006. Available On-Line at: http://www.deq.virginia.gov/Portals/0/DEQ/Water/GroundwaterPermitting/gwma.pdf

23. USGS. Virginia Aquifer Susceptibility Testing Sites. Available On-Line at: http://va.water.usgs.gov/va123/Resources/VAS-Sites_Final.PDF

24. USGS. Groundwater Information for Charles City County Wells. On-Line Address: http://groundwaterwatch.usgs.gov/AWLSites.asp?S=371956076055101&ncd

25. USGS. Groundwater Information for Kent County Wells. On-Line Address: http://groundwaterwatch.usgs.gov/AWLSites.asp?S=371956077055203&ncd

26. U.S. Census Bureau. State & County QuickFacts for New Kent and Charles City Counties, VA. On-Line Address: http://quickfactscensus.gov

27. Virginia Natural Heritage Program. New Kent County Species Data Search. On-Line Address: http://www.dcr.virginia.gov/natural_heritage/resources/display_counties.cfm

28. Richmond Regional Planning District Commission. Chickahominy River Recreational Access Study. October 31, 2007. Available On-Line At: http://www.richmondregional.org/Publications/Reports_and_Documents/Planning/ChckhmnyRvrStudy.pdf

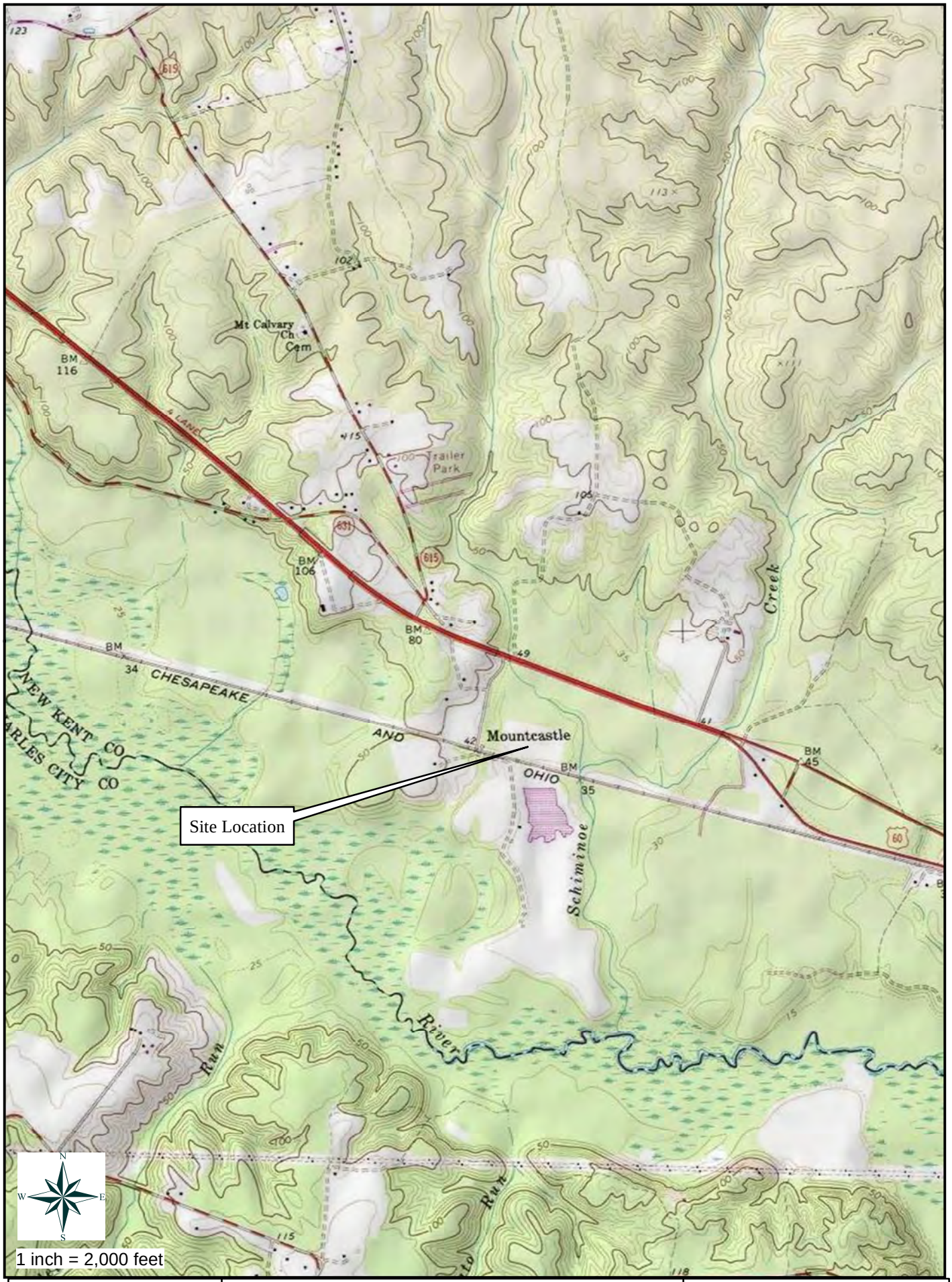
29. MyFishMaps.Com. Schiminoe Creek in New Kent County, Virginia. On-Line Address: www.myfishmaps.com.

30. U.S. Department of Agriculture. Natural Resources Conservation Service. Custom Soil Rpeort for New Kent County, VA, New Kent Wood Preserving. April 18, 2012.Meng, Andrew A., and John F. Harsh. Hydrogeological Framework of the Virginia Coastal Plain. Regional Aquifer-System Analysis. 1988.

31. Blueskies. Electronic Mail From Randall Morrissette To Sandra Williams Regarding Community Wells Within 4-Mile Radius of Site. February 23, 2012.

APPENDIX A

FIGURES



blueskies

www.blueskiesassociates.com

New Kent Wood Preservatives, Inc.

New Kent County, Virginia

Data Sources: USGS 24K Quadrangle Providence Forge, VA, 1977

Figure 1

Site Location

N
W
E
S

Legend

- Community Supply Well
- 4-mile rings

Woodhaven Shores #1

Woodhaven Shores #2

Long Acres Mobile Home Park #1

Minitree Glen #1

0.25 mi

0.50 mi

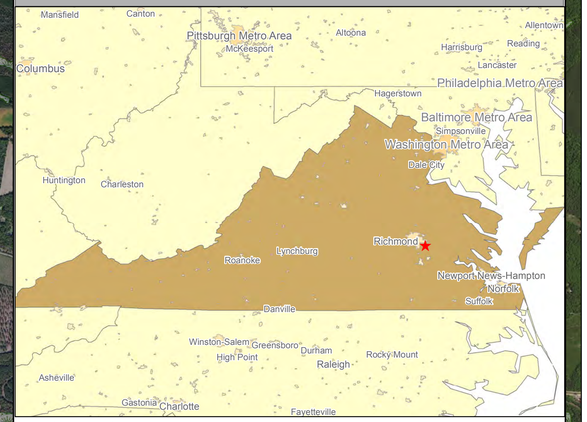
1.0 mi

2.0 mi

3.0 mi

4.0 mi

Site Location



Source: USA Base Map, ESRI, 2010

Source: ESRI ArcGIS Online (2010) and data partners including USGS and © 2007 National Geographic Society

New Kent Wood Preservatives, Inc.

New Kent County, VA

Figure 2

4-Mile Radius Map

Created by: S. Williams

Creation date: April 11, 2012

Revised by:

Revision date:

blueskies environmental associates, inc.
6767 Forest Hill Avenue, Suite 204
Richmond, Virginia 23225
www.blueskiesassociates.com

0.75 0.375 0 0.75 1.5 Miles

11900000 11920000 11940000

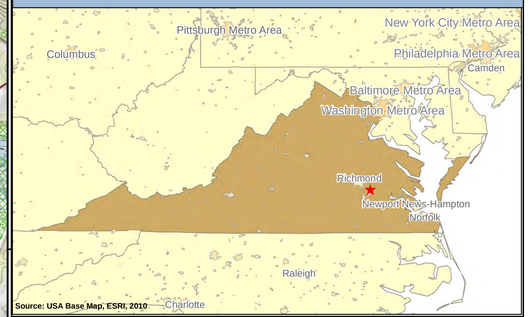
3700000 3690000 3680000 3670000 3660000

Legend

- NWI Wetlands
- Approximate surface water pathway
- Property boundary
- Probable point of entry to Schiminoe Creek
- Mile distance marker

Property Detail

Site Location



New Kent Wood Preservatives,Inc.

New Kent County, Virginia

Figure 3

15-Mile Target Distance Limit Map

Created by: S. Williams

Creation date: April 18, 2012

Revised by:

Revision date:

blueskies environmental associates, inc.
6767 Forest Hill Avenue, Suite 204
Richmond, Virginia 23225
www.blueskiesassociates.com

0 2.5 5 10 15 20 Miles

N W E S

APPENDIX B

PHOTO DOCUMENTATION LOG

Photographic Documentation

Site Name: New Kent Wood Preservatives Inc. Site
Location: Providence Forge, VA

Prepared by: Blueskies Environmental Associates, Inc.
Photograph Date: January 19, 2012

Photograph No. 1

Description: Sign on New Kent Wood Preservatives site driveway.

Photograph No. 2

Description: View of site facing south from driveway.

Photographic Documentation

Site Name: New Kent Wood Preservatives Inc. Site
Location: Providence Forge, VA

Prepared by: Blueskies Environmental Associates, Inc.
Photograph Date: January 19, 2012

Photograph No. 3

Description: View of wood chip pile and logs along southern fenceline.

Photograph No. 4

Description: View of site from driveway facing north/northeast.

APPENDIX C

COPY OF LOGBOOK RECORD

New Kent Wood Preservers 01/19/2012
S. Williams, D. Harris-DEQ

Site Location: 4101 S. Mountcastle Rd.
Providence Forge, VA
23140-3235

Currently shown as
L Woods Inc.
Picked up Devlin Harris at 10:00am.
Drove by the site @ 10:32 am.

- Photographed sign at driveway entrance.

Site sits back off the road.

Pulled into entrance to take photos.

S fenceline –
building - pole type w/ wood shingles. lumber on either side.

New Kent Wood Preservers 1/19/2012
S. Williams, D. Harris - DEQ

Pulled in to turn around - photo taken just N. of building looking across site
Active wood operations - fresh chip new logs.

trailers, boats, trucks, equipment parked all over site.

No visual of buildings in distance.

Observed pieces of pipe, stacks of wood, logs and equipment on S. fenceline.

Chip pile on N. fenceline of site.

Drove S through dirt road to see if residences nearby. Noted one SW of driveway across railroad.
Lee-Hy Paving has a large pile of asphalt millings on their operation

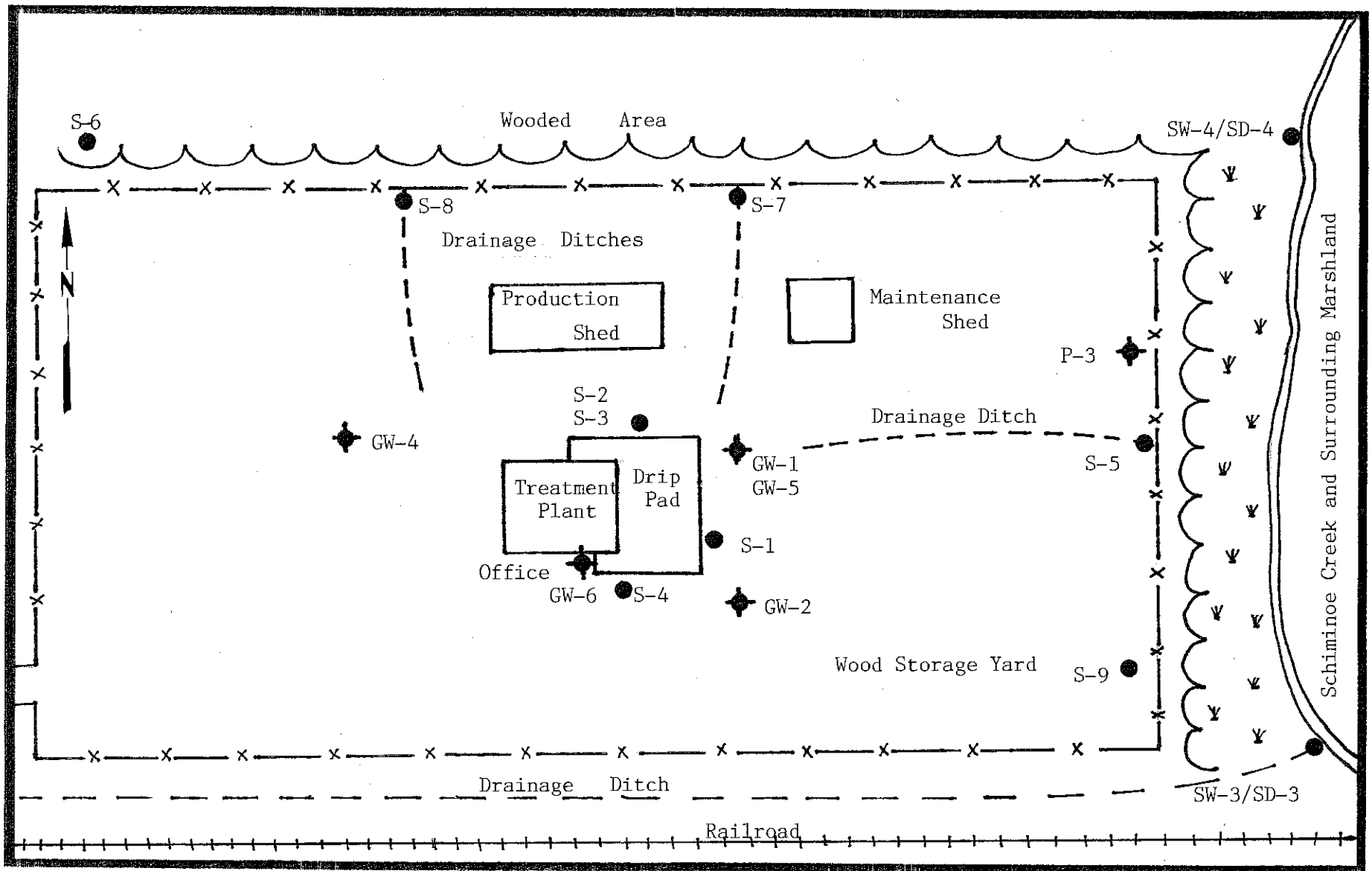
New Kent Wood Preservers 1/19/2012
S. Williams / D. Harris - DEQ

S of railroad and site.

Could not access any other sides of parcel - no road access.
Very wet and swampy.

Followed by pick-up when we drove to see if we could get around other sides of site. No communication with gentlemen.

ATTACHMENT 1



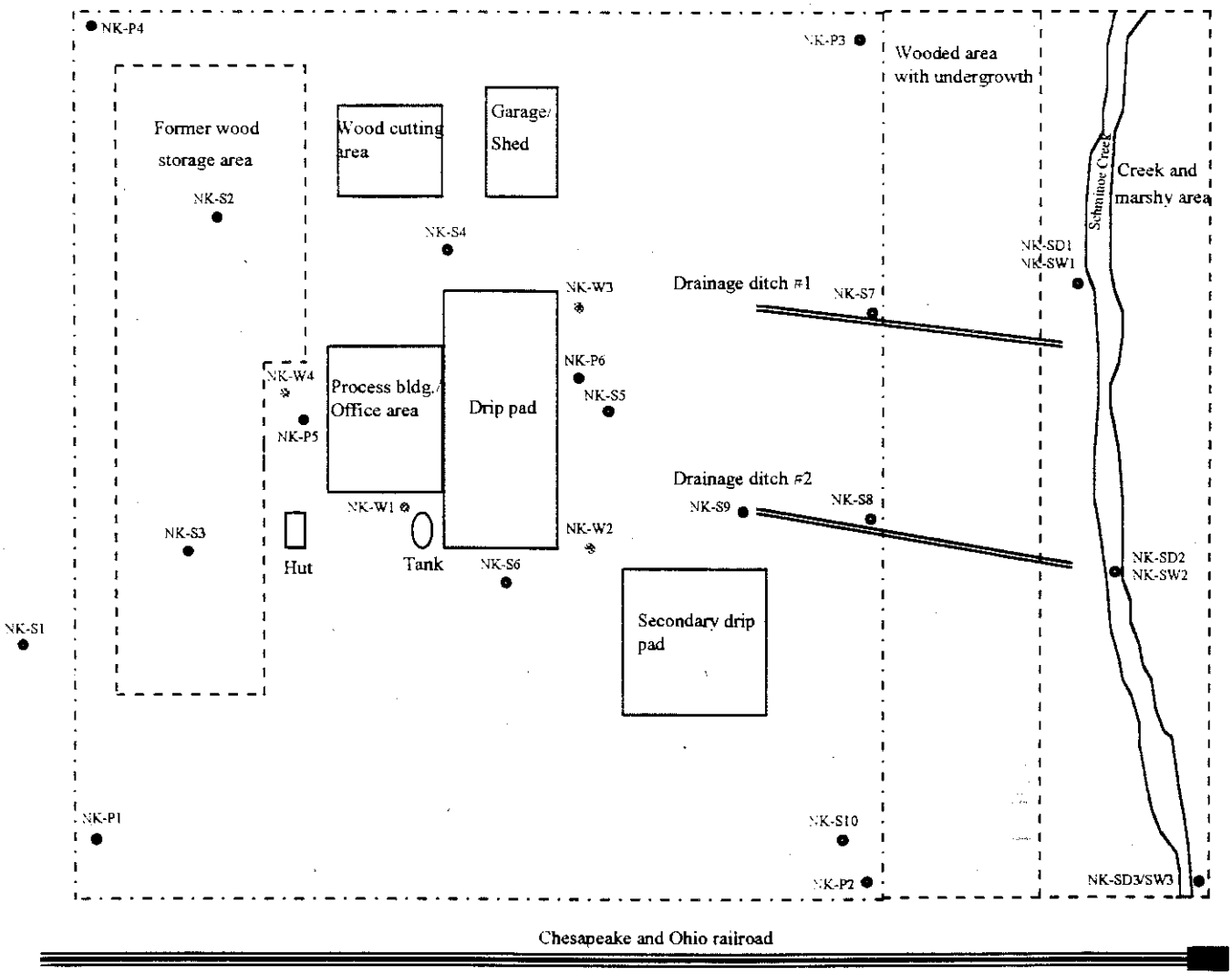
Commonwealth of Virginia

L WOOD, VA-325 1"=127'		**Figure Number:**
REVISED SAMPLING PLAN		3
Drawn by: ems	**Reviewed:**	**Date:** 04/25/89

ATTACHMENT 2

WESTON® MANAGERS DESIGNERS/CONSULTANTS FEDERAL PROGRAMS DIVISION	NEW KENT WOOD PRESERVERS PROVIDENCE FORGE, NEW KENT CO., VA.	TDD#: 9603-22 PCS#: 2285

FIGURE 1



Fenceline

Sampled

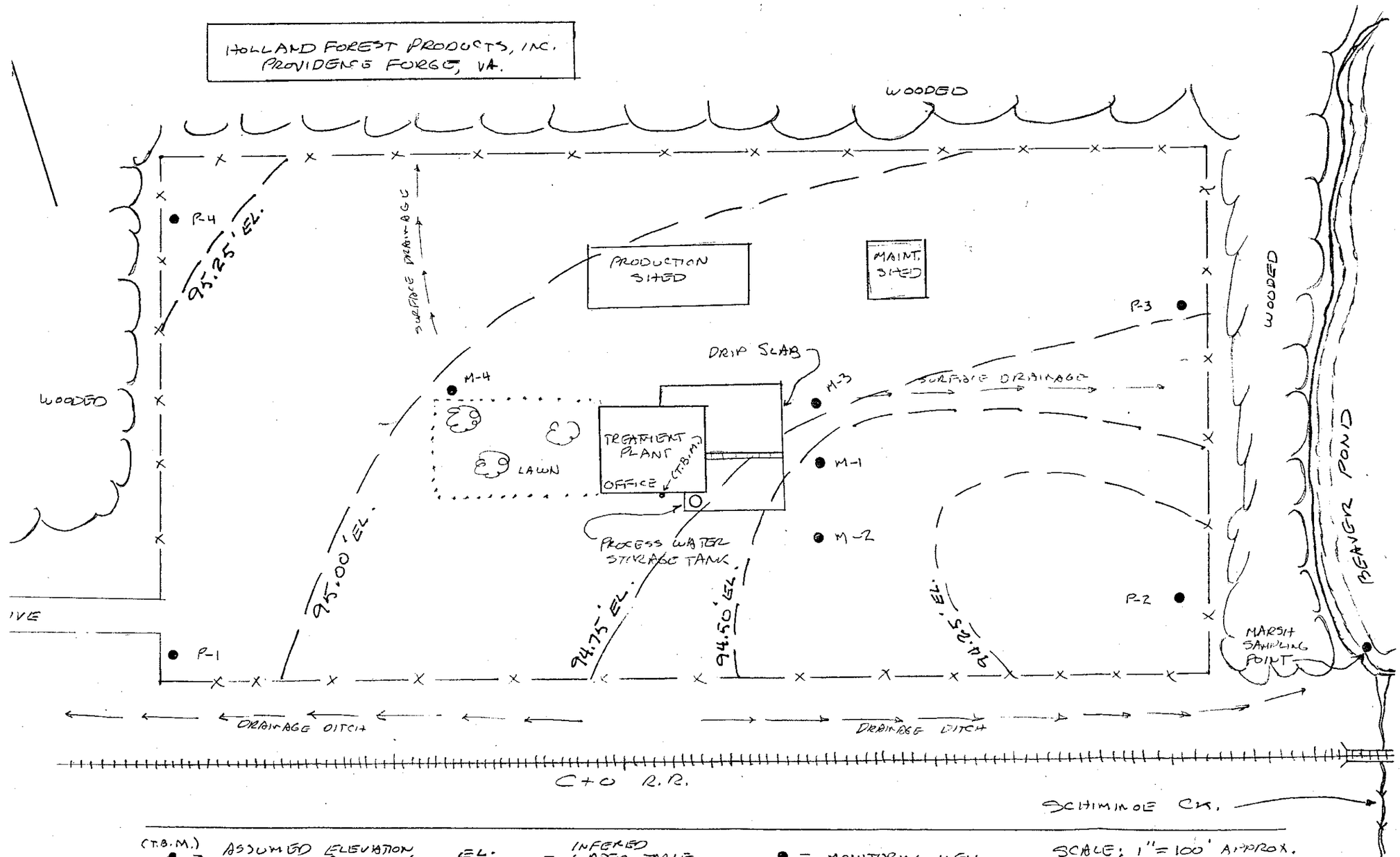
Not sampled

NEW KENT WOOD PRESERVERS- SITE SAMPLING LOCATION MAP

NOT TO SCALE

ATTACHMENT 3

HOLLAND FOREST PRODUCTS, INC.
PROVIDENCE FORGE, VA.



(T.B.M.) ● = ASSUMED ELEVATION, 100.00' ON SLABS.

—EL.— = INFERRED WATER TABLE

● = MONITORING WELL

SCALE: 1" = 100' APPROX.

ATTACHMENT 4

New Kent County
COMMUNITY DEVELOPMENT

New Kent County

Community Facilities

Community Facilities

- Courthouse
- Library
- Post Office
- Fire Station
- Rescue Squad
- Regional Jail
- VDOT
- Airport
- George Watkins ES
- New Kent HS
- New Kent MS
- New Kent Primary
- Newport News Pump Station
- Wastewater Treatment
- Water System
- Sewer-Force Main

0 0.5 1 2 3 4 5 Miles

N W E S

Courthouse Area

Richmond Regional Planning District Commission