

The USEPA ranks chemical carcinogens according to weight of evidence. Arsenic and hexavalent chromium are regarded as human carcinogens, and beryllium and lead are classified as probable human carcinogens. The chemical carcinogen classification for trivalent chromium was pending until USEPA, in September 1998, classified it as Class D (not carcinogenic). Antimony, trivalent chromium, copper, manganese, mercury, and zinc are not classifiable as to human carcinogenicity based on inadequate human and animal evidence of carcinogenicity or the absence of data.

The groundwater at the Site is classified by NYSDEC as Class GA, a drinking water source. In addition, the Site is located in an area classified as a sole-source aquifer. The groundwater from this aquifer is used by residents as a drinking water source and although no residential wells were impacted by the contaminants in the groundwater in 1996, the potential exists for future exposure from residential use. The groundwater plume serves as a continuing source of degradation of off-site groundwater. The significantly high concentrations of inorganic contaminants in groundwater, in excess of NYSDEC Class GA standards, warrant remedial action. Soil contamination also serves as a contributor to groundwater contamination. Remedial investigative activities indicated that most of the contamination was confined to the upper two feet. The surface soil currently poses a hazard to site workers and trespassers, as well as to future utility workers who may contact chemical contamination during daily operations or inhale fugitive dust generated by these activities. Contaminated soils have migrated off-site via the braided, intermittent tributary. Arsenic, chromium, copper, and lead were detected 200 feet downstream of the outfall pipe located on the west side of Speonk-Riverhead Road along the tributary to the East Branch River. In addition, low levels of arsenic, chromium, and copper were detected near the fence line in the predominant northeast windrow. Remedial action is warranted to prevent site workers, residents, and trespassers from potential exposure to site-related contaminants currently and in the future.

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**ENGINEERING FEASIBILITY STUDY  
BB&S TREATED LUMBER SITE (#152123)  
SPEONK, LONG ISLAND, NEW YORK**

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**Prepared for:**

**NEW YORK STATE DEPARTMENT OF  
ENVIRONMENTAL CONSERVATION  
DIVISION OF HAZARDOUS WASTE REMEDIATION**

**JANUARY 1999  
REVISED JUNE 1999  
REVISED AUGUST 1999**

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**BB&S TREATED LUMBER SITE  
FEASIBILITY STUDY**

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## 1.0 INTRODUCTION

### 1.1 PURPOSE AND ORGANIZATION OF THE REPORT

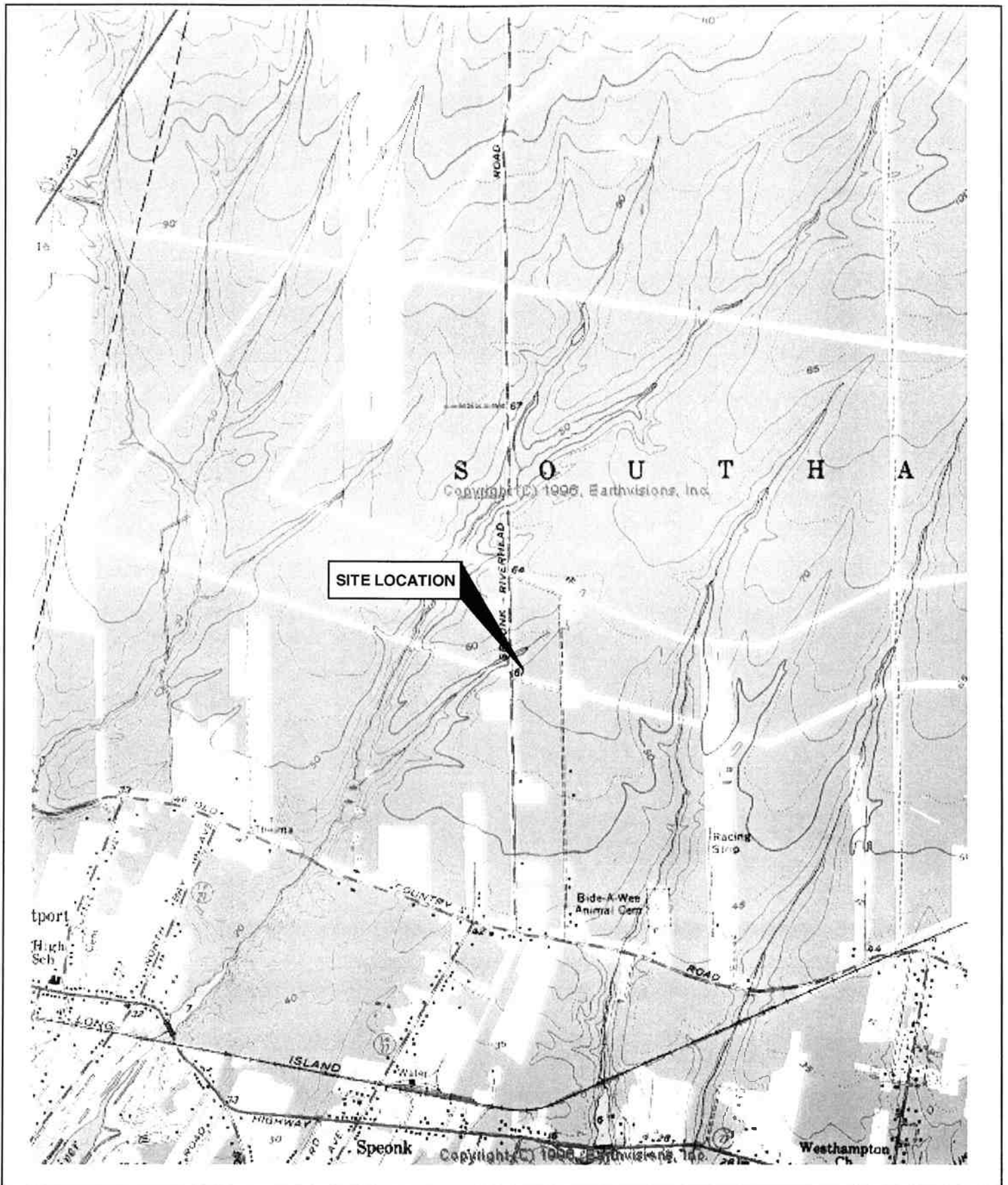
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The BB&S Treated Lumber Corporation is a former lumber preserving facility occupying an approximately 5-acre parcel of land. The wood treatment procedure used chromate, copper, and arsenate (CCA) as a wood preservative. The Site is located in a rural area on Speonk-Riverhead Road in the Hamlet of Speonk in the Town of Southampton, New York (Figure 1-1) and is registered as a "Class 2" site on the New York State Registry of Inactive Hazardous Waste Disposal Sites. Under the authority of Environmental Conservation Law Section 27, the New York State Department of Environmental Conservation (NYSDEC) assigned Malcolm Pirnie, Inc. to perform a Remedial Investigation/Feasibility Study (RI/FS) (Work Assignment #D002852-15) to determine the nature and extent of contamination, develop a conceptual model of the distribution and migration of contaminants to support selection of feasible alternatives for site remediation, and assess the applicability of updating/augmenting the existing reverse osmosis (RO) treatment system for remediation of groundwater.

Between February and August 1987, Groundwater Technology, Inc. (GTI) constructed and started-up an on-site RO groundwater treatment system. Through November 1990, the system had problems with bacterial buildup on the membranes and chronically exceeded hexavalent chromium SPDES discharge limitations.

During the period of March 1996 through November 1997, Malcolm Pirnie performed remedial investigation field activities in accordance with the NYSDEC-approved RI/FS Work Plan. Phase I field activities were conducted from March through August 1996 to define the nature and extent of contamination, delineate the groundwater contamination, assess the risks associated with the Site. During the course of the field investigative activities, a number of modifications/additions to the scope of work and/or investigative procedures were recommended on the basis of new information discovered and/or mitigating circumstances encountered in the field. These modifications are discussed in Section 3.0 of





Source: Eastport, NY USGS Quadrangle dated 1956

**BB&S TREATED LUMBER  
SPEONK, NEW YORK  
SITE LOCATION MAP**

the Final Remedial Investigation (RI) Report submitted to NYSDEC on June 4, 1998. Based on the results of the Phase I RI, a Phase II RI was conducted from February through November 1997. The Phase II field activities were conducted to better define the extent of contamination in both on-site and off-site soil and groundwater. The results of these investigations are discussed in the Final RI Report.

The purpose of this Feasibility Study (FS) is to identify and evaluate feasible alternatives for remediation of groundwater and surface soils identified during the RI; and to develop a remedial approach which will provide reliable, long-term protection of human health and the environment in a cost-effective manner. A brief overview of the five sections contained in this FS is provided below.

- Section 1.0 presents a summary of the BB&S Treated Lumber site (the Site), including site history, and the nature and extent of contamination.
- Section 2.0 presents the remedial action objectives (RAOs) for the Site, identifies potential general response actions available to address the contaminants of concern in groundwater and soil, identifies potentially applicable, or relevant and appropriate Standards, Criteria, and Guidelines (SCGs) for the Site, and identifies and screens treatment technologies based on their applicability.
- Section 3.0 combines the screened technologies and general response actions into site-specific alternatives for remediation of the contaminated groundwater and soil. These remedial alternatives are then screened based on their effectiveness in achieving the RAOs for the site and their implementability.
- Section 4.0 provides a detailed analysis of the potentially feasible remedial alternatives (those alternatives that pass the preliminary screening in Section 3.0) based upon NYSDEC criteria for selection of a remedy, in accordance with its technical assistance and guidance memo (TAGM HWR 90-4030) entitled "Selection of Remedial Actions at Inactive Hazardous Waste Sites".
- Section 5.0 describes the recommended remedial alternatives for groundwater and soil, summarizes the rationale for remedy selection, and presents preliminary cost estimates.

## **1.2 BACKGROUND INFORMATION**

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### **1.2.1 Site Location and Description**

The BB&S Treated Lumber site is located in the Pine Barren region of Suffolk County, Long Island, New York. The Pine Barren region covers approximately 50 square miles in southeastern Suffolk County. Land in the Pine Barrens is used for several purposes; principally housing, parks and recreation, and agriculture. Commerce and industry, transportation, and utilities comprise a smaller component of land use in the Pine Barrens.

The Site is surrounded by open pitch pine-red oak forests. The western boundary of the Site is Speonk-Riverhead Road. The properties located across Speonk-Riverhead Road are occupied by the Speonk Sand and Gravel Company to the west, and by an automobile restoration and dump operation to the east. The Site is enclosed by a fence, however, the unguarded entrance does not restrict unauthorized access.

No residences border the Site. The closest residence is approximately 300 feet southeast of the Site on 5th Avenue. The nearest business and residential development are located approximately 0.25 and 0.5 miles south (downgradient) of the Site. These residences use private groundwater wells as a sole source of drinking water. With the exception of a small paved parking lot located along Speonk-Riverhead Road and the concrete drip pad area, the Site is composed of unpaved sand and gravel. A framed building used for office space also houses the wood treatment process and the RO treatment system. The remainder of the site is used for storage of both treated and untreated lumber.

The Site is located within an area of gently sloping plains. Two small areas (less than one half acre each) of standing water are located in the northeast and southeast corners of the property. A catch basin collects runoff from the concrete drip pad area and outfalls on the west side of Speonk-Riverhead Road to an intermittent tributary to the East Branch River. Since the majority of the Site is unpaved, drainage of precipitation occurs primarily through infiltration into the ground. The Site is immediately underlain by Pleistocene outwash deposits consisting of fine- to coarse-grained sand and gravel to at least 120 feet below ground surface (bgs). The stratigraphy beneath the Site is fairly homogeneous. There are no significant or abrupt grain size changes that might be indicative of different geologic

zones. The Gardiners Clay, underlying the outwash deposits beneath the Site, was not encountered in the deepest boring (i.e., 40 feet bgs) or while hydropunching at a maximum depth of 125 feet bgs.

### **1.2.2 Site History**

Aerial photographs from 1959, 1969, 1976, and 1985 were reviewed and compared to existing Site features to trace the history of the Site and surrounding area. In 1959, the Site and most of the surrounding area consisted of scrub brush and farmland. An automobile dump was located to the northwest across Speonk-Riverhead Road, and cleared tracts of land were visible to the east and southeast of the Site. In 1969, what appeared to be another automobile dump occupied a tract of land east of the Site. In 1976, a portion of land (approximately 500 feet by 250 feet), in the southwest corner of the Site, had been developed and a small building had been constructed. The automobile dump to the east had expanded, although much of the surrounding area remained as scrub brush. In 1985, the Site had become a developed lumberyard and stacks of lumber throughout the property were clearly visible. With the exception of a quarry located west, across Speonk-Riverhead Road, further development was not evident.

Presently, the Site is an active lumberyard operated by Best Building and Supply Corporation. Although lumber is no longer treated on-site, treatment operations may resume in the future. The current operations consist of wholesale/retail distribution of treated and untreated lumber and assorted construction products. Much of the surrounding area appears the same as in 1985, with the exception of another sand and gravel quarry situated northeast of the Site.

### **1.2.3 Nature and Extent of Contamination**

#### **1.2.3.1 Characterization Methodologies**

Characterization of the nature and extent of contamination associated with the BB&S Treated Lumber site was accomplished by the collection and analysis of 58 groundwater samples from on-site and off-site recovery, production, drinking, and monitoring wells, 12

on-site and 37 off-site surface soil samples, and 48 on-site and 2 off-site subsurface soil samples.

A detailed description of the groundwater and soil sampling programs and analytical results is presented in the RI report. In general, the majority of on-site contamination is confined to surface soils which have been impacted by site operations. Discharges of chromate, copper, and arsenate (CCA) are believed to have entered the soil and groundwater from concrete sumps located within the wood treatment building. Zinc is a minor component (less than 10 percent) of the CCA solution. Off-site soils in the tributary and along Speonk-Riverhead Road have been impacted by on-site contamination via surface water runoff. A brief summary of groundwater and surface soil contamination at the Site is presented below.

#### **1.2.3.2 Groundwater**

The average depth of all on-site groundwater monitoring wells is approximately 70 feet below grade. Groundwater is present within the homogeneous outwash deposits, beginning between 38 and 42 feet bgs, and flows towards the south. The upper glacial aquifer beneath the Site is highly transmissive and capable of producing large quantities of water.

Three rounds of groundwater samples were collected and analyzed for TAL (target analyte list) metals, including hexavalent chromium, for unfiltered samples. As part of the groundwater sampling program, the first sampling round was analyzed for both filtered (dissolved) and unfiltered (total) TAL metals. Since total and dissolved metals results correlated well, the subsequent two rounds of groundwater samples were analyzed for unfiltered (total) TAL metals only. The following discussion focuses on sample results for total metals.

Arsenic, total chromium, hexavalent chromium, and copper were detected in groundwater at concentrations exceeding NYSDEC Class GA water quality standards at all sampling locations except at wells DW-1, RW-3, MW-12, MW-13, and MW-16. The results from both total and dissolved metal analyses indicate a plume emanating from the wood treatment process building with minimum lateral dimensions of 1,200 feet in length and 250

feet in width. Total and hexavalent chromium, and copper concentrations exceeded NYSDEC Class GA standards in the deepest well sampled (i.e., RW-2 at 106 feet bgs). Zinc concentrations exceeded NYSDEC Class GA standards in RW-1, RW-2, and MW-8 during one round of sampling; concentrations in all other samples were well below NYSDEC Class GA standards.

The southern and western edges of the plume reach off-site as indicated by elevated levels of arsenic, chromium, hexavalent chromium, and copper in wells MW-14 and MW-15. The extent to which the plume extends to the south has not been determined. Chromium and hexavalent chromium were detected at concentrations exceeding NYSDEC Class GA standards at the wells located the farthest east and south of the treatment building (MW-1 and MW-14, respectively). The groundwater collected from the farthest downgradient well (MW-14) located to the south of the treatment building contained elevated chromium and hexavalent chromium concentrations in all three sampling rounds. Samples collected from wells MW-12 and MW-13, located upgradient and side gradient of MW-14, did not contain contaminant concentrations exceeding NYSDEC Class GA standards in either the first or third rounds of sampling. These results indicate that the groundwater plume is either discontinuous or narrow, escaping detection at MW-12 and MW-13. Possible reasons for a discontinuous groundwater contaminant plume are discussed in the RI Report.

Concentrations of iron, manganese, and sodium exceeded NYSDEC Class GA standards at a number of sampling locations. In general, samples collected from the upper glacial aquifer throughout Suffolk County contain high concentrations of iron, manganese, and sodium.

On-site Hydropunch® samples were analyzed for total (unfiltered) and dissolved (filtered) metals. Chromium, hexavalent chromium, copper, iron, lead, manganese, and zinc were detected in unfiltered samples, collected from all sampling intervals, at concentrations exceeding NYSDEC Class GA standards. Chromium (total and hexavalent) and copper were detected in filtered samples at concentrations exceeding NYSDEC Class GA standards in the two shallowest sampling intervals (i.e., 42 to 45, and 62 to 65 feet bgs) at two Hydropunch® sampling locations (i.e., HP-01 and HP-02). Based on these results, it is likely that

contaminant concentrations detected in the deeper sampling intervals are attributed to sorption of these compounds to the suspended soil particles present in the unfiltered groundwater. Since these contaminants were not detected in the 82- to 85-foot sampling interval, groundwater contamination in the vicinity of HP-01 and HP-02 does not appear to extend deeper than 82 feet bgs.

Off-site Hydropunch® samples were analyzed for dissolved arsenic, chromium, hexavalent chromium, copper, lead, and zinc. Only lead was detected at concentrations slightly exceeding NYSDEC Class GA standards in the deepest sampling interval (i.e., 80 to 83 feet bgs) at Hydropunch® sampling location HP-10. Based on these results, the surface contamination has not impacted groundwater quality west of the Site.

#### **1.2.3.3 Surface Soil**

Surface soils (i.e., 0 to 3 inches below grade) along the perimeter of the concrete drip pad and near the center of the lumberyard contain concentrations of arsenic, chromium, and copper above NYSDEC cleanup objectives and site background levels. Zinc concentrations also exceed NYSDEC criteria in soils surrounding the concrete drip pad. Levels of arsenic and copper are slightly greater than NYSDEC cleanup objectives in catch basin and outfall soils. Chromium levels are above NYSDEC criteria at the catch basin but slightly below NYSDEC cleanup objectives at the outfall. Surface soil samples collected 200 feet downstream of the outfall in the intermittent tributary to the East Branch River contain arsenic, chromium, copper, lead, and zinc at concentrations above NYSDEC cleanup objectives. These results indicate that the contaminants from the Site have migrated off-site via the catch basin as a result of surface water runoff from the concrete drip pad area.

Iron was also detected at concentrations exceeding NYSDEC cleanup objective; however, elevated levels of iron were also detected in the Site background sample. Therefore, elevated concentrations of iron appear to be naturally occurring in the area and not related to site activities.

On September 30, 1998, NYSDEC collected additional surface and subsurface soil samples, not to supplement RI sampling efforts but to assist in defining the impacted areas

for FS cost-estimating purposes. These sampling results will be discussed in Section 2.5, Volume and Extent of Impacted Media, and are tabulated in Appendix A.

#### **1.2.3.4 Subsurface Soil**

Arsenic, chromium, and copper were detected at concentrations exceeding NYSDEC cleanup objectives only in shallow soil along the perimeter of the office/treatment building (i.e., 0 to 2 feet bgs), and in the tributary to the East Branch River (i.e., 0 to 3 feet bgs). Iron was also detected at concentrations exceeding NYSDEC cleanup objective; however, elevated levels of iron were also detected in the Site background sample. Therefore, elevated concentrations of iron appear to be naturally occurring in the area and not related to site activities.

#### **1.2.4 Contaminant Fate and Transport**

Following review of the data obtained through remedial investigations, the potential contaminant migration pathways identified include:

- Migration of solubilized contaminants in soil into the groundwater due to infiltration of precipitation and/or contact of the groundwater with contaminated soils.
- Lateral movement in the groundwater via hydraulic gradients and vertical movement through the permeable overburden.
- Fugitive dust, generated from unvegetated loose sands, transported to off-site properties.
- Surface runoff from the soils surrounding the concrete drip pad, off-site via the intermittent tributary of the East Branch River.

Groundwater contamination was delineated during the RI and consists of a plume with minimum lateral dimensions of 1,200 feet in length and 250 feet (on-site) in width. The vertical extent of the groundwater plume varies with location. Groundwater contamination extends between 65 and 82 feet bgs at the southwestern corner of the treatment building (in the vicinity of HP-01) and to 106 feet bgs south of the treatment building in the vicinity of



recovery well RW-2. The southern edge of the plume has not been defined but the plume has migrated at least to monitoring well MW-14, approximately 700 feet south of the BB&S property line. Off-site monitoring wells downgradient of the plume did not contain chemicals of concern above NYSDEC Class GA standards during the May 1996 sampling event. The closest residence is approximately 300 feet southeast (cross-gradient) of the Site and the closest downgradient receptor, an Autobody Shop, is located approximately 0.25 miles (1,320 feet) south of the Site. The potential exists for future contamination of off-site residential and commercial wells if measures to prevent further migration of the groundwater plume are not employed.

The transport of trace elements in soil may occur via the dissolution of metals into pore water and leaching to the groundwater. The sandy soils located at the Site do not readily bind inorganic compounds, thus they can mobilize to deeper soil layers and eventually to the groundwater.

To determine approximate travel times to potential downgradient receptors, a series of one-dimensional (1D) solute transport calculations were performed. Using reasonable assumptions with the best available data for the Site, total chromium concentrations exceeding 50 ug/L (Class GA Groundwater Quality Standard) would appear 0.25 miles downgradient in less than 14 years from the onset of contamination. Assuming the onset of contamination coincided with start-up of the collection system in 1987, the chromium concentration could reach 50 ug/L in 2001. A detailed presentation of the assumptions and results of the 1D solute transport estimates has been included as Appendix B. In November 1998 through January 1999, the Suffolk County Department of Health Services (SCDHS) sampled six private wells located south of the Site for metals analyses. None of the samples exceeded the Class GA standards for chromium, and arsenic was not detected. The analytical data reports have been included as Appendix C.

The Site is composed of unvegetated, loose sands that have the potential, once airborne, to be deposited on off-site properties. Therefore, contaminated surface soils around the concrete drip pad and near the treated lumber storage area may be mobilized by site activities and wind.

Since the Site is devoid of vegetation, free movement of soil particles from surface run-off is possible. However, due to the permeability of the sandy soils, most surface water would probably quickly infiltrate into the soil. Arsenic, chromium, copper, lead, and zinc were detected at concentrations exceeding NYSDEC cleanup objectives in soils in the intermittent tributary to the East Branch River, extending approximately 200 feet downstream of the outfall, and in the ditches on either side of Speonk-Riverhead Road. The catch basin outfall and, ultimately, the tributary acts as a route for off-site migration of contaminants.

### **1.2.5 Public Health and Environmental Risk**

#### **1.2.5.1 Public Health Risk**

A Human Health Risk Assessment was performed during the RI to evaluate the potential for adverse human health effects resulting from current or future exposure to contaminants at and migrating from the BB&S Treated Lumber site, without any action to control or mitigate such contamination. The analysis consisted of a discussion of potential human exposure pathways to site contaminants and an identification of potential receptors. Site workers, trespassers, future utility workers, and off-site residents were considered to be the potentially exposed population. This qualitative risk assessment was comprised of identification of hazards, assessment of exposure, assessment of toxicity, and characterization of risk.

Selection of chemicals of potential concern in groundwater was based on the exceedance of NYSDEC Class GA standards. Antimony, arsenic, total chromium, hexavalent chromium, copper, manganese, and zinc are considered chemicals of potential concern in groundwater at the Site. Selection of chemicals of potential concern in soils was based on exceedance of both NYSDEC cleanup objective and twice the average background concentration, at a frequency of detection greater than five percent. Arsenic, total chromium, copper, and zinc are considered chemicals of potential concern in on-site soils at the Site. Arsenic, total chromium, copper, lead, and zinc are considered chemicals of potential concern in off-site soils at the Site.

### **1.2.5.2 Environmental Risk**

A fish and wildlife impact analysis was performed during the RI to identify actual or potential threats to fish and wildlife at the Site posed by site-related chemicals detected in soil and groundwater. The impact analysis included a characterization of the vegetation present and the value of these resources to humans, an evaluation of the potential exposure pathways to fish and wildlife, and a comparison of contaminant concentrations to regulatory criteria for the protection of fish and wildlife.

Contaminants from the Site have migrated off-site via surface runoff, as indicated by concentrations of antimony, arsenic, chromium, and copper in the soil samples collected from the catch basin and outfall, and downstream of the outfall in the intermittent tributary to the East Branch River, which exceeded background and toxicological benchmarks. To quantitatively determine the magnitude of risk associated with these four inorganic compounds detected in the soil, dose estimates in indicator species would need to be calculated. The potential risk is likely moderate for arsenic, chromium and copper due to these compounds being present at concentrations an order of magnitude greater than the toxicological benchmarks. Also, these compounds have migrated off-site via surface runoff from the concrete drip pad to the tributary where potential exposure to wildlife can occur.

## **2.0 IDENTIFICATION AND SCREENING OF TECHNOLOGIES**

### **2.1 INTRODUCTION**

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Based upon the contaminant characterization results, exposure pathways, and risk evaluation data presented in the RI, the following media contain site-related compounds exceeding cleanup criteria:

- An arsenic, total and hexavalent chromium-, and copper-contaminated groundwater plume with minimum lateral dimensions of approximately 1,200 feet long and 250 feet wide (on-site).
- Arsenic-, chromium-, and copper-contaminated shallow soils: on-site around the concrete drip pad, the office/treatment building, and in the center of the lumberyard; and off-site near the catch basin, catch basin outfall, and beyond the northeast fenceline in the predominant northeast windrow.
- Arsenic-, chromium-, copper-, and zinc-contaminated shallow soil off-site in the intermittent tributary to the East Branch River, extending approximately 200 feet downstream of the catch basin outfall, and in the ditches on the east and west sides of Speonk-Riverhead Road.

### **2.2 REMEDIAL ACTION OBJECTIVES**

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The identification of remedial action objectives (RAOs) for the media of concern components identified above, are based primarily on the human health and environmental risks posed by the site as identified in the health and ecological risk assessment of the RI report.

Based upon the findings presented above, the following RAOs have been developed for the BB&S Treated Lumber site:

- To prevent further off-site migration of metals-contaminated groundwater and soils to the environment which could result in adverse human health or environmental impacts.
- To prevent direct contact/ingestion of metals-contaminated on-site and off-site soils to eliminate human health and environmental risk.