SUPPLEMENTARY INVESTIGATION WORKPLAN

Former A.C. Dutton Lumber Yard

NYSDEC Brownfields Program Site: C314081

Located at

1 Dutchess Avenue, Town of Poughkeepsie
2 Hoffman Street, City of Poughkeepsie
Dutchess County, New York

Date of Preparation: March 2008

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ESI File: OP08022.40

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Prepared By:

Ecosystems Strategies, Inc.
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Prepared For:

The O'Neill Group – Dutton, LLC
241 Hudson Street
Hackensack, NJ 07601

The undersigned has reviewed this Supplementary Investigation Workplan and certifies to The O'Neill Group – Dutton, LLC that the information provided in this document is accurate as of the date of issuance by this office.

Any and all questions or comments, including requests for additional information, should be submitted to the undersigned.

Paul H. Ciminello
President

TABLE OF CONTENTS

1.0 INTRODUCTION

1.1 Purpose

The purpose of this Supplementary Investigation Workplan (SIWP) is to provide additional data to those existing from previous investigations (see Section 1.3) regarding the nature and extent of contamination at the "Former AC Dutton Lumber Yard" property, located at 2 Hoffman Street and 1 Dutchess Avenue, City and Town of Poughkeepsie, New York. It is the intent of this SIWP to produce data of sufficient quantity and quality to accurately define the nature and extent of on-site arsenic contamination and, subsequently, to support the development of an acceptable Remedial Action Workplan.

1.2 Site Information

1.2.1 Site Identification, Location and History

The Former A.C. Dutton Lumber Yard property is an irregularly-shaped parcel, which has approximately 371 feet of frontage on the northern side of Dutchess Avenue and approximately 213 feet of frontage on the northern side of Hoffman Street. The property is comprised of two lots (City of Poughkeepsie Tax ID: 6062-59-766443, and Town of Poughkeepsie Tax ID: 6062-02-763508). A Site Location Map is included as Figure 1.

The property is an abandoned industrial site most recently used as a lumber pressure treatment facility. Available information indicates that the on-site pressure treatment of lumber using chromated copper arsenate (CCA) began in 1966 and is reputed to have continued until at least 1995 prior to ceasing operations. The property has been subject to several environmental investigations, most recently by Fuss & O'Neill P.C. (F&O). F&O developed a Site Characterization and Remedial Investigation Summary Report,(SCRISR) dated August 2007 which summarized the findings of past investigations and generated new data (a copy of the SCRISR is provided as Appendix A of this SIWP). Elevated concentrations of arsenic at levels above Restricted Residential SCOs have been documented in soils from 0-6' below surface grade (bsg) at sample locations throughout the property. Several areas of petroleum impacts have also been documented.

The specified portions of the property on which the fieldwork proposed in this SIWP will be conducted (hereafter referred to as the "Site") consists of the interiors of the two pressure treatment plants. Proposed Field Work Maps indicating specific site characteristics are included as Figures 2 and 3.

1.3 Conditions of Concern

The Site has been accepted by the NYSDEC Brownfields Program (SITE ID: C314081). An Alternatives Analysis and Remedial Workplan (AARWP), dated August 2007 was submitted for review by the NYSDEC. NYSDEC comments on the AARWP are contained in a letter dated December 19, 2007, and were subsequently discussed and modified in a meeting between the NYSDEC and personnel from this office on January 6, 2008. These communications resulted in the NYSDEC making the following requirements for additional investigative work:

- site media impacted by wood treatment processes are contaminated by a process involving a specified hazardous substance and, therefore, are hazardous wastes. For the purposes of future remediation, all solid media beneath the footprints of the two pressure treatment buildings containing unacceptable concentrations of arsenic will be managed as a classified hazardous waste. Insufficient data have been generated to delineate the volume of hazardous material beneath the buildings.

- elevated concentrations of arsenic have been documented in dust and other residuals on the floors of the two treatment buildings, however, no data documenting arsenic concentrations absorbed into floor materials has been collected. Additional sampling is required in order to make a determination as to appropriate handling and disposal methods for these materials.

1.4 Proposed Future Site Use

The Site has been proposed for mixed use including residential townhouses/condominiums and commercial buildings. As of the date of this SIWP no specific plan for the Site has been developed.

2.0 PROPOSED INVESTIGATION ACTIVITIES

This section of the SIWP details activities that are proposed to investigate environmental conditions on the Site, as defined in Section 1.3, above.

Section 2.1 provides information on services to be conducted in anticipation of intrusive fieldwork and Section 2.2 provides detailed information on the Investigation services that will be conducted by the Site Owner's designated environmental consultant (the "On-Site Coordinator", OSC) to assess Site conditions. For the purposes of this SIWP, the OSC is designated to be Ecosystems Strategies, Inc. (ESI). Project deliverables (i.e., written reports) are described in Section 2.3.

2.1 Site Preparation Services

2.1.1 Project Management

The OSC will be responsible for the effective implementation of the services described in this SIWP, including adherence to the proposed work schedule, barring unforeseen conditions. Qualified personnel shall conduct all on-site Investigation work and prepare all applicable written documentation. All on-site staff will be appropriately trained in accordance with Occupational Safety and Health Administration (OSHA) practices (29 CFR, Part 1910). Prior to the initiation of fieldwork, a Site Health and Safety Officer will be designated by the Site Owner's in order to ensure compliance with the Health and Safety Plan (see Section 2.1.2, below).

2.1.2 Health and Safety Plan

A Site-specific Health and Safety Plan (HASP) will be reviewed with Site personnel and appropriate subcontractors prior to the initiation of fieldwork. All proposed work will be performed in "Level D" personal protective equipment; however, field personnel (including subcontractors) will be prepared to continue services wearing more protective levels of equipment should field conditions warrant. A Qualitative Human Health Exposure Assessment is provided in the HASP. A copy of the HASP is included as Appendix B.

2.1.3 Quality Assurance / Quality Control Plan

A Site-specific Quality Assurance / Quality Control (QA/QC) Plan will be reviewed with Site personnel and appropriate subcontractors prior to the initiation of fieldwork. All proposed fieldwork, sample handling, and laboratory analysis will be performed in accordance with the QA/QC Plan. A copy of the QA/QC Plan is included as Appendix C.

2.1.4 Notification/Communications

2.1.4.1 Agency Notification

The NYSDEC will be notified in writing at least five (5) business days prior to the start of fieldwork (e-mail communication is acceptable) and every effort will be made to ensure that NYSDEC is present to observe field work. Notification of subsequent field activities will be in accordance with reasonable business practice, with verbal notification for immediate (within 48 hours) activities and written notification otherwise. Written notifications will be transmitted to the NYSDEC via facsimile or electronic mail.

2.1.5 Utility Markout

Prior to the initiation of fieldwork, a request for a complete utility markout of the subject property will be submitted by ESI as required by New York State Department of Labor regulations. Confirmation of underground utility locations will be secured, and a field check of the utility markout will be conducted prior to any intrusive activities.

2.1.6 Subcontractor Coordination

Subcontractors will perform requested services, as necessary, as specified by the Volunteer's Consultant (ESI). All subcontracted work (excluding laboratory analyses) will be directly supervised by the OSC.

2.2 Investigative Services

The tasks detailed below will be performed by the OSC and designated subcontractors to achieve the project objectives specified in Section 1.1 of this SIWP. The following investigative tasks will be conducted:

- soil borings will be extended throughout the two former pressure treatment buildings to characterize soil conditions and contaminant concentrations at these two locations (see Section 2.2.1);
- samples of surface materials (asphalt, concrete or wood) from the floors of both treatment plants will be collected;
- all samples will be submitted for laboratory analysis for total weight arsenic; and,
- a specified subset of samples will be analyzed for leachable arsenic using TCLP.

2.2.1 Soil Borings

2.2.1.1 Location and Extension of Soil Borings

A total of nineteen soil borings will be extended in the Northern Treatment Plant and sixteen in the Southern Treatment plant at locations illustrated on the proposed Fieldwork maps.

Soil borings will be extended to a depth of eight feet below surface grade or until visual impacts are no longer present, whichever is deeper. Borings will be extended using a track-mounted Geoprobe rig (equipped with a hollow-core sampler having sample intervals of 4' and disposable, acetate tubes), under the supervision of ESI personnel. At locations where machine access is not possible, hand borings will be extended by ESI personnel using a hand-held Geoprobe (equipped with a hollow-core sampler having sample intervals of 2' and disposable, acetate tubes). The maximum depth of borings by manually driven equipment is anticipated to be shallower.

A determination will be made in the field regarding exact soil boring locations, based on field observations. Each location will be measured in the field to an accuracy of 0.1 foot.

2.2.1.2 Soil Sample Collection

Samples will be collected from each boring locating in two inch intervals where sufficient sampling material is present. All samples will be analyzed at the 4”-6” depth and at 10” to 12” depth. Samples will be collected at the 22” to 24” and the 42” to 44” inch depths. The 4’-8’ soil core will be retained. The acetate tubes containing the sample will be labeled and the ends sealed and stored pending laboratory results for the shallower samples. If unacceptable concentrations of arsenic and or chromium are detected in the shallow samples, progressively deeper samples will be analyzed until acceptable concentrations are detected. The absence of measurable recovery in the sampling spoon may reduce the total number of samples; however, every attempt will be made to obtain sufficient sample material at all sample locations. Where insufficient recovery is obtained or shallow refusal is met, the sample location will be moved a few feet and retried. Dedicated gloves will be used at each sample location to place the material into the laboratory supplied glassware. All investigation derived waste will be drummed for off-site disposal.

2.2.1.3 Soil Sample Analysis

Two soil samples from each boring (70 total) will be submitted to the laboratory for chemical testing. Samples selected for submission to the laboratory will be analyzed for total weight arsenic. Additional samples may be submitted if field conditions indicate the possible presence of contamination. Additional boring locations may be required near cracks, sumps, drains etc and, if necessary, to define stained areas more precisely than would be provided by the proposed sampling grid.

2.2.2 Surface Samples

2.2.2.1 Location and Extension of Surface Samples

A total of fourteen surface samples will be collected from the floors of the Treatment plants (seven in the Northern Treatment Plant and seven in the Southern Treatment Plant) at locations illustrated on the proposed Fieldwork maps.

At each sample location a one foot square area (minimum) will be wiped free of dust and any other loose material using dedicated disposable gloves and paper towels. The center of the cleaned area will be marked. Once the sample location has been determined a Multi-Quip wet drill equipped with a 3” concrete coring bit will be used to collect a core sample. Once the core sample has been collected the top 6mm will be sliced off using a wet concrete saw and submitted for analysis. If unacceptable concentrations of arsenic are encountered in the top 6mm sample, then additional samples will be cut from the core and submitted for analysis. Holes made in the secondary containment areas will be patched with concrete at the conclusion of field activities and investigation derived waste will be drummed for off-site disposal. Appropriate photo documentation will be made of field activities.

2.2.2.2 Surface Sample Collection

Samples will be collected from each location to a depth of 6 mm or until there is no evidence of CCA contamination (i.e. green staining). Dedicated gloves will be used at each sample location to place the material into the laboratory supplied glassware.

2.2.2.3 Surface Sample Analysis

One surface sample from each location will be submitted to the laboratory for chemical testing. Samples selected for submission to the laboratory will be analyzed for total weight arsenic.

2.3 Data Generation and Validation

This Section of the SIWP summarizes proposed analyses of soil and surface samples. The number of samples specified in this Section is subject to change based on field conditions.

2.3.1 Laboratory Analyses

This Section specifies the minimum of samples that will be collected and analyzed for each medium. All samples submitted to the laboratory will be analyzed for total weight arsenic. Of these samples, at least 50% will be analyzed for chromium. If clear trends/correlation between areas impacted by chromium and areas impacted by arsenic are not distinguishable, the remaining 50% will also have to be analyzed for chromium. For disposal purposes, samples containing concentrations of arsenic and or chromium at concentrations above 100 mg/Kg will be analyzed for TCLP arsenic and/or chromium. Field observations may warrant the inclusion of additional samples and/or analytes. Field conditions (e.g., refusal) may prevent the collection of proposed samples or may result in an insufficient volume of soil for the proposed analyses. Any changes in the proposed analyte list will only be made after consultation with the NYSDEC project manager.

All data as provided by the laboratory will be presented as Category B deliverables. Complete quality control documentation will be provided for the purpose of independent data validation (see Section 2.3.3 below).

Summary of Laboratory Analyses

Fieldwork	Medium	Number of Samples	Analytes
Soil Borings	Soil	70	Total Weight Arsenic Total Weight Chromium (50% of samples) TCLP Arsenic (selected samples)
Surface Samples	Concrete/Asphalt	14	Total Weight Arsenic Total Weight Chromium (50% of samples) TCLP Arsenic (selected samples)

Analytical Methods

Total weight arsenic and chromium will be analyzed using USEPA Method 6010. TCLP arsenic and chromium will analyzed using USEPA Method 1311 (extraction) and USEPA Method 6010.

2.3.2 Quality Control Samples

The following QA/QC samples will be included in this investigation:

One rinse blank will be collected from each piece of equipment for every 20 samples collected using that piece of equipment:

- One duplicate sample will be submitted to the laboratory for every 20 samples of each sample medium
- One matrix spike sample and one matrix spike duplicate will be submitted to the laboratory for every 20 samples of each medium;
- Every sample cooler will include a trip blank during each day of sampling; and,
- Split samples to be submitted to the NYSDEC for independent analysis, as per request made by the NYSDEC in the field.

2.3.3 Data Validation

All data as provided by the laboratory will be submitted to an independent data validator for review and comment. The rejection of data by the validator may necessitate the re-collection of samples and subsequent re-analysis by the laboratory. The complete report by the data validator will be included in the SIR & AA (see Section 2.4, below).

2.4 Remedial Action Workplan

Upon completion of Supplementary Site Investigation services, a Supplementary Investigation Report (SIR) and Alternatives Analysis (AA) will be submitted. The SIR & AA will include:

- Documentation of field activities, including relevant supporting documents (e.g., sampling logs);
- All laboratory reports and associated deliverables generated as a result of the investigation;
- A Data Usability Summary Report prepared by an independent, third party;
- A summary of laboratory analytical data, including a comparison of data to appropriate NYSDEC guidance documents;
- Maps and drawings of sufficient specificity to provide a working description of Site, including a survey-quality Site Map, with all sample points indicated.
- An assessment of documented contaminants present on the Site, including an assessment of likely off-site impacts associated with known on-site conditions and a qualitative exposure assessment;
- an analysis of potential remedial options and cost estimates will be provided for each identified environmental condition based on documented Site conditions; and,

Upon completion, the SIR & AA will be submitted to the NYSDEC for review and comment.

3.0 TIME SCHEDULE

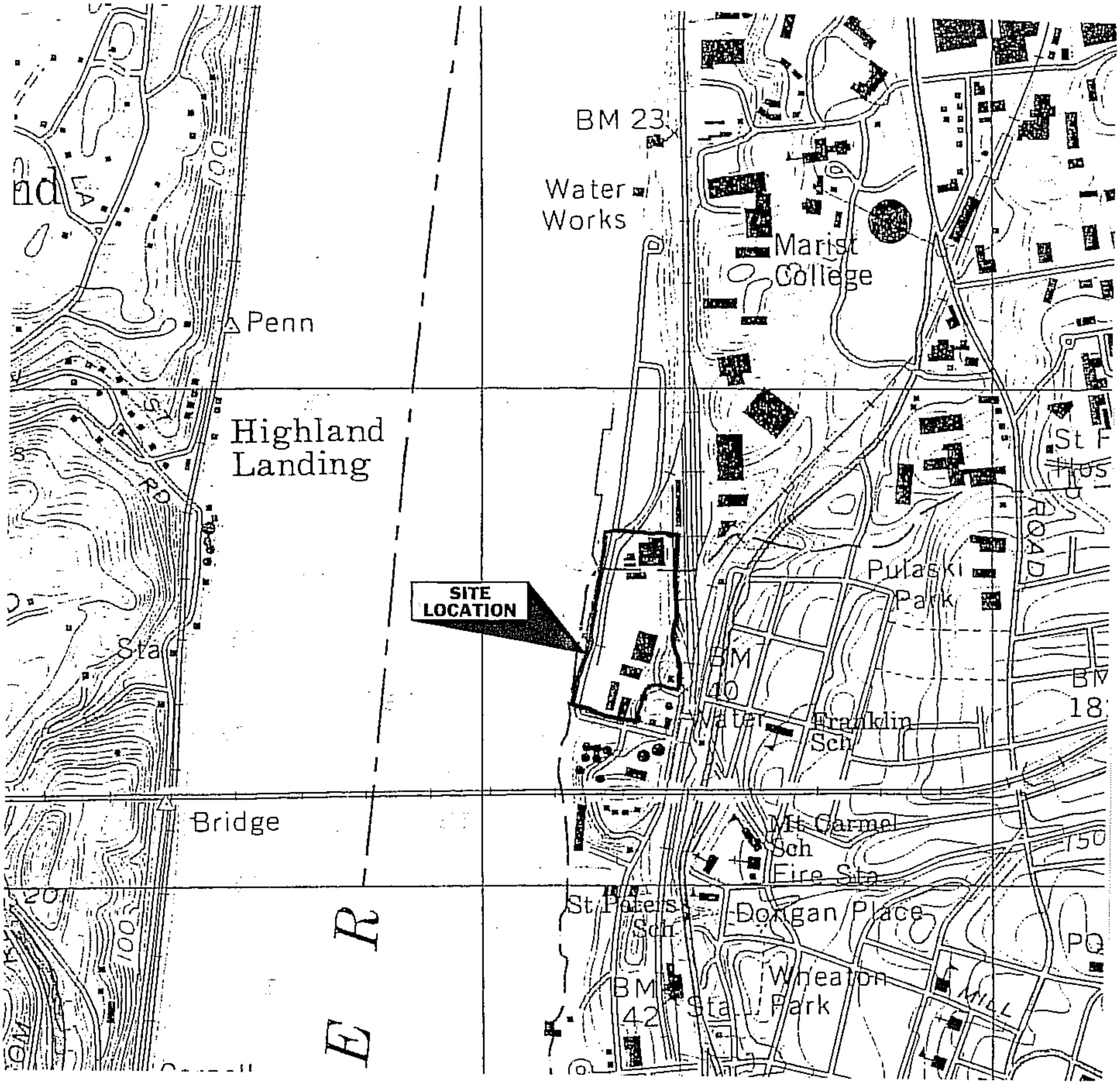
The schedule outlined below will be maintained unless revised by mutual consent of the NYSDEC and the Client.

Within fourteen (14) days of NYSDEC approval of this SIWP, all on-site Investigation activities will have been completed.

Within fourteen (14) days of the completion of on-site Investigation activities, a SIR & AA will be submitted to the NYSDEC.

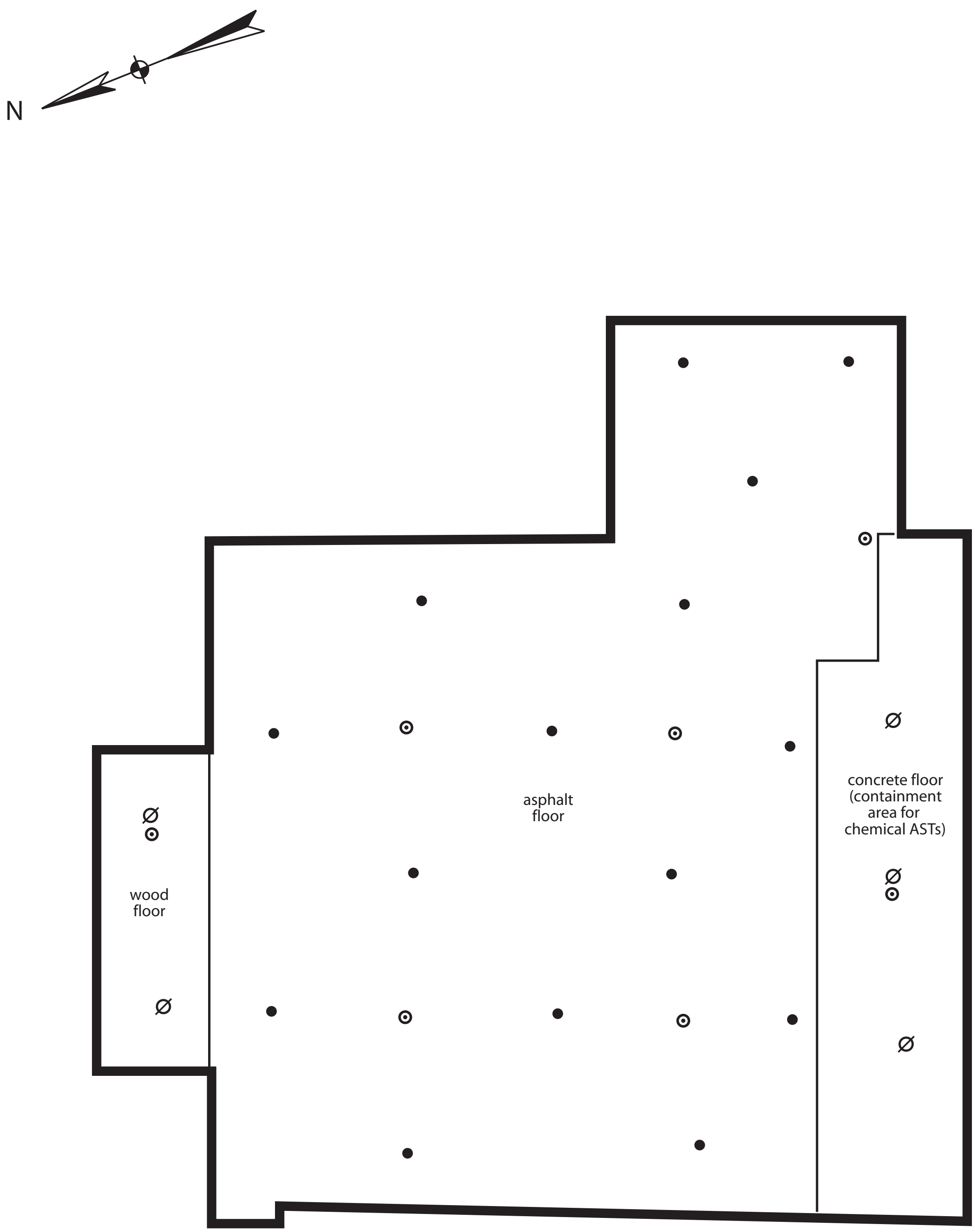
Within thirty (30) days of the receipt of the final Report, the NYSDEC will provide a written response to the Client as to the adequacy of Site Investigation Services.

Figures



Source: U.S. Department of the Interior Geological Survey Topographic Map of the Poughkeepsie, NY Quadrangle, dated 1957

Figure 1. Site Location Map Former A.C. Dutton Lumber Yard 1 Dutchess Avenue and 2 Hoffman Street Town and City of Poughkeepsie Dutchess County, New York	N	ESI File: OP08022.40 Date: March 2008 Scale: 1:24000



All feature locations are approximate. This map is intended as a schematic to be used in conjunction with the associated report, and it should not be relied upon as a survey for planning or other activities.

Figure 2 - Proposed Fieldwork Map

Northern Treatment Plant
former A.C. Dutton Property
1 Dutchess Avenue and 2 Hoffman Street
Poughkeepsie, New York

Legend:
- building outline
- ● proposed machine boring location
- Ø proposed hand boring location
- ⊙ proposed surface sample location

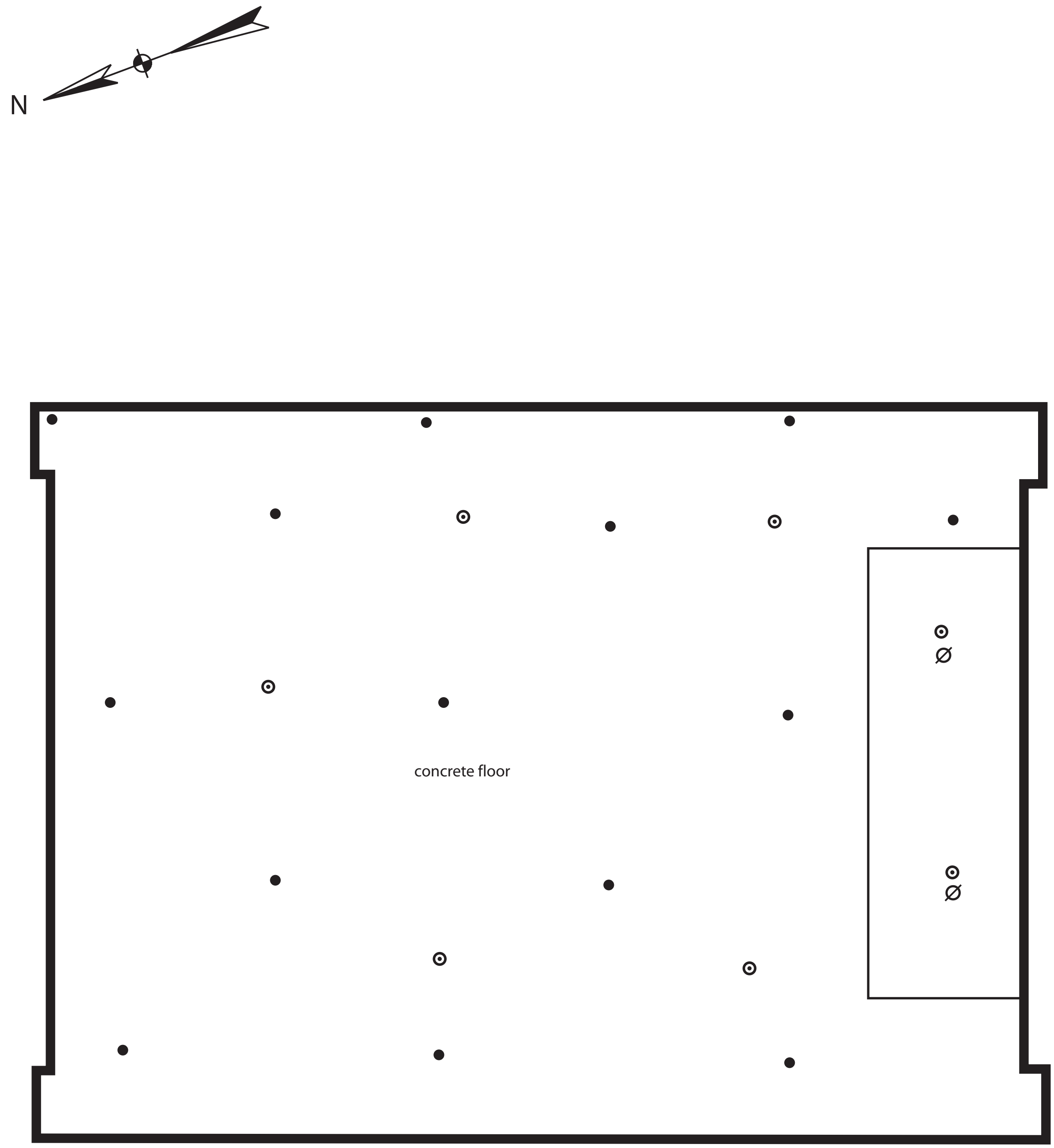
ESI File: OP08022.40

March 2008

Scale: 1" = 30' approximately

Figure 2

Ecosystems Strategies, Inc.



All feature locations are approximate. This map is intended as a schematic to be used in conjunction with the associated report, and it should not be relied upon as a survey for planning or other activities.

Figure 3 - Proposed Fieldwork Map

Southern Treatment Plant
former A.C. Dutton Property
1 Dutchess Avenue and 2 Hoffman Street
Poughkeepsie, New York

Legend:
- building outline
- ● proposed machine boring location
- Ø proposed hand boring location
- ⊙ proposed surface sample location

ESI File: OP08022.40

March 2008

Scale: 1” = 30’ approximately

Figure 3

APPENDIX A

Previous Environmental Reports

Site Characterization and Remedial Investigation Summary Report

Former A.C. Dutton Lumber Facility

2 Hoffman Street
Poughkeepsie, New York
NYSDEC BCP Site No. C314081

August 2007

Prepared for:
The O'Neill Group – Dutton, LLC
Poughkeepsie, NY

For Submittal to:
NYS Dept. of Environmental Conservation
Division of Environmental Remediation
625 Broadway
Albany, NY 12233

FUSS & O'NEILL
Disciplines to Deliver

Fuss & O'Neill of NY, P.C.
80 Washington Street
Poughkeepsie, NY 12601

SITE CHARACTERIZATION AND REMEDIAL INVESTIGATION SUMMARY REPORT

FORMER A.C. DUTTON LUMBER FACILITY

TABLE OF CONTENTS

SECTION | PAGE

1.0 INTRODUCTION

This report presents a summary of the Remedial Investigation (RI) conducted at the former A.C. Dutton Lumber Facility situated in both the Town and City of Poughkeepsie, Dutchess County, New York (Figure 1). The site is currently owned by The O'Neill Group – Dutton, LLC. The O'Neill Group - Dutton, LLC has entered the BCP Program as a Volunteer. The new owner of the property wishes to remediate the site in accordance with the requirements outlined in the NYSDEC Brownfield Cleanup Program (BCP) and restore the site to restricted residential use.

The physical address of the site is 2 Hoffman Street; however, access to the site is currently via Dutchess Avenue. The site consists of approximately 15.0 acres of land, and is identified as two separate tax parcels, as shown on Figure 2.

Parcel	Tax I.D.
City of Poughkeepsie (11.35 acres)	31-6062-59-766443-00
Town of Poughkeepsie (3.65 acres)	14-6062-02-763508-00

2.0 SITE DESCRIPTION

2.1 Site History

According to a 1987 Phase I Investigation report prepared by EnviroPlan Associates, Inc. of Poughkeepsie, NY, the parcel has been in industrial use since the mid-1800s. The A.C. Dutton Lumber Corporation operated a wholesale lumber company at the site beginning in 1913 and the on-site pressure treatment of lumber using chromated copper arsenate (CCA) reportedly began in 1966. The former owner, A.C. Dutton Corporation, was owned in part or in subsidiary by Miron Building Products Co., Inc.

Prior to 1913, site uses included an iron works and a glass works plant. The former glass works plant was reportedly located at the southern end of the parcel. As part of the glass works, there were several kilns at the site in which glass was fired. Historical and empirical data suggest that solidified kiln ash, periodically cleaned out of the kilns, was used as fill material at the site. Additionally, when the glass works building and loading dock were dismantled, this demolition debris was also utilized as fill.

At the A.C. Dutton facility, raw lumber material was brought into the site by truck, boat, and rail. Lumber was processed in either of the two on-site treatment plants, known as the northern and southern treatment plants. The lumber stock was then temporarily stored in a sheltered drip pad area and allowed to partially drip dry, and then transferred outside to large, open storage yards for additional drying. Much of the site is covered with concrete or asphalt pavement, however it is likely that storage of treated lumber did not always occurred on impervious surfaces.

2.2 Adjacent Land Use

The Hudson River forms the western border of the site and Dutchess Avenue forms the southern border. Across Dutchess Avenue is a former manufactured gas plant (MGP) site now owned by Central Hudson Gas and Electric Corporation (Central Hudson) and operated as a gas regulating station. Vassar College owns the land to the north of the site and the property is occupied by a boat house and associated facilities for the College's crew team. There is a chain-link fence along the northern site property boundary. The site is bounded on the east by North Water Street, which extends along the top of a steep bedrock outcrop ridge along most of the length of the site. The ridge rises toward the south, and in the central and southern areas of the site, the road is approximately 15-20 feet above the site.

2.3 Current Conditions

The existing site conditions are shown on Figure 3. Eight abandoned buildings are located across the property, some of which contain equipment associated with the wood treatment process. The site has been abandoned sine the mid-1990's; the buildings and treatment equipment are in significant states of disrepair.

The majority of the site is covered with a 2-4 inch layer of concrete and/or asphalt pavement. This concrete/asphalt groundcover is in fairly good condition in the eastern portion of the property; however, the condition declines westward as the site approaches the Hudson River. The old railroad spur that crossed the site is significantly degraded, and only the rails and a few wooden ties remain. The fence along the northern border of the site was installed recently during construction of the Vassar College boathouse.

The westernmost portions of the site occasionally floods during high tides, especially when water levels are elevated due to weather events. The river was observed to overflow onto approximately 50-75 feet of the property in some locations at high tide during a site visit prior to the remedial investigation. Due to the flooding, western portions of the property are scattered with debris that floated in from the river.

2.4 Petroleum and Chemical Bulk Storage

The facility has several above-ground and underground fuel storage tanks. The facility's Petroleum Bulk Storage (PBS) registration (#3-175935) expired on June 30, 2002, but was updated and submitted to the NYSDEC in August 2005. The updated PBS Registration, valid 5 years from the issue date, is provided in Appendix A. Information from site investigations performed by Ecosystem Strategies, Inc. (ESI) in 2002 was used to update the registration.

The last known Hazardous Substance Bulk Storage (HSBS) registration (#3-000170) expired on August 9, 2003. The tanks are registered as containing arsenic acid (CAS No. 07778-39-4), which accounts for the largest percentage of hazardous components in the CCA liquid used during the former wood treatment processes.

The HSBS was updated by Fuss & O'Neill as part of the remedial investigation. Registered tanks are identified by their location with acronyms NTP (New Treatment Process) and OTP

(Old Treatment Process). These tanks are indicated on Figure 3. A summary of all known tanks at the site is as follows:

Tank #	Size (gal)	Type/Contents	Location
1	3000	AST - Diesel	Adjacent to northern pressure treatment plant
2	1500	AST - No. 2 fuel oil	Beneath main office building
3	3000	AST - No. 2 fuel oil	Inside concrete enclosure south of main office building
4	2 @ 275 (manifold)	AST - No. 2 fuel oil	Inside brick warehouse building at southern end of parcel
5	275	UST - No. 2 fuel oil	Unknown
NR*	1,000**	UST - Unknown	Beneath western brick building
NR*	20,000**	UST - Unknown	Adjacent to northeastern corner of southern pressure treatment plant
NR*	Unknown	UST - Unknown	Beneath concrete slab west of brick warehouse building
NTP01	25,000	AST - CCA	Southern treatment plant
NTP02	25,000	AST - CCA	Southern treatment plant
NTP03	7000	AST - CCA	Southern treatment plant
OTP01	15,000	AST - CCA	Northern treatment plant
OTP02	12,500	AST - CCA	Northern treatment plant
OTP03	12,500	AST - CCA	Northern treatment plant
OTP04	5,600	AST - CCA	Northern treatment plant

* These tanks are not currently registered.

** Identified via ground penetrating radar (GPR) survey performed by ESI.

2.5 Site Geology

Surficial geology consists of unconsolidated deposits in the vicinity of the site as fluvial sand and gravel deposits (adjacent to the Hudson River) and glacial till consisting of sand, silt and gravel and exhibiting variable texture. The Dutchess County Soil Conservation Survey (2002) depicts the soils as being Urban Lands, which typically consist of reworked native material or fill covered extensively by impervious surface. Overall, material encountered during the various site investigations is consistent with the soil survey findings. In those instances when native soils were encountered, the material was described as silty-sand with gravel.

Bedrock in the vicinity of the site consists of the Taconic Melange Formation and the Austin Glen Formation. The Taconic Melange is described as a mix of pebble to block sized Cambrian to Middle Ordivician Age rocks in a pelitic matrix. The Austin Glen formation consists of interbedded layers of greywacke and shale. Outcrops observed on the eastern margin of the site contain siltstone layers interbedded with less competent shale.

The irregularly shaped bedrock outcrop forming the shoreline of the river was likely alternately cut and filled in order to create the straight, flat railroad bed. In addition to rising markedly toward the east, bedrock in the area is gently sloped upward toward the north. The site occupies a relatively narrow margin along the bedrock ridge forming the riverbank. Bedrock was noted at very shallow depths along the full length of the eastern side of the property, sometimes immediately below the surface, and dropped off toward the river.

Historically, areas of the site received fill that was placed along western portions of the property to level and extend the shoreline of the Hudson River westward. Subsurface material encountered at the site consisted of kiln slag from the glass works which was sometimes combined with sand and gravel, demolition debris including bricks and cinder block fragments, large fragments of anthracite coal, ash, sand, silt and large gravel. Native material, consisting of light brown silty sand, was rarely encountered in the eastern and central portions of the site, but near the river was encountered at approximately 5 feet below the surface.

2.6 Site Hydrogeology

Groundwater was typically encountered at depths of four to six feet below the ground surface across the site. Given regional topography and the proximity to surface water bodies, it is assumed that shallow groundwater flows from east to west across the site and discharges to the Hudson River. Because the Hudson River adjacent to the site is tidally influenced, it is likely that groundwater flow at the site is, in part, influenced by tides.

The westernmost portions of the site occasionally floods during high tide, especially when water levels are elevated due to weather events. At times, the river has overflowed onto approximately 50-75 feet of the property in some locations during high tide. Due to the flooding, western portions of the property are scattered with debris that floated in from the river.

3.0 PREVIOUS INVESTIGATIONS

Subsurface investigations were undertaken at the site by ESI in 2002 on behalf of Scenic Hudson Land Trust, Inc. Results of these investigations were summarized in two reports:

- Summary Report of Subsurface Investigation dated October 3, 2002
- Summary Report of Supplemental Subsurface Investigation dated November 25, 2002

An overview of sampling results from the ESI investigations is provided below. Sampling locations from the 2002 ESI investigations are identified on Figure 4. Specific references to the ESI investigation results are included within the text.

3.1 Metals in Soils

ESI investigations documented metals impacts to shallow soil that are consistent with the use of CCA wood preservative at the site. Data indicate that the highest metals concentrations are present in surficial material and shallow soils (e.g., 0-0.5 feet) immediately below pavement and that metal concentrations decrease with depth.

The ESI investigation included collection of samples of surficial dust, sand or silt present immediately at the ground surface or upon floor surfaces within the treatment plant buildings. Some of these samples likely consisted of silt or sand that at one time was completely saturated with CCA fluid. These samples exhibited the maximum arsenic, chromium and copper impacts identified at the site. Arsenic concentrations in these samples were found as high as 138,000 ppm, in sample SS-1, collected from the secondary containment pit for the CCA tanks in the northern treatment plant. Similar results were observed in samples from sump pits and floor surfaces in both treatment plant buildings.

ESI also obtained soil samples from shallow depth intervals, typically from 0.0 to 0.5 feet below ground surface. While not exhibiting the extremely elevated arsenic and chromium concentrations found in surficial material, these soil samples contained significantly elevated levels of these metals, and many exceeded the action levels defined by ESI and described in Section 4.3 of this report.

Supplemental investigations by ESI as well as the Remedial Investigation included the collection of soil samples from greater depth intervals, extending to approximately 8.0 to 12.0 feet below the surface. Arsenic and chromium concentrations in deeper samples exceeded action levels to a much lesser degree, and were mostly observed in the immediate area surrounding the treatment plant buildings, as well as the central and northwestern sections of the site.

Samples from soil borings 3B-14 and 3HB-4 were collected during the ESI investigation and submitted for analysis by Toxic Characteristic Leaching Procedure (TCLP). One sample, 3B-14 (0-2 feet) indicated an arsenic concentration of 16.5 mg/L, which exceeds the standard of 0.5 mg/L for arsenic. This sample location is inside the northern treatment plant building approximately 6 inches from the easternmost floor drain. The 0-2 foot sample was characterized as green/gray silty soil with shale fragments.

3.2 VOCs and SVOCs in Soils

Petroleum hydrocarbon impacts were identified in four areas at the site. These areas included the area near a 3,000-gallon AST located adjacent to the northern pressure treatment plant (near boring B-6/MW-1); the area in the vicinity of a 1,000-gallon UST located beneath the small brick building west of the northern pressure treatment plant (near boring 3B-9); and in the vicinity of the brick warehouse building and suspected UST at the southern end of the property (near boring B-31/MW-5).

During the initial investigations by ESI, SVOCs were detected at location B-6 and at the southwest corner of the northern treatment plant that exceed action levels. Based on these results, and field observations made at that time, the NYSDEC was informed and Spill No. 0206848 was issued for the site. The spill number is currently open.

3.3 Metals in Groundwater

Groundwater samples from wells MW-01, located adjacent to the northern treatment plant building, and MW-02, located in the northwestern lumber storage yard, each exhibited arsenic concentrations exceeding TOGS 1.1.1 standards. None of the groundwater samples collected contained chromium or copper that exceeded standards.

3.4 VOCs and SVOCs in Groundwater

The ESI investigation included sampling of shallow groundwater at five (5) temporary wells at the site. The ESI monitoring well locations are shown in Figure 4. Temporary well points were constructed from 1.25-inch diameter poly vinyl chloride (PVC) wells placed in Geoprobe® boreholes. Groundwater samples were analyzed for volatile and semi volatile organic compounds (VOCs/SVOCs), and for total arsenic, chromium and copper.

Monitoring well MW-01 was located in the vicinity of a 3,000-gallon AST on the south side of the northern treatment plant. The soil samples from the well boring exhibited concentrations of SVOCs exceeding TAGM 4046 levels, constituting a reportable petroleum release. Groundwater samples from this well, although exhibiting significant petroleum odors, contained no VOCs or SVOCs above NYSDEC groundwater quality standards (TOGS 1.1.1).

Monitoring well MW-05 was located within the footprint of the former glass works facility, near an identified UST at the southeast corner of the glass works. Groundwater samples from this well contained visible free petroleum product, however exhibited no VOCs or SVOCs that exceeded groundwater quality standards. Field observation of free product, and high laboratory detection limits suggest that soils and groundwater in this area are impacted with highly weathered waste oil.

Groundwater samples from monitoring wells MW-02, located in the northwestern lumber storage yard; and well MW-04, located near the railroad tracks in the southern section of the site, did not exhibit concentrations of VOCs or SVOCs above minimum detection limits.

Monitoring well MW-03 is located near the northeastern corner of the southern treatment plant. There is a reported 20,000-gallon UST in this immediate area; however, neither the soil boring nor the well did not contain evidence of petroleum impacts.

3.5 Sediment Sampling

Sampling of sediment near the outfall of Kidney Creek and the shoreline of the Hudson River was performed by ESI. Samples were analyzed for metals, total petroleum hydrocarbons (TPH) and for polychlorinated biphenyls (PCBs). Low levels of arsenic, chromium and copper were detected. These levels were below NYSDEC action levels.

3.6 Floor Drains and Sump Pits

The supplemental ESI investigation included sampling within the culverted sections of Kidney Creek and several floor drains and sump pits found in the northern pressure treatment plant. Dye testing was performed by ESI to determine whether the floor drains in the Northern Treatment Plant are connected to Kidney Creek. Dye was introduced to each of the floor drains, where it was noted to have traveled to a metal-lined sump beneath the end of the pressure treatment vessel. These floor drains, and two additional drains in the former timber-drying kiln were noted to enter metal-lined sumps. No trace of dye was observed in Kidney Creek during the test.

No information is available regarding how liquids were managed once they entered the sumps. Toxic Release Inventory (TRI) reporting information for the years 1987-1996 was reviewed for the A.C. Dutton site on EPA's Envirofacts Warehouse website. The database shows that arsenic compounds (TRI ID N020), chromium compounds (TRI ID N090) and copper compounds (TRI ID N100) were each disposed of to a landfill or disposal to surface impoundment. Although it is unknown how the disposed material was generated, it is possible that it originated as a result of cleaning out the on-site sumps.

4.0 REMEDIAL INVESTIGATION

4.1 Conceptual Site Model

The redevelopment of the former A. C. Dutton site is intended for residential, recreational, and commercial use. The history of property usage in the area of the site has been generally commercial and industrial in nature. The adjacent parcel to the north is currently occupied by the Vassar College Boathouse, which is a training and rowing center for crew teams. The properties to the east are either commercial or residential and to the south, beyond Dutchess Avenue, is the Central Hudson Gas Regulating Station, a manufactured gas plant. The Hudson River abuts to the west. Existing residential areas are upgradient from the site and are not likely to be impacted by contaminants at the site based on topography and groundwater flow direction. Additionally, the region surrounding the site is provided with potable water by the Poughkeepsie Water District; therefore, a human exposure pathway has not been identified with respect to groundwater.

Sampling results obtained are consistent with the historic use of CCA wood preservative at the property. In many areas, green staining indicative of oxidized copper is visible on exposed surfaces. Analytical data indicate that shallow soil underlying the former pressure treatment plants (northern and southern) as well as soil located beneath paved surfaces throughout property has been impacted by metals, particularly copper, chromium, and arsenic. Mercury and silver were detected infrequently in samples obtained by ESI; however, metals impacts are dominated by the three CCA constituents. Vertically, soil analytical results indicate that the metals impacts decrease with depth, supporting the model of surficial release of CCA wood preservative.

Sampling results and field observations indicate that surfaces across the site (e.g., concrete and paved surfaces) have been impacted by metals released through the use of CCA preservative inside the pressure treatment plants and in exterior areas where treated wood was managed and staged pending transport off site. In places, it is apparent that CCA preservative has penetrated highly weathered areas on the floor of the pressure treatment buildings and in exterior paved areas. Aerial photographs indicate that storage and handling of wood occurred across the site (See Figure 2).

Petroleum impacted soil also has been identified in four areas on the site. Sources of petroleum releases at the site are attributed to underground or above-ground petroleum storage tanks. It is possible that petroleum impacts observed at the southwestern section of the site may in part be attributed to the existing MGP site south of Dutchess Avenue.

Areas of observed petroleum impacts have been designated as Areas of Concern (AOCs). Releases of petroleum have been identified in the following areas:

- AOC-1: The south side of the northern treatment plant building in the vicinity of a 3,000-gallon AST,
- AOC-2: Vicinity of a 1,000-gallon UST located beneath the western brick building
- AOC-3: Vicinity of the southern treatment plant building and former masonry office building. There are several UST locations in this area,
- AOC-4: Vicinity of the southwest corner of the former glassworks building and loading dock, near the location of a former 1,000-gallon UST.

There is also a reported 20,000-gallon UST located near sample point P2, near the northeast corner of the southern treatment plant building. The exact location of the UST is not known, however no petroleum impacts were observed in soils in test pits and soil borings advanced in this area. This area was not designated as an AOC.

4.2 Investigation Objectives

The scope of work for the Remedial Investigation Work Plan (RIWP) is consistent with NYSDEC DER-10 Technical Guidance for Remedial Investigation and Remediation. Since the publication of the Draft Remedial Investigation Report, the NYSDEC has added to the regulations in 6 NYCRR Part 375-6. The updated *Remedial Program Soil Cleanup Objectives* have replaced the standards and guidelines outlined in TAGM 4046. As such, data tables and text in this report have been revised to reflect the new soil cleanup objectives for restricted residential use under the Part 375 regulation.

The Remedial Investigation field work was accomplished in compliance with additional existing regulatory rules, technical guidance and historical reports including in the following:

- The USEPA Guidance for conducting RI/FS investigations under CERCLA.
- Remedial Investigation Work Plan, Fuss & O'Neill of N. Y., October 2005
- Summary Report of Subsurface Investigation, Ecosystems Strategies, Inc., October 2002
- Summary Report of Supplemental Subsurface Investigation, Ecosystems Strategies, Inc., November 2002
- Site-Specific Quality Assurance Project Plan (QAPP)
- Site-Specific Health and Safety Plan (HASP)

All samples were analyzed in accordance with ASP Level B analytical protocols by an ELAP certified laboratory. The soil data have been reviewed by Fuss & O'Neill's quality assurance officer following the protocols outlined in Draft DER-10. A data usability summary report (DUSR) has been completed in accordance with the protocols outlined in draft document DER-10. The DUSR is attached as Appendix D. Field and laboratory data collected during the investigation was entered into the GIS/Key™ environmental data management system. Output from GIS/Key™ will be used to refine the remedial approach for the site. This information may be obtained in tabular form and presented on maps and cross-sections.

Throughout this report, reference is made to the results of previous investigations performed at the site by ESI. It must be noted that although the ESI investigation results are considered highly dependable, data collected during that work has not undergone full laboratory QA/QC reporting protocols.

4.3 Action Levels and Background Samples

Action levels are concentrations of a particular contaminant above which remedial actions are considered more likely to occur. Action levels for many metals and organic compounds in soils have been based on the values presented in 6 NYCRR Part 375-6 *Remedial Program Soil Cleanup Objectives* (Part 375-6). In that document, the action level for arsenic has been set at 16 mg/kg, and for chromium (Cr VI) at 110 mg/kg.

In the previous investigations at this site, action levels for soils were determined based on TAGM 4046, as modified by subsequent and relevant NYSDEC Records of Decision (ROD) for sites with comparative re-use scenarios. ESI presented as an example a ROD for the BB&S Treated Lumber Corporation Site (NYSDEC Site No. 1-52-123), wherein action levels of 30 mg/kg for arsenic and 50 mg/kg for chromium were established. These action levels will not be considered in this report because the intended use of the property is restricted residential, while the BB&S site was an active lumberyard.

Action levels for the determination of groundwater quality are based on the NYSDEC Technical and Operation Guidance Series Memorandum 1.1.1 (TOGS 1.1.1). The document provides standards for groundwater, and guidance values if no standards are specified.

Sediment analytical results are compared to guidance values presented in the NYSDEC's Technical Guidance for Screening Contaminated Sediments (1993, rev. 1999). Screening criteria for metals in sediments are broken into two categories – Lowest Effect Level (LEL) and Severe Effect Level (SEL). The LEL indicates a level of sediment contamination that is tolerated by the majority of benthic organisms, but still may cause toxicity to a few species. The SEL indicates a concentration at which pronounced disturbance of the sediment community can be expected. Results for the analysis of SVOCs are compared to all four screening criteria presented in the guidance document.

Soil samples were collected in areas of the subject site that were considered to be background areas. The background soil sample locations are shown in Figure 4, and results are summarized in Table 9. The primary sources of contaminant release at this site were the pressure treatment processes and CCA storage tanks, and the temporary storage of freshly-treated lumber in the open spaces across the site (described more fully in Section 6.0). Therefore, background soil samples were collected from the far eastern edge of the property, above the steep bank between the site and North Water Street. Of the five background samples collected, the average concentration of arsenic detected was approximately 32 mg/kg, and chromium was 34 mg/kg.

4.4 Soils Investigation - Test Pits and Soil Borings

In order to provide adequate horizontal sampling coverage of soils at the site, a 100-foot on center regularly spaced grid designated with an alpha-numeric identification system was established over the site (See Figure 4). Surficial geologic and chemical data was collected at the 100-foot grid node locations by either digging a test pit using a small excavator, or advancing a soil boring using a GeoProbe direct push sampling system. A total of 66 test pits and 44 soil borings were advanced at the site.

At each grid location, soil samples were obtained at the surface or immediately beneath pavement or concrete. Attempts were made to limit the shallow soil sampling interval to the top 1.0 feet of surface soil. In areas where there are concrete slabs, foundations or paved drying areas on the ground surface, the surficial interval was determined immediately beneath the pavement or concrete.

Samples were collected at ranging depths in areas surrounding the impacted areas identified in previous investigations in order to delineate the extent and magnitude of contamination with as much confidence as possible. To characterize vertical conditions, samples were collected at approximately 1-2 foot interval depths down to and including the saturated zone.

Soil cores or test pits were logged in the field and evidence of soil staining, odor, changes in lithology, moisture content, etc. were recorded. If evidence of soil contamination was observed in the saturated zone (e.g. at petroleum impacted areas), the boring was extended to document the vertical extent of impacts through visual, olfactory, and/or field screening methods. Specific notes relating to sampling conditions are noted on the boring logs, provided in Appendix B.

The locations of several sample points were altered slightly due to field conditions or obstructions or to resample locations that were obtained during the ESI investigation. In the event that refusal was encountered at a given sample point, the boring was off-set approximately 1 meter and reasonable attempts to advance a replacement boring were made. The actual locations of test pits and soil borings are shown on Figure 4.

A total of eighty (80) soil samples were obtained and submitted for metals analysis, including thirty one (31) surficial (less than 1.0 foot), twenty five (25) samples from approximately 1.0 to 3.0 feet deep, twenty (20) samples from between approximately 3.0 and 8.0 feet deep and four (4) samples from between 8.0 and 12.0 feet deep.

Upon review of initial analytical metals results, eight (8) samples were selected for analysis using the Toxicity Characteristic Leaching Procedure (TCLP) to determine the relative leachability of the detected metals. A total of six (6) soil samples were submitted for analysis for volatile and semi-volatile organic compounds (VOC/SVOC). A repeat sample was collected at ESI location B8 (4-6 ft) for comparison purposes.

4.5 Groundwater and Monitoring Wells

Following the advancement of soil borings, nine (9) of the bore holes were completed as shallow monitoring wells. Monitoring wells were constructed with 10-foot long well screens set between approximately 2-12 feet below the ground surface, intersecting the groundwater table. The annular space around the well screens were backfilled with size-appropriate filter pack sand to a height of approximately 1 foot above the screen. Bentonite chips were placed within the remaining annular space to prevent vertical migration of surface water. Monitoring wells were constructed as PVC stick-ups.

The RIWP proposed eight monitoring wells; however based on field conditions, the locations and number of wells were revised during the investigation. The following narrative describes these revisions to the work plan.

- Monitoring well I-5 was placed near the location of ESI's MW-01 (proposed well MW-1R). The well is located on the south side of the northern treatment plant, in the vicinity of a 3,000-gallon AST.
- Proposed monitoring well MW-02R was substituted by two (2) wells, installed at grid locations ACD-A6 and ACD-E8.
- Monitoring well MW-5R was proposed to be installed near the former location of the ESI well MW-05. Multiple attempts were made to establish a well in this area; however, subsurface obstructions including large concrete blocks, significant void spaces and subsurface demolition debris prevented proper construction of a well at this location. A well was installed at grid location AA10 to assess conditions in this area.
- Monitoring wells MW-6, MW-7, MW-8 and MW-10 were proposed to be installed along the eastern edge of the property, adjacent to the bedrock outcrop wall, in order to monitor groundwater quality upgradient of the site. Shallow bedrock prevented the installation of these wells at the proposed locations.
    - Proposed well MW-7 was relocated approximately 150 feet south to grid location ACD-K2;
    - Proposed monitoring well MW-10 was relocated approximately 120 feet northwest to grid location ACD-X7;
    - Proposed monitoring well MW-8 was relocated approximately 250 feet west to grid location ACD-U8 and supplemented with a well at ACD-W8;
    - Conditions near proposed monitoring well MW-6 were assessed based on downgradient wells at grid locations ACD-A6 and ACD-E8.
- Based on field observations, conditions near the proposed MW-9 were assessed by wells at grid locations ACD-U8 and ACD-W8.
- An additional monitoring well was installed at grid location ACD-J9 in response to field observations of petroleum impacts to soils and groundwater observed at this location.

Groundwater samples collected were analyzed using ASP Category B protocols for VOCs by Method 8260B and SVOCs by Method 8270C each modified by the STARS list of contaminants. Well completion logs are included in Appendix B.

4.6 Sediment Sampling

To further assess the off-site migration potential and provide information for a qualitative risk assessment, sediment samples were collected at the locations identified on Figure 4. The sediment samples were obtained from the river bank bottom adjacent to the site from within the upper 1-foot of material.

4.7 Off-Site and Human Health Exposure Assessments

To evaluate the potential contamination of properties adjacent to the subject property, or potential impacts to future users of the property, data collected during the RI was used to evaluate off-site and human health exposure potential. This included collection of soil and sediment samples at the site boundaries, placement of monitoring wells such that off-site migration of groundwater can be assessed, and review of historic and ecological information. Off-site exposures were evaluated through a Fish and Wildlife Resource Impact Analysis (FWRIA) prepared in accordance with Section 3.10.1 of DER-10. The FWRIA report is included as Appendix E.

4.8 Tidal Assessments

The Hudson River at Poughkeepsie is tidally influenced. Therefore, water table elevations and groundwater flow potentials at the site are likely affected by tidal changes. Periodic water level measurements were recorded from the newly installed monitoring wells, and were compared to tide schedules published by the U. S. Coast Guard.

Based on observed depth variations, groundwater at the site appears to be somewhat influenced by tidal fluctuations. Depth to water fluctuated over 0.5-1.0 feet in each well; however, the changes in depth did not correspond exactly with times of high and low tides in the Hudson River. For this reason, it is assumed that while groundwater elevations are affected, the effects are on a time lag from surface water elevation level changes.

5.0 INVESTIGATION RESULTS

5.1 Metals in Soils

A summary of metals results for soil samples are presented in Table 1. Of the eighty (80) soil samples analyzed, fifty-three (53) samples (approximately 66%) exhibited concentrations of arsenic exceeding the action levels based on the restricted residential cleanup objectives in Part 375-6. Only two (2) samples (<1%) exceed the chromium action level. The distribution of elevated levels of arsenic is widespread across the site, but is most significant in the vicinity of the CCA storage tanks and pressure treatment chambers in the treatment plant buildings, and near the rail track along the western and northern sections of the property. Exceedances of action levels at varying depths are shown on Figures 5A, 5B and 5C. These areas are described in the following subsections.

5.1.1 Northern Treatment Plant Building

Arsenic concentrations exceeding action levels were found in surface or near-surface soils. Surface samples from ACD-D4 and ACD-G6, located near the exterior of the building, exhibited arsenic levels of 70 mg/kg and 95.8 mg/kg, respectively. Samples from locations ACD-SS-7R and ACD-B2R collected from within the treatment building exhibited arsenic levels of 212 mg/kg and 77.4 mg/kg, respectively.

The 0.5-3 ft sample from ACD-G2 was the most heavily impacted at the site, exhibiting arsenic at 811 ppm. In addition, concentrations of 469 ppm chromium and 876 ppm copper were detected. Each of these concentrations far exceeds their respective cleanup objectives of 16 ppm, 110 ppm, and 270 ppm. This is one of two locations exhibiting chromium exceedances; the other being the repeated sample at ESI's SS-7R (171 ppm, 0-0.2 ft).

Surficial soil impacts continue to appear in the northwestern storage yard, where location ACD-E8 exhibited an arsenic concentration of 37.1 mg/kg at 0-1 feet. Slight arsenic exceedances were found in the eastern section of the property, between the two treatment plant buildings. Samples from locations ACD-K2, ACD-M2 and ACD-L4, all from the 0-1 ft interval, exhibited concentrations of arsenic exceeding the action level.

5.1.2 Southern Treatment Plant Building

In the vicinity of the southern treatment building, location ACD-S2 (1-3 ft) exhibited an arsenic concentration of 40.4 ppm, while a sample from ACD-S4 (2-3 ft) inside the building had no exceedances for any metals. Other slight exceedances for arsenic occurred in this area at sample locations ACD-Q3 (19.1 ppm) and ACD-U6 (21.2 ppm). In general, soils in the vicinity of the southern treatment plant building are generally less contaminated than those in the vicinity of the northern treatment plant building.

5.1.3 Railroad Spur

Elevated arsenic concentrations were observed at locations ACD-L9 (56.8 mg/kg), ACD-O8 (59.3 mg/kg) and ACD-T10 (36.1 mg/kg), which lie near the railroad track along the western side of the property. Also, location ACD-E8, located in the reported storage area for freshly-treated lumber, exhibited elevated levels of arsenic (37.1 mg/kg). All of these samples were collected from the 0-0.5 ft interval.

Exceedances of arsenic continue to appear in the same general pattern at the 1.0-3.0 ft interval. Location ACD SS-7R (0.8-1.4 ft) exhibited 129 mg/kg arsenic. Location ACD-E5, at the western side of the northern treatment building, exhibited an arsenic level of 94.5 mg/kg, although chromium was not detected. Slight to moderate exceedances of arsenic were also observed at the central and southern areas of the site, at locations ACD-N5 (32.1 mg/kg), ACD-Q6 (44.5 mg/kg), ACD-Z9 (65.4 mg/kg) and ACD-Y12 (31.4 mg/kg).

Data obtained from the 3-6 ft depth interval indicates a significant drop off in arsenic and chromium exceedances occurring through this interval. Samples collected from intervals within approximately 3.0-5.0 ft exhibit an average arsenic concentration of 54 mg/kg; however, samples collected from 3.0-6.0 ft, including the full range of depth, only show an average arsenic level of 21 mg/kg. This data suggests that arsenic concentrations are decreasing, to varying degrees, with increasing depths in the 3.0-6.0 ft interval.

Locations ACD-E4 and ACD-B8R exhibited levels of arsenic of 44.2 mg/kg (3.0-6.0 ft) and 105 mg/kg (4.0-4.5 ft) respectively. ACD-M2 exhibited an arsenic level of 148 mg/kg at the 2.0-5.0 ft depth; however, locations ACD-B3, ACD-V9 and ACD-Y7 exhibited arsenic and chromium levels below action levels.

Samples collected from below 6.0 ft bgs exhibit arsenic and chromium concentrations that were mostly below action levels. The nine (9) samples were collected from varying depths between 6.0 and 12.0 feet averaged arsenic concentrations of approximately 12 mg/kg. The highest reading came from location ACD-T7 (24.4 mg/kg) from the 6.0-8.0 ft depth interval.

5.2 TCLP Results

A total of eight (8) soil samples were submitted for the determination of leachable concentrations of arsenic and chromium. A summary of TCLP results is presented in Table 2. TCLP analyses were selected from the most significantly impacted soil samples as determined by laboratory analysis. Samples from locations ACD-G2 (811 mg/kg As; 469 mg/kg Cr), ACD-B-8R (105 mg/kg As) and ACD-M2 (148 mg/kg As) were submitted for TCLP analysis. Only low levels of arsenic (ACD-G2, 1.59 mg/L) and barium were detected in the TCLP samples. These concentrations are below the TCLP threshold for hazardous waste.

5.3 Volatile and Semi-Volatile Organic Compounds in Soils

Soil VOC laboratory results are summarized in Table 3 and SVOCs are summarized in Table 4. Visual evidence of petroleum-impacted soils was observed in several areas at the site. Areas of petroleum impacts based on visual observations have been designated as Areas of Concern (AOCs). These observations included moderate to strong petroleum-type odors, visible sheens or visible product within the soil core. The four AOCs are depicted in Figure 6. Samples were submitted from locations where the most significant petroleum impacts were observed based on visual and olfactory evidence.

As discussed in Section 2.4, there are possibly eight (8) above-ground or underground petroleum storage tanks located on this property. Most of these tanks have been located by ground-penetrating radar with the exception of one 275-gallon AST. Although indicated in the PBS registration, this tank has not been located on the site.

A low level of benzene (0.9 ppb) was detected in a sample from location ACD-AA11 (12-13 ft). The sample from ACD-AA10 (12-14 ft) exhibited low concentrations of benzene (36 ppb), toluene (1.8 ppb), fluoranthene (400 ppb) and pyrene (990 ppb). None of these detected concentrations exceeds the applicable standards. Other compounds including acetone, methylene chloride and carbon disulfide were detected in several samples. These compounds typically result from laboratory processing and are not considered indicative of site activities.

A repeated sample at ESI location B8 (4-6 ft) had low levels of phenanthrene (5000 ppb). These results are slightly different than the ESI findings (570 ppb phenanthrene, 390 ppb fluorene, and 520 ppb acenaphthene). Analytical results of location ACD-B-6R, a repeat of the ESI boring near the northern treatment building, exhibited concentrations of organic compounds below action levels; however, field evidence of petroleum-contaminated soils support the conclusion that this area has been impacted by releases associated with the adjacent 3,000 gallon AST.

Visual evidence of petroleum impacts were observed at location 3B-5, near the small brick office building on the west side of the property, and evidence of petroleum impacts were also observed in the vicinity of the southern treatment building and the main office building, at locations ACD-U5, ACD-V5, ACD-U6, ACD-W6, ACD-X7 and ACD -W8.

Petroleum impacts were also observed at locations ACD-AA10, ACD-AB10 and ACD-AA11, which are generally downgradient from the UST located at the southwestern corner of the brick warehouse building. No impacts were observed at locations ACD-Y10, ACD-Z9 or ACD-Z10. The evidence of petroleum seen near the USTs and the absence of petroleum impacts in surrounding locations indicates that petroleum impacts are generally confined to the areas indicated on Figure 4.

5.4 Metals in Groundwater

Metals data for groundwater is summarized in Table 5. Groundwater from monitoring well MW-I5 exhibited an arsenic concentration (63.8 µg/L) similar to the adjacent MW-1 installed by ESI (45 µg/L). The TOGS 1.1.1 standard for arsenic is 25 µg/L. This monitoring well is in close proximity to a collection sump described in Section 3.6. Groundwater from monitoring well MW-U8 contained 53.1 µg/L of arsenic. Each of the remaining RCRA8 metals were either not detected, or detected at low levels in samples collected from the remaining monitoring wells.

5.5 Volatile and Semi-Volatile Organic Compounds in Groundwater

A summary of VOC and SVOC data for groundwater is presented in Table 6. The only organic compounds detected in groundwater came from monitoring well MW-E8. SVOCs that were observed in this well include benzo(b)fluoranthene (0.69 J µg/L), benzo(k)fluoranthene (0.75 J µg/L), and chrysene (0.53 J µg/L). Each of these concentrations exceeded the TOGS 1.1.1 guidance values. The MW-E8 well location is approximately 200 feet west of observed petroleum impacts at AOC-1, near the northern treatment plant building. Test pits were advanced in the area between AOC-1 and well MW-E8, at locations F6, F7, G6, G8 and H7, however no evidence of petroleum impacts were observed in these test pits. No visual or olfactory evidence of petroleum impacts are noted on the test pit log for location E8, and the fill material in this area appeared similar to other locations at the site, consisting of coal slag, furnace brick, and glass fragments. The source of petroleum impacts in groundwater at monitoring well MW-E8 are not determined.

No other VOC or SVOCs were detected in groundwater samples from any other monitoring well. Field observations in test pits and soil borings indicated that petroleum product present in soils was likely significantly degraded or "weathered". During typical laboratory procedures, the instrument analyzes the sample, and compares the result against a library of known chromatographic patterns. Over time, organic compounds in soil or groundwater become oxidized, combined with other chemicals or exist as break-down products. In these cases, petroleum contaminants are not detectable using standard laboratory instrumentation because the chromatographic patterns no longer exactly match.

5.6 Metals in Sediments

Results of sediment sample metals analysis are summarized in Table 7. Analytical results indicate that all samples exhibited concentrations of arsenic, cadmium, copper and lead slightly exceeding the lowest effect level screening criteria outlined in the guidance. Four out of the five samples exceed the lowest effect level criteria for chromium and mercury. No results exceeded the severe effect level criteria, or even reach 50% of the severe effect level.

Based on the extent of exceedances of screening criteria for multiple metals, it is possible that background concentrations of these metals in the Hudson River are at elevated levels. The waterfront including and surrounding the site has been used for industrial purposes since its development, which over the long term may have resulted in generally elevated sediment metal concentrations over the length of the Poughkeepsie waterfront.

5.7 Volatile and Semi-Volatile Organic Compounds in Sediments

Results of sediment sample organic data are presented in Table 8.

One or more PAHs were detected at concentrations above screening values in all of the sediment samples. A number of SVOCs were detected in sediment samples, including polycyclic aromatic hydrocarbons (PAHs) that are greater than one or more of the indicated screening criteria. In four out of five samples, the concentration of benzo(a)anthracene is in exceedances of the acute toxicity screening criteria.

Sediment samples were collected at a shallow interval (0-1 ft). It is likely that PAHs observed in these samples are from continuous commercial and recreational boating in the Hudson River. Other possible sources include the existing MGP site adjacent to the A.C. Dutton property.

5.8 Off-Site and Human Health Exposure Assessments

The contaminants of concern at this site are arsenic, copper and chromium (breakdown products from copper chromated arsenate, or CCA). This substance is a formulation of the salts copper arsenate and chromium arsenate. The primary sources of contamination include the CCA storage tanks and pressure treatment vessels located in the northern and southern treatment facility buildings, as well as the former open lumber yard where freshly-treated lumber was reportedly set out to drip dry.

According to EPA's website, 'Information on Toxic Effects of Various Chemical and Chemical Compounds', arsenic is a carcinogen (cancer-causing), teratogenic, and possible mutagen. Aquatic bottom feeders are more susceptible to arsenic, however, birds tolerance to arsenic varies among species. The toxic effects of chromium are primarily found at the lower trophic levels. Chromium may bioaccumulate in algae and other aquatic vegetation, but it does not biomagnify. It is cancer-causing, mutation-causing, and teratogenic.

Human exposure to arsenic present at this site would likely result from direct contact with contaminated media (dermal absorption), ingestion of contaminated media, or inhalation of contaminated dust. The future intended use of the site is as a restricted residential property. Under this redevelopment scenario, contact with site soils is possible by site workers, future residents or visitors/transients.

Notice of site conditions should be provided to any person accessing the site so that any construction activities are conducted in accordance with applicable regulations and site-specific health and safety plans. Contaminated soils will be addressed prior to implementing the intended use.

6.0 CONCLUSIONS

6.1 Site Model

The conventional understanding of this site is that arsenic, copper and chromium, contained in the CCA fluid, was discharged to ground surface as part of the drying process. The CCA liquid was injected into the untreated lumber under pressure in a vessel containing the CCA liquid. The vessel was evacuated after sufficient time had passed to treat the lumber. The treated lumber was "wet" with the liquid CCA. The excess dripped to the floor and was recycled by means of the floor drain and sump system. It has been reported that the large open lumber yard was used to temporarily store freshly treated lumber during drying. While in the yard, CCA fluid likely dripped off the lumber directly to the concrete or asphalt pavement. Collection systems were not in place. The residual liquid collected on the ground surface and was transported via overland flow to low spots in the site.

The floors in the treatment buildings, and most of the exterior areas of the site, are covered with approximately three inches of concrete and/or asphalt. CCA fluid came into contact with incidental soil and dust on the concrete surfaces, the liquid portion eventually evaporated and residual metals and dust accumulated on the concrete surface. In the treatment buildings, CCA fluid flowed or was swept into floor drains or out onto soil immediately adjacent to the treatment buildings.

Over time, CCA fluids likely absorbed into porous surfaces through cracks or breaks in the asphalt or concrete paving, and have impacted surface and near-surface soils under the concrete. Rainfall, surficial run-off and tide cycles that regularly flood portions of the site, all played roles in the accumulation, transport and leaching of metals from surface and near-surface soils.

Remedial investigations at this site have resulted in a data set that can be relied upon. It can be concluded from the results of the investigations that the most significant concentrations of arsenic and chromium are present in the interiors of the treatment buildings where CCA fluid collected in the sumps and floor drain systems and on the floors; and outside the facilities on exposed soil or near cracks, pavement breeches or depressional areas around the site in areas where the treated lumber was allowed to drip dry. Impacts in these areas may have been transported by surface runoff.

6.2 Trends in Metals Contamination

Investigations have found arsenic and chromium in incidental dust and soil on the concrete surfaces at extraordinarily high concentrations. For example, location SS-1, collected from the northern treatment plant building, consisted of material collected from 0-0.5 inches, and exhibited an arsenic concentration of 138,000 mg/kg. Sample SS-8, consisting of "gray-green sawdust and very fine sand", exhibited an arsenic concentration of 96,700 mg/kg. The results of numerous other samples, collected at less than 1 inch depth from locations within and immediately adjacent to the treatment buildings, exhibit similar concentrations.

Samples were also collected from surficial soils adjacent to the treatment buildings. These samples came from locations where surficial soils were openly exposed to runoff and deposition of CCA fluid or dust, and not covered with asphalt or concrete. These samples generally consisted of material from approximately 0-0.5 feet deep. Samples from these areas also exhibited high levels of arsenic and chromium, but these concentrations were less than what was observed in the dust and surface material from within the buildings. Samples 3SS-13, 3SS-14 and 3SS-15, all collected from approximately 6 inches from the edge of the southern treatment building, exhibited arsenic concentrations of 2480 mg/kg, 2350 mg/kg and 2660 mg/kg, respectively.

Soil samples have also been collected from various depths from directly under the concrete or asphalt surface. These samples came from areas that were not openly exposed to the surface, but were covered with significant layers of concrete. In many locations, a 2-6 inch layer of anthracite coal was present under the concrete or asphalt. At these locations, samples were collected from the first available material under the coal layer. Data indicate that arsenic and chromium concentrations are significantly lower overall in these samples than in exposed surface soil areas, and even more so than surficial dust samples.

Soils exhibiting exceedances of arsenic or chromium action levels at greater depths (up to 6 feet) were found in the vicinity of the two main pressure treatment buildings. These findings are illustrated in Figures 5B and 5C. The most significant exceedances of action levels in the deeper samples occur in locations where the highest surficial concentrations were found, indicating that these areas received the most substantial impacts from CCA fluids; however, the range of exceedances at these depths is limited and found within a smaller area than the surficial results.

The site is immediately adjacent to the Hudson River, and is regularly inundated by tide waters extending over approximately 40% of the site along the riverbank at the western edge of the property. The pattern of detections of arsenic and chromium at the site indicates higher concentrations of contaminants on the upper, eastern section of the property than nearer the river, suggesting that the continuous, regular tidal flow has leached metals out of the soils closer to the river.

Analytical results indicate that groundwater resources may be impacted by arsenic from historical uses of the site; however, only two groundwater samples exhibited arsenic concentrations that exceed the applicable action level. Arsenic concentrations exceeding the TOGS 1.1.1 standards were detected in two (2) groundwater monitoring wells, from locations MW-I5 and MW-U8. No other metals were detected at concentrations exceeding standards in any other sample. Monitoring well MW-I5 is located at the south side of the northern treatment plant building, and soils in this area exhibited elevated concentrations of arsenic. Groundwater samples from well MW-U8, located approximately 100 feet west of the former office building and southern treatment plant building, generally do not correspond with arsenic concentrations found in soils from this area.

Samples from soil borings 3B-14, collected during the ESI investigation and submitted for analysis by Toxic Characteristic Leaching Procedure (TCLP), indicated an arsenic concentration of 16.5 mg/L, which exceeds the TCLP standard of 0.5 mg/L for arsenic. This sample location is inside the northern treatment plant building, approximately 150 feet to the east of monitoring well MW-I5. The 0-2 foot sample was characterized as green/gray silty soil with shale fragments.

Elevated arsenic concentrations in groundwater, and a TCLP exceedance in soils from the southern treatment plant area, indicate that elevated heavy metal concentrations in soil may be affecting groundwater quality in these portions of the site. Anticipated remedial actions at the site, which will be described in the Remedial Alternatives Analysis, will likely include removal of significantly impacted soils. This measure would eliminate or substantially reduce the source of arsenic in soils that is potentially leaching into groundwater.

6.3 Petroleum Impacts

Visual evidence of petroleum-impacted soils was observed in several areas at the site. These areas are identified as Areas of Concern (AOCs) on Figure 6. As described in Section 5.5, the extent of the AOCs are based on visual as well as analytical results. Only one groundwater sample exhibited SVOC concentrations that exceeded the TOGS 1.1.1 standards, however, based on field observations of petroleum product in soils and on the groundwater surface in test pits, it is likely that petroleum is highly degraded and not detectable using laboratory analysis.

Location ACD-B6R, a repeat of an ESI boring near the northern treatment building, exhibited concentrations of organic compounds below action levels, however, field evidence of petroleum-contaminated soils support the conclusion that this area has been impacted by the 3,000 gallon AST in the vicinity.

Evidence of petroleum impacts were observed at location 3B-5, near the small brick office building on the west side of the property. Test pits were advanced at locations ACD-I9, ACD-J9, ACD-K8 and ACD-K10, and no further evidence of petroleum was observed in these test pits. It is believed that the petroleum impacts observed by ESI are localized in a relatively small area very near the UST under the building.

Field evidence of petroleum impacts were also observed in the vicinity of the southern treatment building and the main office building. As indicated in Figure 6, field observations of petroleum impacts were seen at locations ACD-U5, ACD-V5, ACD-U6, ACD-W6, ACD-X7 and ACD -W8. Impacts were observed down to a maximum depth of approximately 8.0 feet.

Petroleum impacts were also observed at locations ACD-AA10, ACD-AB-10 and ACD-AA11, which are generally downgradient from the UST located at the southwestern corner of the brick warehouse building. Petroleum impacts were seen down to a depth of approximately 7.0-8.0 feet; however, petroleum impacts were not observed at locations ACD-Y9, ACD-Y10 or ACD-X10. The evidence of petroleum seen near the USTs, and the absence of petroleum impacts in surrounding locations indicates that petroleum impacts are generally confined to the areas indicated on Figure 6.

Groundwater is not currently used to supply water to the site and it is not likely that groundwater will be used for potable purposes as part of future development. Soil removal in areas containing elevated concentrations of metals and petroleum hydrocarbons is likely to reduce groundwater contamination.

6.4 Data Usability

A Data Usability Summary Report (DUSR) is presented in Appendix D. The remedial investigation conducted by Fuss & O'Neill included the collection of quality assurance/quality control (QA/QC) samples in accordance with the NYSDEC DER-10 and the BCP guidance documents. QA/QC samples included field duplicate samples, matrix spike and matrix spike (MS/MSD) samples, trip blanks and equipment blanks. QA/QC samples were collected at appropriate frequency to provide adequate control for all requested analyses.

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Alternatives Analysis & Remedial Work Plan
Former A.C. Dutton Lumber Facility
2 Hoffman Street
Poughkeepsie, New York
BCP Site No. C314081

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ALTERNATIVES ANALYSIS AND REMEDIAL WORK PLAN
FORMER A.C. DUTTON LUMBER SITE

TABLE OF CONTENTS

SECTION **PAGE**

TABLES

FIGURES

1.0 INTRODUCTION

This document presents a Remedial Alternatives Analysis (RAA) and a Remedial Work Plan (RWP) to address areas of concern identified at the Former A.C. Dutton Lumber site located in the Town and City of Poughkeepsie, Dutchess County, New York (Figure 1).

The owner of the property, a Brownfield Cleanup Program (BCP) Volunteer, intends to restore the site to a mix of restricted residential and commercial use. The Volunteer intends to gain approval from the City of Poughkeepsie to construct multi-story buildings consisting of any one of the following combinations: parking on the ground floor, office/retail space, and residential townhouses or condominiums. Because a portion of the property is in the Town of Poughkeepsie, the development of the property will require Coordinated Review. The desired construction may vary from what will be proposed in the City, but will have many of the same elements. Nothing has been formally submitted to either the City or Town, so the proposed remedy is not site specific; rather it is generic so that the property could be redeveloped with a restricted residential reuse option in mind.

The Volunteer has provided for an in-depth remedial investigation at the site in accordance with the requirements outlined in the BCP. The remedy accounts for the significant exposure pathways, source of the contaminants and the fate and transport of those compounds and analytes of concern. Remediation will be consistent with the intended future use of the property. The general concept of restricted residential reuse has been incorporated into this Alternatives Analysis and Remedial Work Plan.

2.0 SITE DESCRIPTION

2.1 Site Description

The A.C. Dutton site consists of two tax parcels; approximately 11.35 acres in the City of Poughkeepsie (parcel #31-6062-59-766443-00), and approximately 3.65 acres in the Town of Poughkeepsie (parcel #14-6062-02-763508-00). The general layout of the site is flat, but slightly sloped toward the Hudson on the west side of the property. Portions of the property rise very steeply along the southeastern edge of the property, where a bedrock cliff is observed.

2.2 Site History

According to a Phase I Investigation report for the site (EnviroPlan 1987), the parcel has been in industrial use since the mid-1800s. The A.C. Dutton Lumber Corporation operated a wholesale lumber company at the site beginning in 1913 and the on-site pressure treatment of lumber using chromated copper arsenate (CCA) reportedly began in 1966. Prior to 1913, site uses included an iron works and a glass works plant.

At the A.C. Dutton facility, raw materials were processed in either of the two treatment plants, temporarily stored in a sheltered drip pad area and allowed to dry, and then stored outside prior to commercial resale. It is suspected that storage of treated lumber has not always occurred on impervious surfaces and that drying may not have always occurred in covered areas.

The site is currently owned by O'Neill-Dutton-LLC. The former owner, A.C. Dutton Corporation, was owned in part or in subsidiary by Miron Building Products Corporation, Inc.

2.3 Geology

The Surficial Geologic Map of New York, prepared by Cadwell (1989), identifies unconsolidated deposits in the vicinity of the site as fluvial sand and gravel deposits (adjacent to the Hudson River) and glacial till consisting of sand, silt and gravel and exhibiting variable texture. The Dutchess County Soil Conservation Survey (2002) depicts the soils as being Urban Lands, which typically consist of reworked native material or fill covered extensively by impervious surface. Overall, material encountered by ESI during subsurface investigation at the site in 2002 was consistent with the soil survey findings. In those instances when native soils were encountered, the material was described as silty-sand with gravel.

Historically, areas of the site received fill that was placed along western portions of the property to level and extend the shoreline of the Hudson River westward. During the investigation soils encountered at the site were generally fill materials; including sand and gravel, silt, cobbles, boulders, brick, coal and coal ash, and some slag. Native material, consisting of light brown silty sand, or bedrock, was encountered in the eastern and central portions of the site. Native material was encountered at approximately 8-10 feet below the surface along the shoreline.

According to the Geologic Map of New York, Lower Hudson Sheet, prepared by Fisher et al. (1970), bedrock in the vicinity of the site consists of the Taconic Melange Formation and the Austin Glen Formation. The Taconic Melange is described as a mix of pebble to block sized Cambrian to Middle Ordovician Age rocks in a pelitic matrix. The Austin Glen formation consists of interbedded layers of greywacke and shale. Outcrops observed on the eastern margin of the site contain siltstone layers interbedded with less competent shale.

During the Remedial Investigation, bedrock was noted at very shallow depths along the eastern side of the property, which is consistent with the rock cliffs forming the eastern boundary. As the site approaches the Hudson River, depth to bedrock generally increases, with few exceptions.

2.4 Hydrogeology

Groundwater was typically encountered at depths of 4-8 feet below the ground surface across western portions of the site. No shallow groundwater was encountered in the eastern portions of the site, which may be a function of the shallow bedrock and the season during which the RI was conducted (winter). Given regional topography and the proximity to surface water bodies, it is assumed that shallow groundwater flows from east to west across the site and discharges to the Hudson River. Because the reach of the Hudson River adjacent to the site is tidally influenced, it is likely that groundwater flow at the site is in part influenced by tides.

Groundwater in the area of the site is not used as a drinking water resource. The site is served by municipal water and sewer.

2.5 Current Conditions

The existing site conditions are shown on Figure 2. Eight abandoned buildings are located across the property, some of which contain equipment associated with the wood pressure-treatment process. The buildings are in various states of disrepair, some are significantly degraded.

The majority of the site is covered with a 2-4 inch layer of concrete and/or asphalt pavement. This groundcover is in fairly good condition in the eastern portion of the property; however, the condition declines westward as the site approaches the Hudson River. The old railroad spur that crossed the site is mostly dismantled, and only the rails and a few wooden ties remain. The fence along the northern border of the site is intact with the exception of one section.

2.5.1 Tidal Effects

The westernmost portions of the site periodically flood during high tide, especially when water levels are elevated due to weather events. At times, the river overflowed onto approximately 50-75 feet of the northwestern portion of the property during high tide. This flooding was observed during preparatory work for the remedial investigation. Due to the flooding, western portions of the property are scattered with debris that floated in from the river.

Based on observed depth variations, groundwater at the site appears to be somewhat influenced by tidal fluctuations. The changes in depth did not correspond exactly with times of high and low tides in the Hudson River. For this reason, it is assumed that while groundwater elevations are affected, the effects are on a time lag from surface water elevation level changes.

2.5.2 Petroleum and Chemical Bulk Storage

The facility's Petroleum Bulk Storage (PBS) registration (#3-175935) was updated and submitted to the NYSDEC in August 2005. Information from site investigations performed by Ecosystem Strategies, Inc. (ESI) in 2002 was used to update the registration, which is valid for 5 years from the date of issuance.

The last known Hazardous Substance Bulk Storage (HSBS) registration (#3-000170) was also updated. The tanks are registered as containing arsenic acid (CAS No. 07778-39-4), which accounts for the largest percentage of hazardous components in the CCA liquid used during the former wood treatment processes. Registered tanks are identified by their location with acronyms NTP (New Treatment Process) and OTP (Old Treatment Process). These tanks are indicated on Figure 2. A summary of the tanks that remain at the site is as follows:

Tank #	Capacity (gal)	Type/Contents	Location
1	3,000	AST – Diesel	Adjacent to northern pressure treatment plant
2	1,500	AST – No. 2 Fuel Oil	Beneath main office building
3	3,000	AST – No. 2 Fuel Oil	Inside concrete enclosure south of main office building

Tank #	Capacity (gal)	Type/Contents	Location
4	2 @ 275 (manifold)	AST – No. 2 Fuel Oil	Inside iron and brick building at southern end of parcel
5	275	UST – No. 2 Fuel Oil	Unknown
NR*	1,000**	UST - Unknown	Beneath western brick building
NR*	20,000**	UST - Unknown	Adjacent to northeastern corner of southern pressure treatment plant
NR*	Unknown	UST - Unknown	Beneath concrete slab west of iron and brick building
NTP01	25,000	AST - CCA	Southern treatment plant
NTP02	25,000	AST – CCA	Southern treatment plant
NTP03	7,000	AST – CCA	Southern treatment plant
OTP01	15,000	AST – CCA	Northern treatment plant
OTP02	12,500	AST – CCA	Northern treatment plant
OTP03	12,500	AST – CCA	Northern treatment plant
OTP04	5,600	AST - CCA	Northern treatment plant

* These tanks are not currently registered.

2.6 Adjacent Land Use

The Hudson River forms the western border of the site and Dutchess Avenue forms the southern border. Further south across Dutchess Avenue is a former manufactured gas plant (MGP) site that is currently owned and operated by Central Hudson as a gas regulating station. Vassar College owns the land to the north of the site, and has recently completed the construction of a new boat house for the College's crew team and other rowing organizations. East of the site is North Water Street and a wastewater treatment facility.

2.7 Existing and Intended Future Use

The property is currently abandoned. No business has been conducted at the site since the departure of the A.C. Dutton Lumber Corporation in the mid-1990's. All existing buildings will require demolition to facilitate the proposed remedy. Many of the buildings are adjacent to or over, suspected source regions.

Although the specific details of the future site configuration have yet to be determined, we have anticipated that a second entrance into the facility will be required regardless of the redevelopment alternative. An entrance roadway/ramp has been included with the remedy as shown on Figure 6.

In addition to the proposed mixed residential and commercial development (see Section 1.0), a riverfront walkway is proposed. The remedy includes the basic grading required for a waterfront walkway, consistent with other walkways that have been installed at properties to the south.

3.0 SITE INVESTIGATIONS

A preliminary environmental investigation was conducted by Ecosystems Strategies, Inc. in 2002, and the Remedial Investigation was conducted within the BCP by Fuss & O'Neill in 2005/2006. The investigations are summarized in the following sections.

3.1 Preliminary Investigations

Subsurface investigations were first undertaken at the site by ESI in 2002 on behalf of Scenic Hudson Land Trust, Inc. Results of these investigations were summarized in two reports; the Summary Report of Subsurface Investigation dated October 3, 2002, and the Summary Report of Supplemental Subsurface Investigation dated November 25, 2002.

Soil Sampling

ESI investigations documented impacts to shallow soil that are consistent with the use of CCA wood preservative at the site. Maximum chromium, copper, and arsenic impacts were identified beneath and immediately adjacent to the northern and southern pressure treatment plants. Impacts also were identified within the northern and central portions of the site and along the railroad spur. Overall, soil analytical data obtained by ESI indicate that the highest metals concentrations are present in surficial soil (e.g., 0-0.5 feet) and that metal concentrations decrease with depth. One sample, collected from the south side of the northern treatment building, resulted in a TCLP concentration that exceeds applicable standards.

Petroleum hydrocarbon impacts were identified in three general areas at the site. These areas included soil in the vicinity of the 3,000-gallon AST located adjacent to the northern pressure treatment plant (e.g., boring B-6/MW-1); soil located in the vicinity of a 1,000-gallon UST located beneath the small brick building west of the northern pressure treatment plant (e.g., boring 3B-9); and in the vicinity of the brick warehouse building and suspected UST at the southern end of the property (e.g., boring B-31/MW-5).

Groundwater and Sediment Sampling

The investigation included sampling of shallow groundwater at five temporary wells at the site. Sampling results indicated the presence of metals and SVOCs in selected wells.

Sampling of sediment within the culverted sections of Kidney Creek and the shoreline of the Hudson River was performed by ESI. Each sediment sample shoed evidence of petroleum contamination.

Floor Drains and Sump Pits

The ESI investigation also included the sampling of several floor drains and sump pits found in the northern pressure treatment plant. Dye testing of these structures by ESI confirmed that the drains discharge to sumps via metal-lined collection trenches. No trenches or sumps appeared to connect to Kidney Creek.

3.2 Remedial Investigation

The Remedial Investigation (RI) was performed to confirm the results of the previous investigations, to determine to what extent the site is impacted from historic activities, to determine if the applicable soil cleanup guidance values and groundwater standards are exceeded, to identify possible exposure pathways and to aid in the selection of appropriate remedial alternatives. Field work was completed under the direction of an NYSDEC-aproved Remedial Investigation Work Plan (RIWP).

Although ESI conducted a fairly large-scale investigation at the site, the extensive RI was used to fill in data gaps in the ESI project, to collect data to confirm the usefulness of the ESI data and to get sufficient information for remedial design purposes. The RI encompassed the entire 15-acre site.

3.2.1 Soil Investigation - Test Pits and Soil Borings

Sample locations were based on a 100-foot on center regularly spaced grid as depicted on Figure 3. Surficial geologic and chemical data was collected at the 100-foot grid node locations by either digging a test pit using a small excavator or advancing a soil boring using a GeoProbe direct push sampling system.

The discussion of analytical results in the following sections is intended to be a summary; refer to the Site Characterization and Remedial Investigation Summary Report (Fuss & O'Neill, August 2007) for a more detailed review of analytical results.

3.2.1.1 Action Levels

The intended future use of the property is restricted residential and commercial. To the extent practical and feasible, the exposure potential will be reduced to the extent that the site will comply with the guidelines for this future use outlined in 6 NYCRR Part 375-6. However, soil samples were collected in areas of the site considered to be undisturbed or representative of background conditions. The samples were taken from the top of the ridge on the east side of the property as shown on Figure 3. Of the five background samples collected, the average concentration of arsenic detected was approximately 30 mg/kg, and chromium was 33 mg/kg (See Table 9). Based on the look-up tables in 6 NYCRR Part 375-6, the action levels for arsenic and chromium are 16 mg/kg and 110 mg/kg (hexavalent chromium), respectively. The background levels for arsenic are slightly higher than the recommended soil cleanup guidance value of 16 mg/kg. Therefore, the focus of the remedial design will be to mitigate exposure routes so that arsenic does not exceed the range of 16 to 30 ppm.

Action levels for the determination of groundwater quality are based on the NYSDEC Technical and Operation Guidance Series Memorandum 1.1.1 (TOGS 1.1.1). The document provides standards for groundwater, and guidance values if no standards are specified. Results from the analysis of sediment samples at this site are compared to the NYSDEC's Technical Guidance for Screening Contaminated Sediments. Action levels for metals are strictly on a mass basis, while action levels for organics are based on the organic carbon content in the sample.

3.2.1.2 Metals in Soil

Approximately 66% of sample submitted for metals analysis (53 of 80 total samples) exhibited concentrations of arsenic and/or chromium exceeding action levels. The distribution of elevated levels of arsenic and chromium is widespread across the site; however, it is most significant in the vicinity of the two processing areas and in low lying areas of the site. Figures 4A, 4B and 4C present the distribution of arsenic and chromium exceedances across the site.

The majority of the arsenic impacts are located in the upper foot of soil and even more so in the surface or near-surface samples. Surface samples exhibited arsenic levels as high as 95.8 mg/kg to 212 mg/kg. The greatest concentration of arsenic (811 mg/kg) was detected in a 0.5-3.0 ft sample taken from location ACD-G2 behind the northern treatment building.

Data obtained from subsurface soils indicate a significant drop off in contaminant levels with depth. Samples collected from between 3.0-6.0 feet exhibited an average arsenic concentration of between 54 mg/kg at the high end to an average arsenic level of 21 mg/kg at the low end, which is consistent with the range of background concentrations measured (Table 9).

Samples collected from below 6.0 feet exhibit arsenic and chromium concentrations below action levels, with the exception of two samples. The average arsenic concentration was approximately 12 mg/kg. It is interesting to note that the arsenic concentrations in the background samples, which were around 30 ppm range, are substantially elevated compared to the native soil found below the site. This is likely because the majority of the land surface in the vicinity of the AC Dutton site has been disturbed and filled.

TCLP analyses were selected for the most significantly impacted soil samples as determined by laboratory analysis. Samples from locations ACD-G2 (arsenic = 811 mg/kg; chromium = 469 mg/kg), ACD-B8R (arsenic = 105 mg/kg) and M2 (arsenic = 148 mg/kg) were submitted for TCLP analysis, among others. None of the samples analyzed failed for toxicity characteristic; therefore, soils will not require management as hazardous materials during remedial activities.

3.2.1.3 Analytical Results – Organics in Soil

Areas of Concern for petroleum contamination are depicted in Figure 5, as estimated based on analytical results. Samples were submitted from locations where the most significant petroleum impacts were observed based on visual and olfactory evidence.

The sample from boring ACD-B8R exhibited a very low concentration of phenanthrene. Soil samples from ACD-MW-AA10 and ACD-MW-AA11 contained benzene at low levels. Boring ACD-AA10 also exhibited concentrations of toluene and pyrene below the action levels.

The field evidence of petroleum-contaminated soils, including strong petroleum odors, product sheen on water and blebs of free product in the soil matrix suggest significant petroleum impacts; however, the field observations are not consistent with the sampling results. Visual and olfactory observations support the conclusion that some areas of the site have been significantly impacted by petroleum. The relative absence of detections of specific compounds detected in the sampling results may be a function of the age of the release instead of the absence of impacts. It is more likely that the petroleum product in the subsurface is old and has undergone weathering and degradation.

3.2.2 Groundwater and Monitoring Wells

Well locations are provided on Figure 3, and a summary of groundwater sampling is shown in Tables 5 and 6. Groundwater from monitoring well MW-I5 exhibited an arsenic concentration (63.8 μg/L) similar to the adjacent MW-1 installed by ESI (45 μg/L), while the TOGS 1.1.1 standard is 25 μg/L. This well is in close proximity to a collection sump described in Section 3.6. Groundwater from monitoring well MW-U8 contained 53.1 μg/L of arsenic. Each of the RCRA8 metals were either not detected, or detected at low levels in samples collected from the remaining monitoring wells. Based on the groundwater data and the TCLP data, it is likely that elevated heavy metal concentrations in surficial soil are not affecting groundwater quality across the majority of the site.

Despite petroleum-related impacts in soils at a number of locations across the site, the only organics detected were in groundwater from monitoring well MW-E8. Several SVOCs were detected (estimated by laboratory); the estimated concentrations of benzo(b)fluoranthene (0.69 J μg/L), benzo(k)fluoranthene (0.75 J μg/L), and chrysene (0.53 J μg/L) each exceed the TOGS 1.1.1 guidance value of 0.002 μg/L. The source of impacts at this location is unknown. No visual or olfactory evidence of petroleum impacts are noted on the test pit log for this location; the fill material is similar to other locations at the site, consisting of coal slag, furnace brick, and glass fragments.

3.2.3 Sediment Sampling

Sediment sample locations are shown on Figure 3. Results of sediment sample analysis are summarized in Table 7 and Table 8. These samples are considered off-site samples since the Volunteer does not own or control the Hudson River.

Analytical results indicate that all samples exhibited concentrations of arsenic, cadmium, copper and lead slightly exceeding the lowest effect level screening criteria outlined in the guidance. Furthermore, four out of the five samples exceed the lowest effect level criteria for chromium and mercury as well. No results exceed the severe effect level criteria, or even reach 50% of the severe effect level. No guidance values are available for barium or selenium. Comparison of all sediment analytical results together reveals that no one location appears to be more heavily contaminated than the next.

A number of SVOCs were detected in each of the sediment samples, namely polycyclic aromatic hydrocarbons (PAHs). Of the PAHs detected, at least one compound from each of the samples is in exceedance of the chronic toxicity screening criteria. In four out of five samples, the concentration of benzo(a)anthracene is in exceedances of the acute toxicity screening criteria.

The source of organic impacts is undetermined. Because sediment samples were collected at a shallow interval (0-1 ft), it is possible that minor releases due to recreational boating in the Hudson River have impacted these sediments. Other possible sources include the existing MGP site adjacent to the A.C. Dutton property and other large-scale spills in the River.

4.0 NATURE AND EXTENT OF CONTAMINATION

4.1 Metals in Soils

Shallow soil over a majority of the site has arsenic impacts over the applicable action levels for restricted residential reuse scenario. Arsenic is also present at levels exceeding the restricted residential reuse criteria in the one to six foot depth range. Arsenic is the primary metal of concern; however, chromium, lead, mercury and, to a lesser extent, copper and barium, are present at levels exceeding the restricted residential action levels.

The bulk of the impacts are limited to the former processing areas and the areas the rail spur that bisects the site. Most of these surfaces consist of a minimum of three inches of concrete and/or asphalt. The floors in the treatment buildings exhibited obvious staining with the CCA residue. The likely source of the impacts observed throughout the site is the former practice of drip drying pressure treated wood in unprotected environments (e.g., outside the northern and southern treatment plants), the intentional (not likely because it would be wasteful of a valuable resource) or inadvertent release of fluid during transfer or replenishment of the product tanks and/or through leaks in the recycling systems set up in both treatment plants to collect excess CCA. The CCA was recycled and the drippings were collected and mixed with fresh CCA and water and reused. This process was apparently continuously repeated. Rarely, was the CCA disposed of; it was reused and reused until gone. In theory, the only product loss was supposed to be the percent of the CCA that was transferred to the wood.

The supply was replenished when the unused CCA product level dropped below a certain volume. There were likely to be occasional loses during transfer; however, most of the impacts are probably related to the drip drying that occurred outside the facility on occasion and/or overflow that ran out of the building and pooled in the low lying areas surrounding the building when the wood was removed from the pressure treatment vessels. The large open lumber yard was used to store freshly treated lumber when it was considered dry; however, there was always some residual that was removed during precipitation events. While in the yard, CCA fluid likely dripped off the lumber directly to the concrete pavement and was then transferred to low lying areas via overland flow during precipitation events. Based on this historic use of the site, it is not unreasonable to expect that these areas would be the most severely affected.

CCA fluid came into contact with incidental soil and dust on the concrete surfaces, the liquid portion eventually evaporated and residual metals and dust accumulated on the concrete surface. From the treatment buildings, CCA fluid flowed out onto soil immediately adjacent to the treatment buildings, or was swept into floor drains that discharged to sump pits adjacent to the buildings. The soil or sediment in these structures exhibited the highest concentrations of metals.

Over time, CCA-contaminated runoff or drip residue was absorbed into porous surfaces of the concrete and pavement through cracks or breaks. Rainfall and run-off all played roles in the accumulation, transport and leaching of metals from surface dust and sediment into the shallow soils. Periodic flooding during unusual high tides may have also contributed to the transport of contaminants.

Arsenic is found in incidental dust and soil on the concrete surfaces at extraordinarily high concentrations. For example, location SS-1, collected from the northern treatment plant building, consisted of material collected from 0-0.5 inches, and exhibited an arsenic concentration of 138,000 mg/kg. Similarly, sample SS-8, consisting of "gray-green sawdust and very fine sand", exhibited an arsenic concentration of 96,700 mg/kg. The results of numerous other samples, collected at less than 1 inch depth from locations within and immediately adjacent to the treatment buildings, exhibit similar concentrations.

In some portions of the site, surficial soils were openly exposed to runoff and deposition of CCA fluid or dust, and not covered with asphalt or concrete. Surficial samples from these areas also exhibited very high levels of arsenic and chromium, but these concentrations were significantly less than what was observed in the dust and surface material from within the buildings.

Samples from under the concrete or asphalt surface areas that were not openly exposed to the surface, but were covered with significant layers of concrete are significantly lower than in exposed surface soil areas, and even more so than surficial dust samples.

Soils exhibiting exceedances of arsenic or chromium action levels at greater depths (1-6 ft) were found in the vicinity of the two main pressure treatment buildings. These findings are illustrated in Figures 4B & 4C. The most significant exceedances of action levels in the deeper samples occur in locations where the highest surficial concentrations were found, indicating that these areas received the most substantial impacts from CCA fluids. The horizontal extent of the most significantly impacted areas at depth appears to be limited, unlike the surficial data suggests.

The 3-6 ft depth interval indicates a significant drop off in metals exceedances. Samples collected from intervals within approximately 3.0-5.0 ft exhibit an average arsenic concentration higher than samples from 3.0-6.0 ft. This data suggests that arsenic concentrations are decreasing, to varying degrees, with increasing depths in the 3.0-6.0 ft interval. Only two samples from below 6 feet contained elevated arsenic concentrations and the action level is only slightly exceeded.

The site is immediately adjacent to the Hudson River, and is regularly inundated by flood waters during storm events and certain times of the year. It is not unusual to see flood waters extending over approximately 20% of the site along the riverbank at the western edge of the property. Consequently, there has been a flushing action that has periodically removed some of the CCA impacts from the surface. The pattern of detections of arsenic and chromium at the site indicates higher concentrations of contaminants on the upper, eastern section of the property than nearer the river.

4.2 Petroleum Impacts

Areas where evidence of petroleum-impacted soils was observed are shown in Figure 5. The area immediately south of the northern treatment plant is known to include at least one 3,000-gallon AST. Petroleum impacts were observed in a limited area between the old treatment plant and the adjacent metal storage building.

Evidence of petroleum impacts were reported by ESI under the small brick building on the west side of the property. A 1,000-gallon UST fuel storage tank is located underneath the floor of the brick building. Test pits were advanced at locations surrounding the building and a monitoring well was installed; no further evidence of petroleum was observed. It is believed that these impacts are localized in a relatively small area very near the UST under the building.

Field evidence of petroleum impacts were also observed in the vicinity of the southern treatment building and the main office building. Impacts were observed to a maximum depth of approximately 8.0 ft.

Petroleum impacts were also observed near the UST at the southwestern corner of the iron and brick building. Petroleum impacts were seen down to a depth of approximately 7.0-8.0 feet.

The evidence of petroleum seen near the USTs, and the absence of petroleum impacts in surrounding locations indicates that petroleum impacts are generally confined to the immediate area.

Petroleum was observed in the area at the southwest corner of the site along Dutchess Avenue and the site's entrance driveway. A limited area southwest of the iron and brick building is impacted with petroleum between approximately 8 and 14.5 feet below ground surface. It is likely that the release occurred from the 1,000-gallon fuel UST located at the southwest corner of the building.

Petroleum impacts were observed around the former office building, including the southwestern corner of the southern treatment plant and the northern end of the iron and brick building. The area is known to include a 1,500-gallon UST and a 3,000-gallon AST. No soil guidance values were exceeded; however, the soils in the 5-10 feet below ground surface interval were clearly impacted as noted by visual and olfactory observations.

4.3 Site Hydrology

Two groundwater samples exhibited arsenic concentrations that exceed the applicable groundwater standard. Volatile and semi-volatile compounds were also detected in a few groundwater samples. These detections are likely resulting from petroleum discharges related to the USTs and fuel storage facilities described above. Groundwater is not used as a potable or industrial water source at the site. It is not likely that groundwater will be used for potable purposes as part of future development. Proposed mitigation measures that include hot spot removal and capping are likely to reduce groundwater contamination.

As discussed in Section 4.1, there are numerous floor drains in the former treatment plant buildings that likely discharge to sump pits found adjacent to the buildings. These structures have accumulated CCA-impacted material, and exhibited the highest metals concentrations on the site. Removal of the sump pits and associated drains is likely to reduce impacts to the shallow groundwater.

5.0 CONTAMINANT FATE AND TRANSPORT

Impacts to soil at the former A.C. Dutton site are limited primarily to the areas surrounding the treatment plants and some low spots on the property. The contaminants of concern are CCA and petroleum hydrocarbons including volatile and semi-volatile organic compounds from above and underground fuel tanks.

Transport of heavy metal impacts via runoff is a substantial issue at this site. The heavy metals of concern (arsenic and chromium) were introduced to the concrete surfaces and surficial soils primarily through the drip drying of treated wood stored at the site. There may be other potential release mechanisms; however, there are no documented cases where CCA was spilled through tank failure or during the transfer of product. The sediment that has collected in the low lying points across the site is significantly impacted. While metals continue to be found at levels exceeding action levels in the shallow soils, the metal concentrations are much higher in the surface sediment.

ESI analyzed some sediment samples for hazardous waste characteristics. They found that some of the sediment in the sumps near the processing plants was significantly impacted. Fuss & O'Neill attempted to duplicate these results by testing the most heavily impacted soil samples using Toxic Characterization Leaching Procedure (TCLP). Eleven (11) soil samples were analyzed by TCLP either as part of the ESI Phase II ESA or the Fuss & O'Neill Remedial Investigation. Results from only one (1) ESI sample taken adjacent to a sump in the northern treatment plant exceeded the TCLP toxicity characteristic for arsenic. The results indicate that the metals are relatively stable and not prone to leaching. Shallow groundwater has not been significantly impacted.

In areas where petroleum impacts were observed, contamination was generally noted at least 4 feet below the surface but not deeper than the native dense silt layer. Although specific compounds were not found in groundwater samples, field evidence confirms that groundwater in some areas of the site is impacted with petroleum. Soil removal in areas containing elevated concentrations of petroleum hydrocarbons is likely to reduce groundwater contamination.

5.1 Exposure Pathways

The exposure pathways are based on those that could be reasonably expected under anticipated future property uses. The contaminants of concern are present in soil in groundwater and have been dispersed by contact with precipitation and flood waters. It is possible for people to come in contact with the contaminants of concern through routine site activity if conditions stay the same. Given the current use of this and surrounding properties, and the planned future use of the property, the following human receptor populations have been identified:

- Visitors/Transients – includes individuals who may visit or otherwise be present on the property for brief periods. Visitors and transient individuals are assumed to include both adults and children.
- Future Residents – includes adults and children living on the property
- Site Workers – Workers could be exposed to contaminants during construction. Site workers would be adults.

- Adjacent Residents – There is one single family residence adjacent to the property and one apartment building. The remaining surrounding properties are commercial, industrial or recreation oriented (Vassar Boathouse). A temporary pathway exists during construction activity.

The exposure pathways are direct dermal exposure, inhalation of dust, ingestion of contaminated groundwater and inhalation of vapors associated with the storage and use of petroleum products on-site. The proposed alternatives address these exposure pathways and any impacts and/or adverse health concern for humans who could reasonably be exposed to contaminants originating from the site during and following construction activities. The exposure pathways will be addressed and no access to surface or subsurface soils will remain that would re-create an exposure pathway. A summary of the receptors and the exposure pathways is provided below.

Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Potential CoC's	Evaluated Qualitatively?	Reasons
Soil	Subsurface	Site Workers	Adults	Ingestion; Dermal; Inhalation	CCA, petroleum	Yes	Contaminated Soil during excavation
	Subsurface	Residents	All	Ingestion; Dermal	CCA, Petroleum	No	Remedy addresses exposure path
	Subsurface	Transients & Visitors	All	Ingestion; Dermal	CCA, Petroleum	No	Remedy addresses exposure path
	Surficial	Site Workers	Adult	Ingestion; Dermal; Inhalation	CCA	Yes	Impacts during remedy
	Surficial	Residents	All	Ingestion; Dermal; Inhalation	CCA	No	Addressed by remedy
	Surficial	Transients & Visitors	All	Ingestion; Dermal; Inhalation	CCA	No	Addressed by remedy
Ground Water		Site Workers	Adult	Ingestion; Dermal	Arsenic, Petroleum	Yes	Encountered in trenches
		Residents	All	Ingestion	Arsenic Petroleum	No	Public Water
		Transients & Visitors	All	Ingestion	Arsenic, Petroleum	No	Public Water
Sediment		Site Workers		Dermal	CCA	Yes (offsite issue)	Shoreline Stabilization
		Residents		Dermal	CCA	Yes (offsite issue)	Swimming & Fishing
		Transients & Visitors		Dermal	CCA	Yes (offsite issue)	Swimming & Fishing

This property is serviced by a municipal potable water supply. Groundwater will not be used as a source of potable water.

Exposure could occur during site work performed as part of the proposed remediation and development. Any invasive work within potential contaminant source regions in the future also has the potential to put site workers and residents temporarily at risk; however, exposure pathways will be mitigated through engineering and institutional controls based on the foreseeable future uses of this property. An environmental easement will be used to limit exposure possibilities. Any future invasive action in the suspected source regions will require NYSDEC approval and oversight to ensure adequate protection of those persons performing the work.

6.0 REMEDIAL ACTION OBJECTIVES (RAO)

6.1 Introduction

Goals for the remedial program have been established using the guidelines suggested in the Brownfield Cleanup Program Guide (NYSDEC DER-10). The overall remedial goal is to protect the users of the facility from potential exposure to the contaminants of concern. At a minimum, the proposed remedy will eliminate or substantially reduce the threat to the public health and to the environment presented by the impacted soil. As will be discussed below, the Volunteer wishes to pursue this course of action using an approach consistent with the redevelopment of the site for restricted residential and commercial reuse.

The Remedial Action Objectives (RAOs) for this site are as follows:

Groundwater

- Prevent contact and/or inadvertent ingestion of contaminated groundwater during construction activity
- Prevent contact with or inhalation of vapors from contaminated groundwater once construction is completed.
- Limit the discharge of impacted groundwater to the Hudson River

Soils

- Limit direct dermal contact and inhalation of dust-borne particles containing CCA
- Reduce and prevent, to the extent practical, additional impacts to groundwater and surface water from residual contaminants.
- Prevent future impacts to the adjacent off-site estuarine environment (Hudson River) from run-off containing impacted soils and dust laden with CCA.

Sediment

- Prevent direct contact with contaminated sediment during site construction activities and shoreline stabilization.

These Remedial Action Objectives (RAOs) are intended to be protective of human health and the environment. The RAOs are developed considering the exposure pathways and the intended future use of the property.

6.2 Development of Remediation Goals

The intended use of this facility is a restricted residential and commercial mix. Under existing conditions, the exposure potential exists from dermal contact and inadvertent inhalation of CCA impacted soils. The most heavily metal-impacted soils are those at the surface. The risk of exposure to contaminated soil exists during invasive construction/demolition activities and is likely to be the primary route of exposure to the compounds of concern. The proposed remedial goals and action objectives were developed to be protective of site workers and users of the facilities, based on the intended use of the development as condominiums, townhouses, apartments, stores, and, possibly, a restaurant.

6.3 General Response Actions

Since exposure to CCA in soil can be eliminated by isolation, the exposure potential will be mitigated. Soils do not contain substantive quantities of petroleum hydrocarbons; however, specific areas have excessive concentrations of CCA.

Three remedial alternatives are considered. The first alternative is the no action alternative which is not appropriate, the second alternative is cleanup to predisposal conditions and the third and preferred remedy includes removing residual sources of CCA and petroleum (e.g. USTs and the production equipment), limited hot spot removal and capping the site. Some of the contaminated soil will be consolidated on the eastern side of the site beneath the likely location of an entrance ramp. The preferred remedy may also include soil vapor barriers to eliminate potential exposure via soil vapors into future buildings. Environmental easements and/or deed restrictions will be employed to ensure that potential future exposure issues are suitably addressed.

The proposed remedy meets the RAOs for the site by isolating the contaminants of concern, reducing infiltration potential, limited source removal and the use of institutional and engineering controls during construction and after construction to ensure that the exposure pathways are permanently addressed.

6.4 Significant Threat Determination

The NYSDEC and NYSDOH have not yet performed a significant threat determination for the site in accordance with the BCP. Historic results indicated the potential for hazardous waste levels of CCA to remain on-site; however, recent testing indicates that the residual material does not meet the criteria for listing as a hazardous waste.

7.0 ALTERNATIVES ANALYSIS

7.1 Alternatives Screening

In this section, the remedial alternatives are evaluated in terms of the following criteria:

- Overall protectiveness of human health and the environment.
- Compliance with SCGs, including action-specific and location-specific SCGs

- Long-term effectiveness and permanence, focusing on the reliability and adequacy of controls
- Reduction in toxicity, mobility, or volume
- Short-term effectiveness, focusing on the protection of community, workers, and environment during remedial actions
- Implementability
- Cost (affordability by the Volunteer is a key consideration)
- Community Acceptance
- Land Use Criteria

The general types of Remedial Alternatives considered for this BCP site include:

- A no action alternative;
- Cleanup to predisposal conditions (unrestricted re-use of the property);
- Site specific cleanup tailored to mitigate exposure routes (Restricted Residential and commercial re-use).

The alternatives were evaluated based on their capacity to meet the Remedial Action Objectives. The remedial alternatives were designed and screened using the abovementioned criteria. The preferred remedy is consistent with the NYSDEC's goals for the program in that it remains consistent with the overall program criteria: protect human health and the environment; and to comply, to the extent practical and feasible, with SCGs for the site.

The "no action" alternative is not discussed. Under no circumstances would it be appropriate for this site. The second and third alternatives are applicable; however, the removal to predisposal conditions is neither practical nor warranted. These alternatives are discussed in detail in the following sections.

The proposed Remedial Alternative was developed to address environmental conditions at the site. It is generic in that no concept plan for redevelopment has been approved by the City/Town of Poughkeepsie. However, consideration is given to the economic reuse of this facility. The focus of this evaluation was to develop satisfactory remedial alternatives that will allow this property to be re-developed as a restricted residential development. The mitigation plan will be protective of construction workers building the site and the future residents and users of the facility.

The following considerations were generally applicable:

- The areas of metals-impacted soil are large. Over much of the site, shallow surface soils exceed the NYSDEC's guidance for arsenic. The impacts are likely the result of historical industrial practices; however the nature of the fill material used to create much of the land surface that abuts the Hudson River is suspect. Background readings taken in the area indicate that soil in the region contains arsenic at levels that are two times (~33 ppm) the allowable guidance value. There is also petroleum at levels that are likely to be actionable.

- Soil removal and disposal from this site is feasible; however, complete removal to predisposal conditions has limited application.
- The remedy that is proposed will effectively isolate the soil and limit infiltration to impacted soil left in place. Groundwater sampling results indicate that the metals are relatively immobile, so impacts to groundwater and surface water will be reduced. The area is supplied with public water so there are no risks associated with ingesting potentially impacted groundwater.

7.2 Alternative 1 – No Action

Under this alternative, the property would be developed without directly mitigating the environmental issues. Any reduction in the concentration of metals, VOCs and SVOCs would be the result of dispersion or dilution. Dispersion or dilution could potentially result in additional future groundwater and surface water impacts and does not meet the SCGs. Risk to human health from contact with impacted soil exists, especially during construction activity. However, risks of future exposure to the contamination would be minimal because much of the impacted soil would be isolated beneath paved areas and buildings, or below the surface. The isolation would reduce the mobility of the contaminants.

This alternative involves implementation of deed restrictions and/or other institutional controls. Development would not be protective of human health and the environment. Residential reuse would not be appropriate; however, industrial reuse could be appropriate. Although this option could be implemented, it provides no direct mitigation to existing problems and relies on naturally occurring processes. There would be no reduction in the toxicity of the contaminants other than through dilution and dispersion. Potential health risk factors would still exist. There are low foreseeable costs associated with this alternative, primarily with those normally associated with construction activity. It is presumed that the NYSDEC would not accept this alternative and would not grant the applicable liability waivers or provide a Certificate of Completion because it does nothing to meet the overall RAOs. This alternative can easily be implemented but is not considered further because it has no potential to meet the objectives of the BCP.

7.3 Alternative 2 - Complete Restoration to Predisposal Conditions

This alternative would incorporate complete removal of impacted soil at the site down to background levels. Development would occur after the material was removed. To accomplish complete removal of impacted soil above the unrestricted reuse criteria listed in 6 NYCRR Part 375-6 from the site, approximately 38,000 - 66,000 yd^3 of soil and other materials would require removal and off-site disposal. A summary of the screening criteria is presented below.

Screening Criteria	Advantages and Disadvantages
Overall Protectiveness of Human Health and Environment	*Advantages*: This alternative is protective of human health and the environment. *Disadvantages:* Nearly 100,000 tons of soil, concrete debris and asphalt would be removed from the site

Screening Criteria	Advantages and Disadvantages
Compliance with SCGs	*Advantages*: Complies with the applicable SCGs. *Disadvantages*: Very difficult to remove all of the impacted material; groundwater cannot be easily addressed (natural attenuation required and will take time)
Long-term effectiveness and permanence	*Advantages:* All soil with contaminants above applicable action levels would be removed. Certainly an effective and long-term solution. *Disadvantages:* Reliability and adequacy of controls an issue during implementation.
Reduction in toxicity, mobility, or volume	*Advantages:* Completely removes impacted soils exceeding the unrestricted use criteria. *Disadvantages:* Cannot readily address groundwater and may mobilize already stable situations.
Short-term effectiveness, focusing on the protection of community, workers, and environment during remedial actions	*Advantages:* Effectively protects human health and the environment by the use of engineering controls. *Disadvantages*: Possible exposure to workers and general public during construction if engineering controls fail or are insufficient.
Implementability	*Advantages:* Can be implemented. Excavation and disposal of soil exceeding guidelines is possible with typical construction equipment. *Disadvantages:* Must find a facility willing to accept material; may be difficult to find a facility that would be willing to accept the entire volume. Probably not administratively feasible.
Cost	*Advantages*: One time expense and theoretically no long-term costs to maintain systems. *Disadvantages*: Very costly, with little subsequent advantage; Not affordable by Volunteer
Community Acceptance	*Advantages*: Certain subsets of the population will be glad that the site has been restored to pre-disposal conditions. *Disadvantages*: Likely to meet resistance from adjacent and nearby neighborhoods. Activity will be very intrusive; however, most of the objection may be to the project in general.

Screening Criteria	Advantages and Disadvantages
Land Use Criteria	*Advantages*: Restores the property and complies with the City's Revitalization Plan. *Disadvantages*: Not currently zoned for the intended future use.

7.4 Alternative 3 – Site-Specific Cleanup; Limited Excavation & Consolidation

This alternative incorporates removal of significantly contaminated material and off-site disposal, demolition and processing of on-site buildings, removal and reburial of lesser contaminated material into well defined areas, and placing a minimum two feet of soil over practically the entire site to mitigate exposure to low levels of contaminants and limit infiltration.

Reduction in the concentrations of petroleum contaminants would be through the removal of the most significantly impacted material; however, some soil would remain on site in a consolidation zone that eliminates the direct exposure pathway and infiltration potential, thereby reducing the likelihood of further impacts to the environment. Contaminant mobility is greatly reduced by the use of engineering controls in the soil consolidation area, and across the site. The potential for subsequent dispersion is greatly reduced and environmental easements will be used to address potential future exposure to the contaminants of concern. A summary of the screening criteria is presented below.

Screening Criteria	Advantages and Disadvantages
Overall Protectiveness of Human Health and Environment	*Advantages*: This alternative is protective of human health and the environment. *Disadvantages:* Material exceeding SCGs left in place; engineering and institutional controls required.
Compliance with SCGs	*Advantages*: Relies on isolation; Complies with SCGs at typical exposure points *Disadvantages*: Relies on site controls to meet SCGs. Requires maintenance of controls
Long-term effectiveness and permanence	*Advantages:* Effective and long-term solution *Disadvantages:* Requires maintenance of engineering controls. Reliability and adequacy of controls based on local conditions.
Reduction in toxicity, mobility, or volume	*Advantages:* Removes some impacted soils; isolates contaminants and reduces infiltration through the contaminated zone. *Disadvantages:* Substantively impacted soils will remain in place

Screening Criteria	Advantages and Disadvantages
Short-term effectiveness, focusing on the protection of community, workers, and environment during remedial actions	*Advantages:* Effectively protects human health and the environment by the use of engineering controls. *Disadvantages:* Possible exposure to workers and general public during construction if engineering controls fail or are insufficient.
Implementability	*Advantages:* Readily implemented with typical construction equipment. *Disadvantages:* Site management plan required for future construction efforts; Phasing may be required
Cost	*Advantages:* Affordable by the Volunteer; much more likely to result in the restoration of this property *Disadvantages:* Does not restore the site to pre-disposal conditions
Community Acceptance	*Advantages:* The public and local government is likely to support the project because it will create opportunities. *Disadvantages:* Likely to meet resistance from adjacent and nearby neighborhoods
Land Use Criteria	*Advantages:* Restores the property and is consistant with the City's Revitalization Plan. *Disadvantages:* Not currently zoned for the intended future use.

8.0 RECOMMENDED ALTERNATIVE

The Volunteer is proposing to do a generic cleanup of the property since there is no locally approved site plan to tie into and one is not likely to be forthcoming in the near future. The Volunteer has expressed an interest in developing the site with a mix of residential townhouses/condominiums and commercial buildings. Commercial will be located on the lower floors and there may also be some parking structures on the ground floor; however, residential dwellings on the ground floor are not ruled out. The Volunteer is also willing to work with the City to install a public access walkway along the riverfront consistent with the local waterfront revitalization plan.

Alternative 3, consisting of limited excavation of petroleum and CCA "hot spots", capping the remainder of the impacted portions of the site with a minimum of a two to four foot soil cap, creation of a soil consolidated zone to manage impacted construction and demolition debris, isolating the soil consolidation zone and the installation of vapor barriers under occupied spaces (if warranted), is the preferred approach to mitigating exposure potential at the former

A.C. Dutton site. This approach will facilitate redevelopment of the property and is cost effective. Cleanup up of the site using the preferred approach provides a substantial reduction in contaminant mobility and some of the most toxic material will be removed from the site. The approach provides significant reduction in potential health risk factors by removing the most heavily impacted material and environmentally isolating the remaining impacted soil at the site. This approach will also reduce impacts to groundwater and limit future impacts to the sediment in the Hudson River. The proposed alternative does not address historic impact to the sediment in the Hudson. That issue is an off-site problem, and, consequently, is not the responsibility of the Volunteer. Proposed redevelopment of the site will require shoreline stabilization, so the mitigation plan will reduce the potential for direct dermal exposure to the impacted sediments along the immediate shoreline and eliminate any future impacts to sediment associated with historic use of the property.

This alternative provides a long-term, manageable solution to the problem and would be permanent. Any subsequent disturbance at the site that could potentially penetrate the soil cap would be done under the conditions outlined in a Site Management Plan, which will be incorporated into the OM&M plan. Any invasive activity would be done under the direction of the NYSDEC with the appropriate level of health, safety and environmental protection in place.

The approach is very effective and provides immediate benefit, yet facilitates the proposed site development activity. This alternative is easily implemented and is cost-effective from the Volunteer's perspective. The proposed alternative effectively returns the property to productive re-use, promotes economic growth in the region, and improves environmental quality.

Implementation of the proposed alternative will consist of the following steps:

- <u>Generation of a Remedial Action Work Plan (RAWP)</u>: The RAWP will document a generic remedial design for the facility. It will outline the mechanisms to be used for removing the severely impacted material, isolating the more benign impacted material by capping, and implementing the engineering and institutional controls necessary to eliminate exposure pathways. The mitigation plan will be sufficient to ensure the safety of the community while remediation is underway and will include a sampling program as warranted to verify that the project goals where met.

- <u>Building and Structure Demolition</u>: All existing buildings at the site will be demolished and disposed of appropriately. This is necessary because of the nature and extent of the impacts observed at the site. There are also petroleum and chemical bulk storage tanks remaining on site that will be closed properly. The CCA solution storage tanks will be emptied, cleaned and removed. All process equipment associated with the wood treatment process will be cleaned and removed.

  <u>Brick and concrete portions of the buildings will be crushed and used as fill material.</u> The crushed material will be placed within a soil consolidation zone. The residual concrete and asphalt in the processing plant areas will also be crushed and placed in the soil consolidation zone. Other portions of the treatment plant structures, including the sumps and drainage troughs inside the buildings will be cleaned of accumulated sediment, which will be drummed for disposal as warranted. Other pertinent structures

such as the rail siding will be dismantled and recycled as warranted. Any wood or other organic debris will be disposed of appropriately, either onsite in a specific area or at an appropriate facility off-site.

- Removal of Concrete and Paved Surfaces: Both the ESI Phase II ESA and the recent RI found that the most heavily impacted areas are associated with the dust that accumulates directly on concrete and paved surfaces. Nearly all of the site is covered in either a concrete or asphalt pad, an average of 4-5" thick. This material will be pulled up and crushed following the scarification process, and placed in segregated stockpiles dependant on the location of origin. The stockpiles will be sampled and characterized to determine whether the material is suitable for fill. Due to frequent flooding (tidal and weather related), concrete surfaces in the vicinity of the Hudson River will not require scarification as any surface contamination has likely been washed away.

  Material generated during the scarification process will be stockpiled for characterization with TCLP analysis prior to management. .

- Construction of Soil Management Zones: All excavated soils will be stockpiled in the designated management zones, allowing for soils to be characterized. Soil will be placed on plastic, and covered with plastic to prevent further release of contaminants. Some soil may require off-site disposal after characterization.

- Subsurface Soil Excavation: Metals-impacted soils will be stockpiled and characterized in accordance with DER-10 to determine whether they are suitable for fill in the soil consolidation zone, or if they require off-site disposal. Petroleum-impacted soil will be stockpiled and characterized for off-site disposal of the most heavily impacted material, or for consolidation of the less impacted material. Any aboveground or underground tanks found will be properly cleaned and removed.

- Sub-Slab Depressurization and Vapor Collection System: Due to the depth of petroleum impacts, it is likely that impacted soil will remain in place and be covered by either a parking areas or building foundations. Active sub-slab depressurization systems are being considered for installation beneath all future permanently occupied structures built over the areas of consolidation for petroleum impacted soils. The sub-slab depressurization system design will be incorporated into the RAWP and reviewed and approved by the NYSDOH.

An estimate of the impacted areas requiring excavation, and soil consolidation and management zones are shown on Figure 6. In one or more of the impacted areas, petroleum and metals impacted soils overlap. Due to the nature of the contamination and the point of release, un-impacted material may exist in the vertical region between the surface metal contamination and the petroleum contamination at depth. This situation is most likely to exist in the southwestern portion of the site.

Once soil management is complete, excavations will be filled with clean, construction-grade fill. The fill may originate from the site, or from an off-site location. The next steps will consist of:

- Off-site disposal of significantly contaminated material as warranted based on the characterization results (Estimated volume is between 5,000 and 15,000 tons).

- The remaining soil will remain in the on-site soil consolidation zone. The proposed Soil Consolidation Zone is likely to be located on the eastern edge of the property were it will be necessary to construct an entrance roadway/ramp.

- Bringing in clean fill to cap the site

- Site restoration (including shoreline stabilization) and grading for redevelopment of the site

- Development of a Site Management Plan

- Imposition of an institutional control in the form of an environmental easement that will: (a) require compliance with the approved site management plan, and (b) require the property owner to complete and submit to the NYSDEC an annual certification to insure compliance with the use restrictions.

9.0 REMEDIAL WORK PLAN

The field investigation has provided data to describe geologic conditions, nature and extent of contamination, fate and transport, and primary exposure pathways for the contaminants at the site. Based on the available information, the preferred remedy is an alternative developed for site-specific remediation goals.

9.1 Preferred Remedy

The preferred remedy is outlined in detail in Section 8.0: Recommended Alternative. The proposed soil remediation action plan is depicted in Figure 6. The following outlines the mitigation approach:

- Building demolition, removal of CCA and petroleum tanks, dismantle railroad tracks (this may be done as an IRM). Construction and demolition debris suitable for construction purposes will be placed in the Soil Consolidation Zone
- Concrete and asphalt pad demolition and placement in the Soil Consolidation Zone
- Hot Spot soil excavation
- Soil disposal, as warranted and consolidation of the less contaminated material in the Soil Consolidation Zone
- Capping the remainder of the site with two or more feet of clean, construction grade fill
- Restoration and grading
- Development of site management plan
- Implementation of Engineering Controls as warranted

This alternative includes construction of a soil management area. The purpose of the soil management area will be to create a controlled environment where potentially contaminated soils can be processed. The Soil management area will be sufficient large to allow temporary stockpiling of process materials including excavated soil and construction and demolition debris. Construction and demolition debris shall be crushed into useable aggregate for construction purposes. The soil management zone will include appropriate dust suppression measures and a collection system for any potential impacted water used in the dust suppression process.

Once a system is in place for processing material, the Soil Consolidation Zone (SCZ) will be prepared. The proposed location of the SCZ is along the eastern boundary of the property. The SCZ will be located in an area where it is highly likely that and asphalt road will be constructed to allow access to the property on this side. The only fill material that will be placed in the SCZ will be suitable to create a stable road sub-base.

The SCZ will be cleared of vegetation and smoothed. A demarcation barrier material (e.g., "orange snow fence") will be placed over the cleared area to delineate the lower edge of the SCZ. Please note that there is likely to be some mildly impacted material remaining beneath the SCZ; however, it is highly unlikely that the material would ever be disturbed. Processed soil and C&D would be placed in one foot lifts in the SCZ and compacted with a 10-ton vibratory roller. The side slopes of the SCZ will be graded to a minimum two to one slope.

Once all of the processed material is put in the SCZ, another demarcation layer will be installed on top of it. Clean, construction grade fill will be placed on top of the second barrier layer until the desired grade is reached.

The size of the SCZ is unknown at this point in time. It will depend on the volume of construction and demolition debris generated from the buildings and CCA processing facilities. This area will also be used bury some of the excavated contaminated soil. If the soil does not meet the characteristics of grossly contaminated soil, it may also be stockpiled in the SCZ. Once the soil consolidation area is created, construction grade fill will be used to bring the site to final grade. The construction fill should also be compacted to lessen the likelihood of future settlement. The fill will be analyzed before it is delivered to ensure it is not contaminated, unless certified by the delivery company.

10.0 INSTITUTIONAL CONTROLS AND ENVIRONMENTAL EASEMENTS

Institutional controls in the form of an environmental easement will be established at the completion of remedial activities but prior to the Certificate of Completion. At a minimum, the easement would:

- Require compliance with the approved site management plan;
- Limit the use and development of the property to commercial and restricted residential uses only;
- Restrict use of groundwater as a source of potable or process water; and
- Require the property owner to complete and submit to the NYSDEC an annual certification.

The Site Management Plan developed shall include an institutional and engineering control plan which details the oversight steps and any media-specific requirements necessary to assure the institutional and/or engineering controls required for the site remain in place and effective. This plan should include but not be limited to:

- A description of all institutional controls and engineering controls as required by the environmental easement;
- A copy of the environmental easement for imposing the institutional controls on site;
- Provisions for the annual certification of the institutional and/or engineering controls;
- Appropriate plans for implementation of an institutional control, such as a soil management plan for handling soils removed from beneath a soil cover or cap;
- Any provisions necessary to identify or establish methods for implementing the institutional controls required by the site remedy, as determined by the environmental easement; and
- A detailed description of the steps necessary to manage any suspect material encountered during subsequent construction activity.

11.0 EVALUATION OF LAND USE CRITERIA

The Volunteer considered the NYSDEC's fifteen land use criteria for the proposed cleanup and redevelopment of the former A. C. Dutton site in the context of how it will affect the local community. The evaluations are provided in Table 10. The proposed remediation and development of the site is consistent with the City of Poughkeepsie's Comprehensive Plan and the Waterfront Revitalization Plan.

The nearest sensitive receptor to the A.C. Dutton site is the Hudson River. The recommended alternative addresses the protection of this sensitive receptor. Under the planned use of the facility, the likely potential exposure routes to human populations are through ingestion, skin absorption, and inhalation of dusts generated by the excavation activities proposed for the site. These pathways will be addressed by taking the appropriate precautions to minimize dust generation (the soil will be kept damp) during site work. Also, no on-site equipment used in the excavation and or transportation of potential contaminated material will leave the site without first being decontaminated.

The facility and surrounding community is serviced by public water and potential impacts to public and private drinking water supplies do not exists. No access to surface or subsurface soil is known to exist without entry onto the site. Appropriate controls will be implemented during site work to keep unauthorized personnel off the site.

Any invasive work in the potential source regions in the future also has the potential to put site workers at risk. Appropriate precautions will be taken to ensure that site workers are not exposed and deed restrictions and/or equivalents will be used to limit the possibility for any future activity once the remedial alternative is implemented. Any future invasive action in the suspected source regions will require NYSDEC approval and oversight to ensure adequate protection of those persons performing the work in the suspected source regions.

Soil and waste characterization samples will be collected as warranted in accordance with NYSDEC guidance, based on the generation of potential waste material and the exposure of clean sediments. Typically, waste characterization analysis requirements are pre-determined by the proposed disposal facility but the level and type of contaminants encountered will direct the testing efforts.

12.0 REMEDIAL ACTION WORK PLAN

A Remedial Action Work Plan detailing the remedial action activities will be developed for the site which will include the following plans:

Health and Safety Plan (HASP) – The existing site-specific Health and Safety Plan (HASP) will be modified to cover construction activity for the project. It will provide specific guidelines and establishes procedures for the protection of personnel performing remedial activities. It would contain a Contingency Plan, to be implemented in the event of a threat to human health or an environmental hazard is encountered during remediation. The HASP will also include a Community Air Monitoring Plan (CAMP), which will provide the details to monitor air quality and minimize dust generation. Air quality will be monitored at the perimeter only while soil is disturbed during remediation. The CAMP outlines a monitoring protocol to monitor and minimize exposure to the public and establishes safe breathing levels surrounding the site during remediation (worker protection is addressed in the HASP).

Quality Assurance Project Plan (QAPP) – The existing site-specific QAPP will be germane to all sample collection and analysis. The plan will describe protocols and procedures necessary to assure that specific tasks and actions are planned and executed in a manner consistent with quality assurance objectives. These same protocols and procedures will be implemented during site remediation activities.

Citizens Participation Plan (CPP) - The existing CPP will be adhered to. The reports and documents are and will continue to be available to the public for review.

Soil Management Plan (SMP) and Field Sampling Plan (FSP) - This plan shall document how soil will be excavated, screened, processed, stockpiled and relocated as warranted or disposed off-site. The FSP documents the frequency and type of field screening and confirmatory samples required to verify that the remedial objectives have been met.

Remedial Design Drawings - The remedial design drawings will show the zone of consolidation, and other pertinent information for the remedial action.

13.0 SCHEDULE

13.1 Implementation

The anticipated time schedule for implementation of this plan is winter 2007/2008 or early spring 2008. The Volunteer intends to commence site remediation activities as soon as practical behind NYSDEC approval of the Remedial Action Work Plan.

13.2 Reporting

Monthly progress reports will be provided to the NYSDEC during remedial activity and until the Certificate of Completion is obtained. Upon completion of the remedial activities, a Remedial Action Report (RAR) will be provided to the NYSDEC.

14.0 PROJECT ORGANIZATION

Fuss & O'Neill project organization, including functions and responsibilities, are described below.

Project Director and Manager – **Jim McIver**: Mr. McIver will monitor project status and provide the project team with technical direction.

Task Manager, Field Operations Leader – **Lisa Gwiazdowski**: Ms. Gwiazdowski will be responsible for executing the scope of work and for task-specific budgeting and scheduling. During field activities, she will be the liaison among field staff, subcontractors, and on-site representatives from NYSDEC.

Quality Assurance Officer – **Lynn Matteson**: The QAO will assist the project manager in the development of the sampling and analytical portion of the Quality Assurance Project Plan. The QAO or a designee shall conduct periodic field and sampling audits, interface with the analytical laboratory, and develop a project specific data usability report, if required by the NYSDEC.

Health and Safety – **Kevin Miller, Ph.D.**: The Health and Safety Officer will be responsible for review and approval of the site-specific Health and Safety Plan and ensuring that throughout the duration of the field activities all aspects of the Health and Safety Plan will be complied with. Mr. Miller will have authority to stop work should unacceptable health and safety risks occur.

15.0 REFERENCES

EnviroPlan Associates, Inc., 1987, Phase I Investigation, A.C. Dutton Lumber Corporation, City/Town of Poughkeepsie, Dutchess County, new York, dated November 1987.

Ecosystems Strategies, Inc., 2002a, Summary Report of Subsurface Investigation performed on the A.C. Dutton Property, 2 Hoffman Street (formerly 1 Hoffman Street), City and Town of Poughkeepsie, Dutchess County, dated October 3, 2002.

Ecosystems Strategies, Inc., 2002b, Summary Report of Supplemental Subsurface Investigation performed on the A.C. Dutton Property, 2 Hoffman Street (formerly 1 Hoffman Street), City and Town of Poughkeepsie, Dutchess County, dated November 25, 2002.

Fuss & O'Neill of New York, P.C., 2006. DRAFT Site Characterization and Remedial Investigation Summary Report – Former A.C. Dutton Lumber Facility, Poughkeepsie, NY. Dated April 2006.

Fuss & O'Neill of New York, P.C., 2007. Site Characterization and Remedial Investigation Summary Report – Former A.C. Dutton Lumber Facility, Poughkeepsie, NY. Dated August 2007.

Leovic, Kelly and Craig, A.B., January 1993. Radon Prevention in the Design and Construction of Schools and Other Large Buildings. United States Environmental Protection Agency, Air and Energy Engineering Research Laboratory.

NYSDEC, December 2006. 6 NYCRR SubPart 375-6 – Remedial Soil Cleanup Objectives.

NYSDEC, December 2002. Draft DER-10 Technical Guidance for Site Investigation and Remediation.

NYSDEC, Division of Environmental Remediation, May 2004. Draft Brownfield Cleanup Program Guide.

USEPA, Region I, July 1, 1993. Tiered Organic and Inorganic Data Validation guidelines.

USEPA, August 1994. EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations. Draft interim Final, EPA QA/R5.

USEPA, Region I, December 1996. Data Validation Functional Guidelines for Evaluating Environmental Analyses.

USEPA, September 1998. Quality Assurance Guidance for Conducting Brownfield Site Assessments.

APPENDIX B

Health and Safety Plan

HEALTH AND SAFETY PLAN

FOR

SUPPLEMENTARY INVESTIGATION

Former A.C. Dutton Lumber Yard

NYSDEC Brownfields Program Site: C314081

Located at

1 Dutchess Avenue, Town of Poughkeepsie
2 Hoffman Street, City of Poughkeepsie
Dutchess County, New York

Date of Preparation: March 2008

Ecosystems Strategies, Inc.
24 Davis Ave, Poughkeepsie, NY 12603 | 845.452.1658 | ecosystemsstrategies.com

ESI File: 0P08022.40

TABLE OF CONTENTS

1.0 INTRODUCTION

1.1 Purpose

This Health and Safety Plan (HASP) has been developed to provide the requirements and general procedures to be followed by the consultants and designated subcontractors while performing a Supplementary Investigation (fieldwork) at the "Former AC Dutton Lumber Yard" property, located at 2 Hoffman Street and 1 Dutchess Avenue, City and Town of Poughkeepsie, New York. Site Location and Proposed Fieldwork Maps are attached to the Supplementary Investigation Work Plan (SIWP).

This HASP describes the responsibilities, training requirements, protective equipment, and standard operating procedures to be utilized by all personnel while on the Site. This HASP incorporates by reference the applicable Occupational Safety and Health Administration (OSHA) requirements in 29 CFR 1910 and 29 CFR 1926.

The requirements and guidelines in this HASP are based on a review of available information and evaluation of potential on-site hazards. This HASP will be discussed with Site personnel and will be available on-site for review while work is underway. On-site personnel will report to the Site Safety and Health Officer (SSHO) in matters of health and safety. The on-site project supervisor(s) are responsible for enforcement and implementation of this HASP.

This HASP is specifically intended for the conduct of activities within the defined scope of work in specified areas of the Site. Changes in site conditions and future actions that may be conducted at this Site may necessitate the modification of the requirements of the HASP. Although this HASP can be made available to interested persons for informational purposes, Ecosystems Strategies, Inc. (ESI) has no responsibility over the interpretations or activities of any other persons or entities other than employees of ESI and designated subcontractors to ESI.

1.2 Site Location and Description

The Former A.C. Dutton Lumber Yard property is an irregularly-shaped parcel, which has approximately 371 feet of frontage on the northern side of Dutchess Avenue and approximately 213 feet of frontage on the northern side of Hoffman Street. The property is comprised of two lots (City of Poughkeepsie Tax ID: 6062-59-766443, and Town of Poughkeepsie Tax ID: 6062-02-763508). The property is an abandoned industrial site most recently used as a lumber pressure treatment facility. Available information indicates that the on-site pressure treatment of lumber using chromated copper arsenate (CCA) began in 1966 and continued until at least 1995 when the Site ceased operations.

The specified portions of the property on which the fieldwork proposed in the SIWP will be conducted (hereafter referred to as the "Site") consists of the interiors of the two pressure treatment plants.

1.3 Fieldwork Activities

Fieldwork activities are detailed in the SIWP, dated February 2008. The specific tasks detailed in the SIWP are wholly incorporated by reference into this HASP. The tasks described in the SIWP are proposed to define the nature of environmental conditions beneath the Northern and Southern pressure treatment plants.

The following field tasks will be performed:

- Soil borings will be extended in the floors of the Northern and Southern former treatment plants to characterize soil conditions and contaminant concentrations at these locations (see SIWP Section 2.2.1).

- Surface samples will be collected in the floors of the Northern and Southern former treatment plants to characterize contaminant concentrations at these locations (see SIWP Section 2.2.2).

2.0 HEALTH AND SAFETY HAZARDS

Chemical Hazards

Soils, dust and surface debris exhibiting concentrations of arsenic and chromium in excess of NYSDEC soil criteria were previously documented in both former pressure treatment facilities.

During fieldwork, the possibility exists for on-site personnel to have contact with soils and dust containing elevated levels of arsenic and chromium. Contaminants may be present in dust at levels that may present an inhalation or ingestion hazard. It is not anticipated that contaminants will migrate from the Site. Only small quantities of soil will be disturbed during the Supplementary Investigation. Previous on-site and off-site groundwater sampling revealed no significant on-site groundwater contamination and no migration of contaminants from the Site; therefore, with regard to contaminant exposure, this HASP is limited to direct contact with soil and fugitive dust concerns.

Physical Hazards

Working in the vicinity of heavy equipment is the primary safety hazard at the Site. Physical hazards in working near heavy boring equipment include the following: overhead hazards, slips/trip/falls, hand and foot injuries, moving part hazards, improper lifting/back injuries, and noise.

3.0 PERSONAL PROTECTIVE EQUIPMENT

The levels of protection identified for the services specified in the Workplan represent a best estimate of exposure potential and protective equipment needed for that exposure. Determination of levels was based on data provided by previous studies of the Site and information reviewed on current and past Site usage. The Site Safety and Health Officer (SSHO) may recommend revisions to these levels based on an assessment of actual exposures.

The level of protective clothing and equipment selected for this project is Level D. Workers will wear Level D protective clothing including, but not limited to, a hard hat, steel-toed boots, latex (or equivalent) gloves (when handling soils and/or surface materials), and safety goggles. Workers extending concrete cores will wear dust masks. Personal protective equipment (PPE) will be worn at all times, as designated by this HASP.

The need for an upgrade in PPE will be determined based upon measurements taken in the breathing zone of the work area by visual observations for dust. As outlined in Section 5.0, below, an upgrade to a higher level of protection will begin when visible dust is observed.

If any equipment fails and/or any employee experiences a failure or other alteration of their protective equipment that may affect its protective ability, that person will immediately leave the work area. The Project Manager and the SSHO will be notified and, after reviewing the situation, determine the effect of the failure on the continuation of on-going operations. If the failure affects the safety of personnel, the work site, or the surrounding environment, personnel will be evacuated until appropriate corrective actions have been taken.

With regard to physical hazards, all personnel will maintain a safe distance from boring equipment in order to not interfere with their operation. Those personnel not involved directly with observation and supervision of site remediation activities involving heavy equipment will stand at a safe distance from all such equipment. All personnel will be familiar with the location and operation of the kill switch on utilized equipment. Precautions will be taken in lifting any heavy equipment. Additionally, hearing protection will be utilized during any operations generating excessive noise levels.

4.0 CONTAMINANT CONTROL

Precautions will be taken to avoid breathing dust-generated from soils. Response to the monitoring will be in accordance with the action levels provided in Section 5.0.

5.0 MONITORING AND ACTION LEVELS

Concentrations of metals in the air are expected to be below OSHA permissible exposure limits (PELs). Air monitoring for visible signs of dust will be conducted at all times that fieldwork activities which are likely to generate emission are occurring. Monitoring will occur near the area of activity visible dust in the air will be used as an indication of the need to initiate personnel monitoring and/or increase worker protective measures.

6.0 SITE ACCESS AND CONTROL

Site control procedures will be established to reduce the possibility of worker contact with compounds present in the soil, to protect the public in the area surrounding the Site and to limit access to the Site to only those persons required to be in the work zone. Measures (e.g., the construction of fences, placement of traffic cones and warning tape, etc.) will be taken to limit the entry of unauthorized personnel into the specific areas during field activity.

7.0 PERSONNEL TRAINING

Work zones that will accomplish the general objective stated above will be established by the Project Manager and the SSHO. Site access will be monitored by the SSHO, who will maintain a log-in sheet for personnel that will include, at the minimum, personnel on the Site, their arrival and departure times, and their destination on the Site. Personnel exiting the work zone(s) will be decontaminated prior to exit. The SSHO will establish a decontamination system and decontamination procedures appropriate to the Site and the work that will prevent potentially hazardous materials from leaving the Site (see Section 8.0).

Site-specific training will be provided to each employee. Personnel will be briefed by the SSHO as to the potential hazards to be encountered. Topics will include:

- Availability of this HASP;
- General site hazards and specific hazards in the work areas, including those attributable to the chemicals present;
- Selection, use, testing, and care of the body, eye, hand, and foot protection being worn, with the limitations of each;
- Decontamination procedures for personnel, their personal protective equipment, and other equipment used on the Site;
- Emergency response procedures and requirements;

- Emergency alarm systems and other forms of notification, and evacuation routes to be followed; and
- Methods to obtain emergency assistance and medical attention.

8.0 DECONTAMINATION

The drill rig will be brushed to remove materials adhering to the surfaces. Sampling equipment will be segregated and, after decontamination, stored separately from splash protection equipment. Decontaminated or clean sampling equipment not in use will be covered with plastic and stored in a designated storage area in the work zone.

9.0 EMERGENCY RESPONSE

9.1 Notification of Site Emergencies

In the event of an emergency, the SSHO will be immediately notified of the nature and extent of the emergency.

The last page of this HASP contains Table 1: Emergency Response Telephone Numbers, and immediately following is a map detailing the directions to the nearest hospital. This information will be maintained at the Site by the SSHO. The location of the nearest telephone will be determined prior to the initiation of on-site activities. In addition to any permanent phone lines, a cellular phone will be available for use on-site.

9.2 Responsibilities

The SSHO who is responsible for responding to emergencies and prior to the initiation of on-site work activities will:

1. Notify individuals, authorities, and/or health care facilities of the potentially hazardous activities and potential wastes that may develop as a result of the investigation;
2. Confirm that the following safety equipment is available: first aid supplies and a fire extinguisher;
3. Have a working knowledge of safety equipment available; and
4. Confirm that a map detailing the most direct route to the hospital is prominently posted with the emergency telephone numbers.

The SSHO will be responsible for directing notification, response, and follow-up actions and for contacting outside response personnel (ambulance, fire department, or others). In the case of an evacuation, the SSHO will account for personnel. A log of individuals entering and leaving the Site will be kept so that everyone can be accounted for in an emergency.

Upon notification of an exposure incident, the SSHO will contact the appropriate emergency response personnel for recommended medical diagnosis and, if necessary, treatment. The SSHO will determine whether and at what levels exposure actually occurred, the cause of such exposure, and the means to prevent similar incidents from occurring.

9.3 Accidents and Injuries

In the event of an accident or injury, measures will be taken to assist those who have been injured or exposed and to protect others from hazards. If an individual is transported to a hospital or doctor, a copy of the HASP will accompany the individual.

The SSHO will be notified and will respond according to the severity of the incident. The SSHO will perform an investigation of the incident and prepare a signed and dated report documenting the investigation. An exposure-incident report will also be completed by the SSHO and the exposed individual. The form will be filed with the employee's medical and safety records to serve as documentation of the incident and the actions taken.

9.4 Communication

No special hand signals will be utilized within the work zone. Field personnel will utilize standard hand signals during the operation of heavy equipment.

9.5 Safe Refuge

Vehicles and on-site structures will serve as the immediate place of refuge in the event of an emergency. If evacuation from the area is necessary, project vehicles will be used to transport on-site personnel to safety.

9.6 Site Security and Control

Site security and control during emergencies, accidents, and incidents will be monitored by the SSHO. The SSHO is responsible for limiting access to the Site to authorized personnel and for oversight of reaction activities.

9.7 Emergency Evacuation

In case of an emergency, personnel will evacuate to the safe refuge identified by the SSHO, both for their personal safety and to prevent the hampering of response/rescue efforts. The main entrance to the subject property is through chain link gates which front onto Red Flynn Drive.

9.8 Resuming Work

A determination that it is safe to return to work will be made by the SSHO and/or any personnel assisting in the emergency, e.g., fire department, police department, utility company, etc. No personnel will be allowed to return to the work areas until a full determination has been made by the above-identified personnel that all field activities can continue unobstructed. Such a determination will depend upon the nature of the emergency (e.g., downed power lines -- removal of all lines from the property; fire -- extinguished fire; injury -- safe transport of the injured party to a medical facility with either assurance of acceptable medical care present or completion of medical care; etc.).

Before on-site work is resumed following an emergency, necessary emergency equipment will be recharged, refilled, or replaced. Government agencies will be notified as appropriate. An Incident Report Form will be filed.

9.9 Fire Fighting Procedures

A fire extinguisher will be available in the work zone during on-site activities. This extinguisher is intended for small fires. When a fire cannot be controlled with the extinguisher, the area will be evacuated immediately. The SSHO will be responsible for directing notification, response, and follow-up actions and for contacting ambulance and fire department personnel.

9.10 Emergency Decontamination Procedure

The extent of emergency decontamination depends on the severity of the injury or illness and the nature of the contamination. Whenever possible, minimum decontamination will consist of washing, rinsing, and/or removal of contaminated outer clothing and equipment. If time does not permit decontamination, the person will be given first aid treatment and then wrapped in plastic or a blanket prior to transport to medical care.

9.11 Emergency Equipment

The following on-site equipment for safety and emergency response will be maintained in the on-site vehicle of the SSHO:

1. fire extinguisher;
2. first aid kit; and
3. extra copy of this Health and Safety Plan.

10.0 SPECIAL PRECAUTIONS AND PROCEDURES

The activities associated with this investigation may involve potential risks of exposure to both chemical and physical hazards. The potential for chemical exposure to hazardous or regulated substances will be significantly reduced through the use of monitoring, personal protective clothing, engineering controls, and implementation of safe work practices.

10.1 Heat/Cold Stress

Training in prevention of heat/cold stress will be provided as part of the site-specific training. The timing of this project is such that heat/cold stress may pose a threat to the health and safety of personnel. Work/rest regimens will be employed, as necessary, so that personnel do not suffer adverse effects from heat/cold stress. Special clothing and appropriate diet and fluid intake regimens will be recommended to personnel to further reduce this temperature-related hazard. Rest periods will be recommended in the event of high/low temperatures and/or humidity to counter the negative effects of heat/cold stress.

10.2 Heavy Equipment

Precautions will be taken when standing near or working adjacent to any heavy equipment.

10.3 Additional Safety Practices

The following are important safety precautions which will be enforced during this investigation:

1. Medicine and alcohol can aggravate the effect of exposure to certain compounds. Controlled substances and alcoholic beverages will not be consumed during investigation activities. Consumption of prescribed drugs will only be at the discretion of a physician familiar with the person's work.

2. Eating, drinking, chewing gum or tobacco, smoking, or other practices that increase the probability of hand-to-mouth transfer and ingestion of material is prohibited except in areas designated by the SSHO.

3. Contact with potentially contaminated surfaces will be avoided whenever possible. Workers will not unnecessarily walk through puddles, mud, or other discolored surfaces; kneel on the ground; or lean, sit, or place equipment on drums, containers, vehicles, or the ground.

4. Personnel and equipment in the work areas will be minimized, consistent with effective site operations.

5. Unsafe equipment left unattended will be identified by a "DANGER, DO NOT OPERATE" tag.

6. Work areas for various operational activities will be established.

10.4 Daily Log Contents

The SSHO will establish a system appropriate to the Site, the work, and the work zones that will record, at a minimum, the following information:

1. Personnel on the Site, their arrival and departure times, and their destination on the Site.

2. Incidents and unusual activities that occur on the Site such as, but not limited to, accidents, spills, breaches of security, injuries, equipment failures, and weather-related problems.

3. Changes to the HASP.

4. Daily information generated such as: work accomplished, the current Site status, and monitoring results.

11.0 TABLE AND FIGURE

Table 1: Emergency Response Telephone Numbers

Emergency Agencies	Phone Numbers
EMERGENCY	911
St. Francis Hospital 41 North Road	(845) 485-5087
Poughkeepsie Police Department	(845) 451-4000 or 911
Poughkeepsie Fire Department	(845) 451-4081 or 911
City Hall	(845) 451-4200
City Mayor	(845) 451-4073
Water and Sewer	(845) 451-4111

Figure 1: Directions to Hospital / Map

		Dist	Turn		Road	Exit	Finish Time	Finish Dist
			Start	at	Hoffman St		00:02:53	0.94 mi
			Go straight (E)	on	Hoffman St		00:02:53	0.94 mi
	in	0.02 mi	Turn left (NNE)	on to	US 9		00:02:48	0.92 mi
	in	0.47 mi	Turn right (E)	on to	Manist Dr		00:01:41	0.45 mi
	in	0.12 mi	Turn right (SSE)	on to	SR 376 (North Rd)		00:01:13	0.33 mi
	in	0.06 mi	Turn left (NE)	on to	Baker Ave		00:01:04	0.27 mi
	in	0.17 mi	Turn right (SSE)	on to	Poplar St		00:00:23	0.10 mi
	in	0.07 mi	Turn right (W)	on to	Webster Ave		00:00:06	0.03 mi
	in	0.03 mi	Finish	at	Saint Francis Hospital		00:00:00	0.00 mi

Total Time: 00:02:53 Total Distance: 0.94 mi


W CEDAR ST
IRVING AVE
Yeung Ho No 2
Marina's Pizzeria
BAKER AVE
Mona Lisa's Gourmet Pizza & Wings
McCoys Ale House
KOHL AVE
MANIST DR
Saint Francis Hospital
COOKE ST
Dough Boy's Pizzaria
GARDEN ST
GREEN ST
Saint Francis Hospital
NORTH
BEEKMAN ST
POPLAR ST
FAIRVIEW AVE
Palace Diner
CLARK ST
SPRUCE ST
376
Sal's Little Italy Pizzeria & Restrnt
Northside Diner
9G
WHINFIELD ST
Pulaski Park
TAYLOR AVE
Hoffman St
DUTCHESS AVE
VERNON TER
ORCHARD PL
BAIN AVE
TALMADGE ST
Aloy's Garden Restrnt
N HAMILTON ST
Andy's Place
DUTCHESS AVE
W OAKLEY ST
DUANE ST
GIFFORD AVE
FALLKILL PL
BROOKSIDE AVE
DAVIS ST
VERAZZANO BLVD
MARSHALL ST
Ksw Fast Foods
CROYDON CT
ELM PL
DELORME
Data use subject to license.
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www.delorme.com
MN (13.5° W)
ft
0 500 1000
Data Zoom 14-0

ATTACHMENT A

Site Location Map

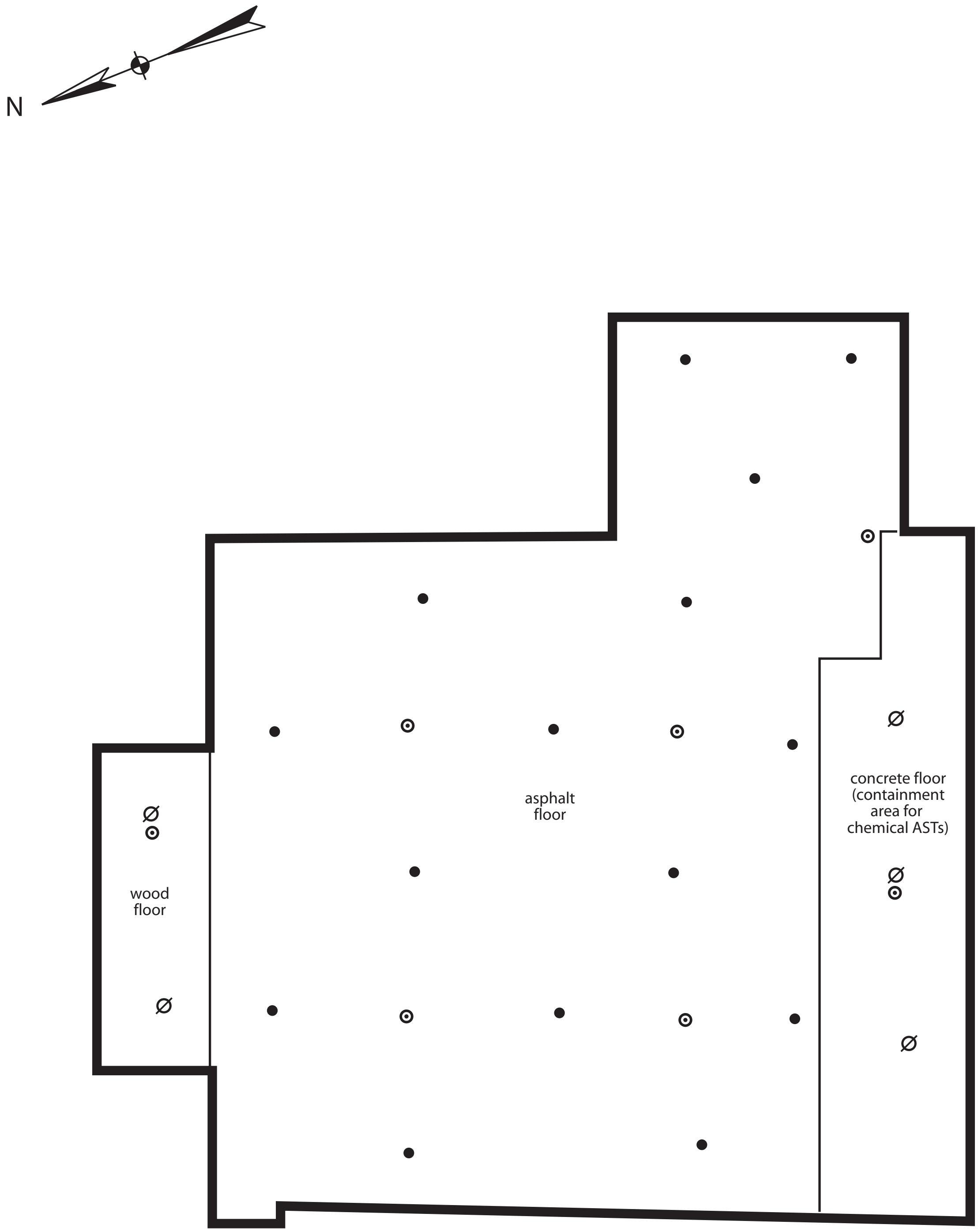
Ecosystems Strategies, Inc.

Site Location Map Former A.C. Dutton Lumber Yard 1 Dutchess Avenue and 2 Hoffman Street Town and City of Poughkeepsie Dutchess County, New York	N	ESI File: OP08022.40 Date: March 2008 Attachment A

ATTACHMENT B

Proposed Fieldwork Maps

Ecosystems Strategies, Inc.



All feature locations are approximate. This map is intended as a schematic to be used in conjunction with the associated report, and it should not be relied upon as a survey for planning or other activities.

Figure 2 - Proposed Fieldwork Map

Northern Treatment Plant
former A.C. Dutton Property
1 Dutchess Avenue and 2 Hoffman Street
Poughkeepsie, New York

Legend:

- building outline
- ● proposed machine boring location
- Ø proposed hand boring location
- ⊙ proposed surface sample location

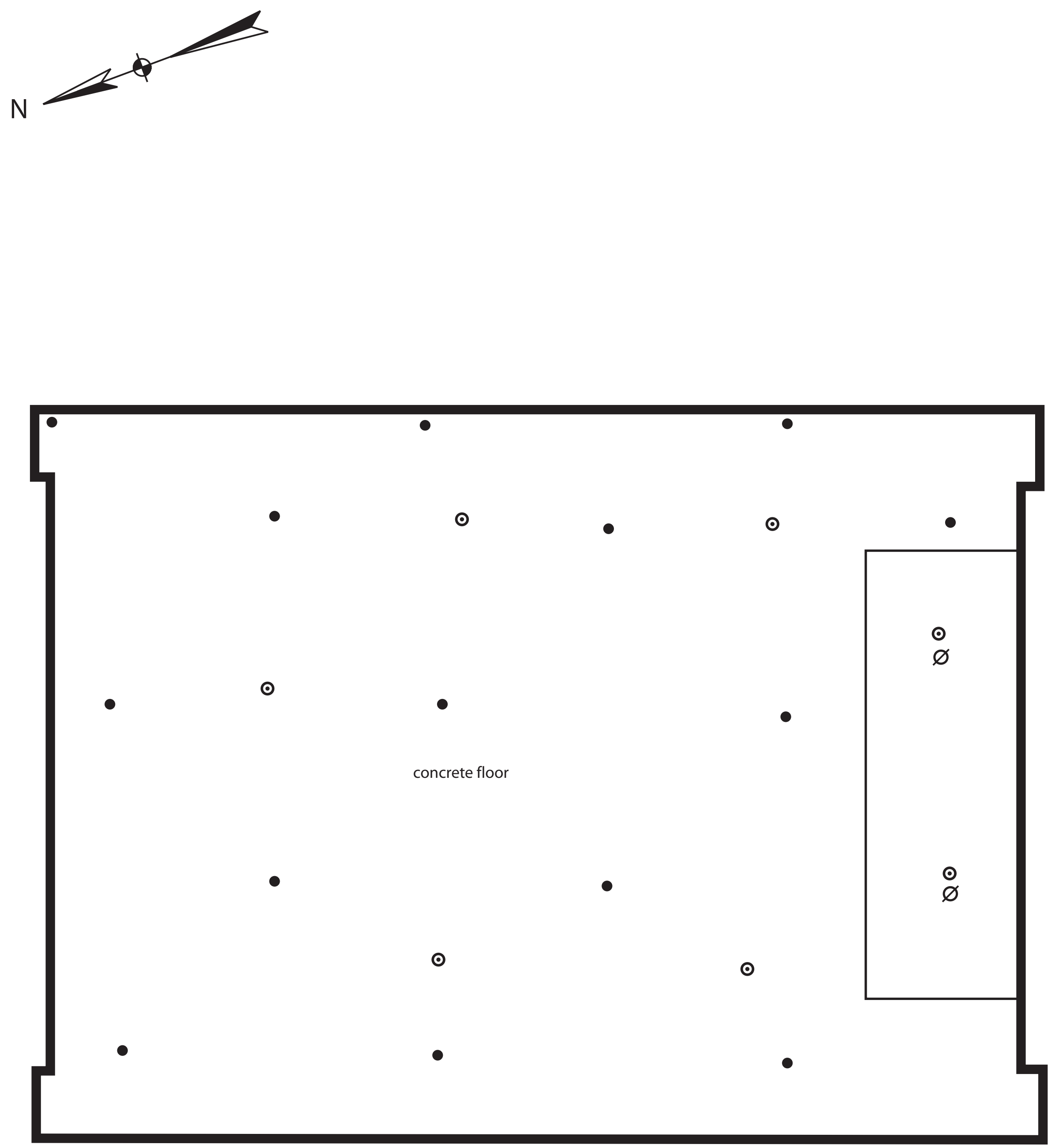
ESI File: OP08022.40

March 2008

Scale: 1" = 30' approximately

Figure 2

Ecosystems Strategies, Inc.



All feature locations are approximate. This map is intended as a schematic to be used in conjunction with the associated report, and it should not be relied upon as a survey for planning or other activities.

Figure 3 - Proposed Fieldwork Map Southern Treatment Plant former A.C. Dutton Property 1 Dutchess Avenue and 2 Hoffman Street Poughkeepsie, New York	Legend: building outline ● proposed machine boring location ∅ proposed hand boring location ⊙ proposed surface sample location	ESI File: OP08022.40 March 2008 Scale: 1” = 30’ approximately Figure 3

APPENDIX C

Quality Assurance / Quality Control Plan

QUALITY ASSURANCE/QUALITY CONTROL PLAN

For

Former A.C. Dutton Lumber Yard

NYSDEC Brownfields Program Site: C314081

Located at

1 Dutchess Avenue, Town of Poughkeepsie
2 Hoffman Street, City of Poughkeepsie
Dutchess County, New York

Date of Preparation: March 2008

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TABLE OF CONTENTS

1.0 PROJECT MANAGEMENT

1.1 Project/Task Organization

The following individuals are major participants in the project:

Joshua Cook	NYSDEC
Robert Capowski P.E.	Dewkett Engineering, P.E.
Paul Ciminello	President, Ecosystems Strategies, Inc.
Richard Hooker	On-Site Coordinator (OSC) Ecosystems Strategies Inc.

1.2 Principal Data Users

The principal users of the generated data in this project are listed below.

a. Residents of the City and Town of Poughkeepsie, especially those residing in the vicinity of the site
b. The O'Neill Group – Dutton, LLC.

c. NYSDEC

1.3 Problem Definition/Background

The primary objective of the proposed supplementary investigation is to generate data of sufficient quality and quantity to represent surface and subsurface conditions at the Northern and Southern Pressure Treatment Plants with a view to generating a Remedial Action Workplan (RAWP). The RAWP will recommend necessary remedial actions.

1.4 Project Task/Description

The project will meet its objective by collecting surface samples and extending borings at the site. Soil and surface samples will be collected and analyzed for total weight arsenic to document site conditions.

1.5 Quality Objectives and Criteria

The data collected in this project will be used for three purposes:

(1) To identify and locate occurrences of on-site contamination;

(2) To inform and educate the public about potential impacts to human health; and,

(3) To collect baseline data for planning future remedial activity. This objective requires the same data quality and performance criteria as (1) above.

1.6 Documents and Records

Electronic and paper copies of all measurements will be retained by Ecosystems Strategies, Inc. Paper copies will also be included in the RAWP to be generated at the conclusion of field investigations.

2.0 Data Generation and Acquisition

2.1 Sampling Methods

Soil and surface material samples will be collected in appropriately-sized glass jars provided by the laboratory, in the manner outlined in the Supplementary Investigation Workplan (SIWP), dated February 2008. During the sampling procedure, samples will be stored in a cooler prior to transport to the approved laboratory.

2.2 Sample Handling and Custody

Samples will be handled by the OSC. After each sample is collected, it will be placed in a sample cooler that is maintained at approximately 4°C. For each sampling day, sampling personnel will be required to complete a sampling custody worksheet indicating all pertinent information about the samples collected, handling methods, name of the collector, and chain of custody. Upon the completion of each day of sample collection activities, all samples will be shipped via either courier or overnight delivery (per laboratory requirements) to a NYSDOH ELAP approved laboratory. Laboratory personnel will record the cooler temperature (approximately 4°C) upon receipt and analyze the samples prior to the expiration of the 6 month hold time for metals.

2.3 Analytical Methods

Soil and surface samples will be analyzed for total weight arsenic and a subset will be analyzed for total weight chromium (USEPA 6010).

2.4 Quality Control

Accuracy and precision will be determined by repeated analysis of laboratory standards, and matrix effects and recovery will be determined through use of spiked samples. With each sample run, standards, blanks, and spiked samples will be run.

One QA/QC sample for every 20 samples per medium (soil and surface) will be duplicated by ESI. One in 20 samples per medium will also be submitted for Matrix spike (MS) and Matrix Spike Duplicate (MSD) analysis. One rinse blank will be prepared for each given piece of sampling equipment for every 20 analytical samples collected using that piece of equipment. For each day of sampling, a trip blank will be included with each sample cooler.

2.5 Inspection/Acceptance of Supplies and Consumables

The following supplies and consumables will be used:

- One 2-oz clear glass jar will be used for each soil/surface sample. Duplicate soil/sediment samples will each require one additional sample volume. MS/MSD soil/sediment samples will each require two additional sample volumes,
- Disposable gloves (nitrile or equivalent).
- Distilled water (for decontamination and the preparation of rinse blanks)

All supplies and consumables will be inspected and tested (if necessary) by the QA manager upon receipt.

2.6 Data Management

For the purpose of data management, the data can be divided into field and laboratory data.

Field data will be recorded at the time of measurement on written field logs.

3.0 Assessment and Oversight

3.1 Reports to Management

The results of the assessments described above (surveillance, inspection, and performance evaluations) will be reported to those on the distribution list after the completion of fieldwork.

4.0 Data Validation and Usability

4.1 Data Review, Verification, and Validation

Data generated by this project will be reviewed, verified and validated as follows:

4.1.1 Laboratory Analysis

As a NYSDOH ELAP-certified certified laboratory, the approved laboratory will follow standard procedures regarding data validation and verification.

4.2 Verification and Validation Methods

4.2.1 Verification Method

Once collected, all data will go to the QA manager for review and verification. Review will involve determining that all data has been collected at the proper locations by the proper persons and that all field and laboratory logs are complete. Data will be validated by an independent data validator.

4.2.2 Authority for Verification

Authority for verification, validation, and resolution of data issues will be distributed among the investigators. Authority to resolve issues regarding verification of field measurements will rest with the QA manager.

4.2.3 Transmittal to Users

Following review, validation, and verification, all data will be conveyed to users via the Supplementary Investigation Report (SIR) and Alternatives Analysis (AA).

4.2.4 Calculations

There are no project specific calculations required.