STATE OF DELAWARE
DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL
SITE INVESTIGATION AND RESTORATION BRANCH

FINAL PLAN OF REMEDIAL ACTION

SCANNED
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File # DE1287 B9

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Former Dagsboro Substation
Dagsboro, Delaware **DNREC Project No. DE-1287**

This final plan of remedial action (final plan) presents the Department of Natural Resources and Environmental Control's (DNREC's) preferred cleanup alternative for the remediation at the Former Dagsboro Substation (Site) in Dagsboro, Delaware. For site-related reports and more information, please see the public participation section of this document.

The purpose of the final plan is to provide: 1) specific information about the contamination present at the Site and 2) the presumptive remedy DNREC has selected as the remedial action for the Site. A presumptive remedy is the preferred and established remedial alternative for common categories of releases or facilities and the remedy DNREC selected falls into this category. In addition, as described in Section 12 of the Delaware Regulations Governing Hazardous Substance Cleanup (Regulations), DNREC provided notice to the public and an opportunity for the public to comment on the proposed plan of remedial action (proposed plan). During the comment period of December 7 to December 27, 2005, DNREC did not receive any comments on the proposed plan; therefore, the proposed plan has been adopted as the final plan. The final plan designates the selected remedy of the site.

The final plan summarizes the Remedial Investigation/Focused Feasibility Study (RI/FFS) dated February 24, 2005. This report is included in the administrative record file upon which this final remedy is based. Copies of this document can be obtained or viewed at DNREC offices in New Castle, Delaware.

INTRODUCTION

The Site is 3.9-acres in size and is located at Railroad Avenue and Clayton Street within the limits of the City of Dagsboro (Figure 1). The coordinates of the Site are: Latitude 38.547400 - 38° 32' 50.6'' (North), Longitude 75.248500 - 75° 14' 54.6'' (West). The property encompasses the following Tax Parcel Numbers:

- 2-33-11.13 - 15 (0.06 acres)
- 2-33-11.13 - 15 (0.53 acres)
- 2-33-11.13 - 15 (0.21 acres)
- 2-33-11.13 - 11 (2.69 acres)
- 2-33-11.13 - 16.1 (0.40 acres)

Delmarva Power & Light (DP&L) entered into the Voluntary Cleanup Program (VCP) under the provisions of the Delaware Substance Cleanup Act (HSCA), 7 Del. C. Chapter 91 in July 2003. Through the VCP Agreement, DP&L agreed to perform an investigation to identify whether any risks to public health, welfare and the environment are present at the Site and to perform the remedy, if necessary. DP&L contracted Environmental Alliance (Alliance), a HSCA approved environmental consulting company, to perform the investigation.

SITE DESCRIPTION AND HISTORY

The Site is bordered by Railroad Avenue to the west and Clayton Street to the north. Lingo Road is located along the northeast property boundary. The majority of the property is open land. A fenced compound used for equipment storage occupies a portion the southwestern area of the property (Figure 2).

Prior operations at the Site include a tomato cannery in the 1930s in the northwest portion of the property, and a chicken feed mill in the western portion until 1956. The fenced compound formerly housed an electrical substation. An underground storage tank (UST) associated with the former feed mill was removed by DP&L in 1995. After excavation of petroleum-contaminated soil, and sampling of remaining soil and groundwater for gasoline constituents, the UST file was closed by DNREC's Tank Management Branch (TMB) with a No Further Action determination.

Surrounding property uses include residences that are located across adjacent roads to the south and east. Commercial properties are located to the north and west, and an automotive repair shop is located on the southeast corner of the block. The nearest body of water is a branch of Pepper Creek located approximately 300 feet south of the property across Road 406.

INVESTIGATION RESULTS

EA completed a Remedial Investigation and Focused Feasibility Study and submitted the report to DNREC in February 2004. This investigation involved the collection of samples from surface soil, subsurface soil, and groundwater beneath the Site. Several contaminants were detected in soil and groundwater above Delaware's unrestricted use (residential) screening criteria. A

detailed discussion of the sampling results is included in the RI/FFS report. The following is a summary of the investigation results.

SOIL

SURFACE SOIL

In surface soils (0 to 2 feet below ground surface (bgs)), polychlorinated biphenyls (PCBs) including Arochlor 1248, 1254 and 1260 were detected at concentrations above DNREC's Uniform Risk-Based Remediation Standards (URS) for unrestricted use (residential) and restricted use (commercial/industrial) in a Critical Water Resource Area (CWRA) within the former substation compound (See Table 1). Aluminum, arsenic, and iron were also detected above DNREC's unrestricted use (residential) criteria for CWRA; however, aluminum and iron concentrations were within the range of concentrations typically found in Delaware soil. In addition, arsenic was detected at concentrations less than the Delaware Background criteria. As a result, PCBs were the only contaminants of concern in surface soils. Contaminants that exceeded the URS in the surface soil at the Site are shown in Table 1:

Table 1: Surface Soil Results (0-2 feet bgs)

Contaminant	Reasonable Maximum Exposure Concentration* (mg/kg)	URS for Unrestricted Use (mg/kg)	URS for Restricted Use (mg/kg)	Delaware Default Background Remediation Standard (mg/kg) **	Typical Delaware Soil Concentrations (mg/kg)**
Organics (PCBs)					
AROCLOR 1248	29.94	0.300	3	N/A	N/A
AROCLOR 1254	6.92	0.300	3	N/A	N/A
AROCLOR 1260	2.98	0.300	3	N/A	N/A
Inorganics-Metals					
Aluminum	9,967	7,800	200,000	7,800	4,800-12,000
Arsenic	3.65	0.4	3	11	0.58-31***
Iron	6,750	2,300	61,000	2,300	3,000-22,000

* RME –Reasonable Maximum Exposure Concentration calculated as the 95% Upper Confidence Level (UCL) of the arithmetic mean of contaminants detected at the site. RME values calculated using EPA Pro-UCL Software (USEPA, 2004).
* mg/kg – milligram per kilogram (parts per million or ppm)
** From URS Guidance (DNREC, 1999)
***Average background arsenic concentration as presented in Arsenic Risk Management Proposal Draft Background Document June 22, 2005

N/A – Not Applicable

SUBSURFACE SOIL

In subsurface soil, only arsenic and iron were detected above DNREC's URS for unrestricted use (residential) for a CWRA; however, iron concentrations were within the range of concentrations typically found in Delaware soil and arsenic was detected at concentrations less that the Delaware background criteria (See Table 2). As a result, there are no contaminants of concern in the subsurface soil. Contaminants that exceeded URS in the subsurface soil at the Site are shown in Table 2:

Table 2 Subsurface Soil Results (more than 2 bgs)

Contaminant	Reasonable Maximum Exposure Concentration* (mg/kg)	URS for Unrestricted Use (mg/kg)	URS for Restricted Use (mg/kg)	Delaware Default Background Remediation Standard (mg/kg**	Typical Delaware Soil Concentrations (mg/kg)**
Inorganics – Metals					
Arsenic	**5.03**	**0.4**	**3**	**11**	**0.58-31*** **
Iron	**5,430**	**2,300**	**61,000**	**2,300**	**3,000-22,000**

*Maximum concentration detected
*Subsurface soil concentrations are based on the finding of the Remedial Investigation Report
***Average background arsenic concentration as presented in Arsenic Risk Management Proposal Draft Background Document June 22, 2005

GROUNDWATER

Groundwater at the Site occurs at depths ranging from approximately 3 to 4 feet bgs. The groundwater zone consists of fine to very fine grained sand with varying amounts of clay, sandy clay and silt. Groundwater flow is toward the east. As part of the RI, groundwater samples were collected from nine monitoring wells during several groundwater sampling events. Based on the results of the sampling events, metals (aluminum, iron and manganese) and Semi-Volatile Organic Compounds (SVOCs) which included naphthalene, dibenz(a,h)anthracene, and indeno(1,2,3-c,d)pyrene exceeded DNREC's criteria in selected wells (See Table 3).

DNREC's criteria for aluminum, iron, and manganese are based on the Secondary Maximum Contaminant Levels (SMCLs) that are aesthetic-based (taste and odor), not health-based criteria. Therefore, aluminum, iron and manganese are not considered contaminants of concern. The monitoring wells which exceeded DNREC's criteria were located next to the former UST area. The elevated metals and SVOCs results were identified as likely being related to the residual petroleum contamination from the former UST area. Contaminants that exceeded URS in groundwater at the Site in selected wells are shown in Table 3:

Table 3 Groundwater Results

Contaminant	Maximum Concentration* (ug/L)	Groundwater URS (ug/L)
Inorganics – Dissolved Metals		
Aluminum	**257**	**200**
Iron	**30,800**	**300**
Manganese	**1,240**	**50**

Organics (SVOCs)		
Naphthalene	**24**	**20**
Dibenz(a,h)anthracene	**2**	**0.01**
Ideno(1,2,3-c,d)pyrene	**2**	**0.09**

* Maximum Concentration detected in groundwater.
* ug/L – micrograms per liter (parts per billion or ppb)

SITE RISK EVALUATION

A risk assessment was performed to identify the potential effects to human health and environment by the contaminants of concern at the Site.

Soil

The total carcinogenic risk posed by Site surface soil to a resident would be 1.25×10^{-4} (1.25 in 10,000), which exceeds DNREC's acceptable risk level of 1×10^{-5}. The compounds that contribute to the carcinogenic risk are PCB Aroclors 1248, 1254 and 1260 (which were detected only within a portion of the fenced compound).

No contaminants of concern were identified in the subsurface soil and therefore no risk calculation for the subsurface soil was necessary.

Groundwater

The total carcinogenic risk for groundwater based on the worst-case results from individual wells in the former UST area was calculated at 2.40×10^{-4}, which exceeds DNREC's acceptable risk level of 1×10^{-5}. The risk calculation considered the use of the groundwater for drinking and bathing purposes at the site. Currently groundwater from the site is not being used. The non-carcinogenic hazard index (HI) for groundwater was calculated to be 8.2, which exceeds DNREC's acceptable risk level for HI of 1.0. The compounds that contribute to the HI are naphthalene, iron and manganese, which were detected in the former UST area.

Groundwater to surface water discharge: The nearest surface water body is a branch of the Pepper Creek. Groundwater contamination at the site is confined to the source area at the site. The down-gradient monitoring wells located between the creek and the source are not contaminated. The remedy selected for the site includes removal of the source followed by groundwater monitoring. The absence of contamination in the down-gradient wells indicates that groundwater contamination is not impacting the branch of the Pepper Creek. In addition, the future monitoring after the remedy will determine if there is a potential for impact to surface water. If necessary, DNREC will require remedial measures based on the monitoring data.

REMEDIAL ACTION OBJECTIVES

According to Section 8.4(1) of the HSCA Regulations, site-specific remedial action objectives (RAOs) must be established for all plans of remedial action. The Regulations provide that DNREC will set objectives for land use, resource use, and cleanup levels that are protective of human health and the environment. The following qualitative RAOs are appropriate for the Site:

- Prevent human exposure to PCB contaminated soil in the former substation area under future unrestricted land use for as long as the contaminated soil remains at concentrations exceeding acceptable concentrations;

- Prevent the use of groundwater except under certain conditions at the Site as long as groundwater is contaminated with hazardous substances at unacceptable concentrations;

- Prevent leaching of contamination in soil to cause shallow groundwater contamination at concentrations that may cause an unacceptable risk.

These objectives are consistent with the current and future development plans of the Site, and the City of Dagsboro zoning policies, and applicable state and local regulations.

Quantitative objectives define specific levels of remedial action to achieve protection of human health and the environment. Based on the qualitative RAOs, the following quantitative RAOs based on an unrestricted Site use are:

- Prevent human exposure to soil in the former substation area contaminated with PCBs, specifically Aroclors 1248, 1254, and 1260 that would result in a cumulative carcinogenic risk factor greater than 1×10^{-5} and a non-carcinogenic risk greater than a Hazard Index of 1.0.

- Prevent human exposure to groundwater contaminated with poly-aromatic hydrocarbons (PAHs), specifically dibenz (a,h) anthracene, Indeno (1,2,3-cd) pyrene, and naphthalene that would result in a cumulative carcinogenic risk factor greater than 1×10^{-5} and a non-carcinogenic risk greater than a Hazard Index of 1.0.

- Prevent leaching of contamination in soil to cause contamination of shallow groundwater with PAHs specifically dibenz (a,h) anthracene, Indeno (1,2,3-cd) pyrene, and naphthalene that would result in a cumulative carcinogenic risk factor greater than 1×10^{-5} and a non-carcinogenic risk greater than a Hazard Index of 1.0.

EVALUATION OF REMEDIAL ALTERNATIVE

A presumptive remedy is the preferred and established remedial alternative for common categories of releases or facilities. The presumptive remedy considered for the Site is removal of contaminated soil in the former UST and the PCB-impacted areas and subsequent monitoring to confirm that the remedy has achieved the remedial objectives. According to Subsection 8.5(3) of the HSCA Regulations, "The Department may consider and approve any presumptive remedy that is determined to satisfy the requirements contained in Subsection 8.6". Removal of contaminated soil was determined to meet the requirements of Subsection 8.6, which include:

- Protective of public health, welfare and the environment.
- In compliance with regulations
- Acceptable to the community
- Technically Practical
- Meets short-term and long-term effectiveness

DNREC has accepted soil removal and subsequent monitoring as the preferred remedial action for the Site since the remedy meets the criteria presented above. In addition the remedy permanently removes soil contamination at the source area and it can be implemented in a short time frame.

FINAL PLAN OF REMEDIAL ACTION

Based on DNREC's evaluation of the Site information, which includes current and past environmental investigations, historical information, the above remedial action objectives, and the evaluation of the presumptive remedy, DNREC requires that the following remedial actions be taken at the Site:

1) Soil contaminated with PCBs at a total concentration in excess of 1.0 ppm (parts per million), the Uniform Risk-Based Standard (URS) for unrestricted future use of the site, will be excavated from the former substation compound (Figure 2). Confirmatory samples will be collected to determine if clean up was successful. The excavated areas will be backfilled with DNREC approved clean fill. The excavated soils will be disposed in accordance with a DNREC approved soil management plan.

2) Soil contaminated with residual concentrations of petroleum hydrocarbons as determined by detection with field equipment will be excavated from the former UST area (Figure 2). Groundwater encountered during the excavation will be containerized and properly disposed in accordance with a DNREC approved disposal plan. The soils removed will be properly disposed in accordance with a DNREC-approved soil management plan. The excavated area will be backfilled with DNREC approved clean fill.

3) A DNREC approved groundwater monitoring plan will be established and implemented within 90 days following DNREC's adoption of the final plan. Groundwater monitoring will continue as long as PAHs specifically dibenz (a,h) anthracene, Indeno (1,2,3-cd) pyrene and naphthalene in selected wells present a carcinogenic risk over 1×10^{-5} and Hazard index of 1.0.

4) An environmental covenant, consistent with Delaware's Uniform Environmental Covenants Act, UECA (Title 7, Del. Code Chapter 79, Subtitle II), will be required at the Site, within 90-days following DNREC's adoption of the Final Plan of Remedial Action. The environmental covenant will describe the restrictions regarding the use of groundwater at the Site in accordance with the Groundwater Management Zone (GMZ) described below.

5) DNREC will place a Groundwater Management Zone (GMZ) on the Site that will stipulate that DNREC's review and approval will be required before placement of any water supply well or usage of groundwater at the site. The GMZ will prohibit the installation of any water supply well in the shallow aquifer. Water supply wells may be installed in the deeper aquifer only upon DNREC's written approval. Upon attainment of the remedial objectives, DNREC may consider removal of the GMZ and the environmental covenant as applicable.

The final plan includes remedial actions for groundwater based on the Department's best understanding of the current and anticipated future use of groundwater at or near the site. Groundwater is considered a valuable resource in the State of Delaware. Therefore, if the actual

or potential future use of the groundwater resource at or near the Site changes, or if it becomes known that groundwater conditions result in an unacceptable risk to public health and/or the environment additional remedial actions shall be required.

PUBLIC PARTICIPATION

The Department actively solicited written public comments and suggestions on the proposed plan of remedial action. The comment period began on December 7, 2005 and ended on December 27, 2005. No comments were received. If you have any questions or concerns regarding the Former Dagsboro Substation site, or if you would like to view reports or other information regarding the site, please contact the project manager, Rick Galloway, at 391 Lukens Drive, New Castle, Delaware 19720, or at 302.395.2600.

DECLARATION

The final plan of remedial action for the Former Dagsboro Substation site is protective of human health, welfare and the environment, and is consistent with the requirements of the Delaware Hazardous Substance Cleanup Act.

Kathleen Stuller Bonnington for
James D. Werner, Director,
Division of Air and Waste Management

1/5/06
Date

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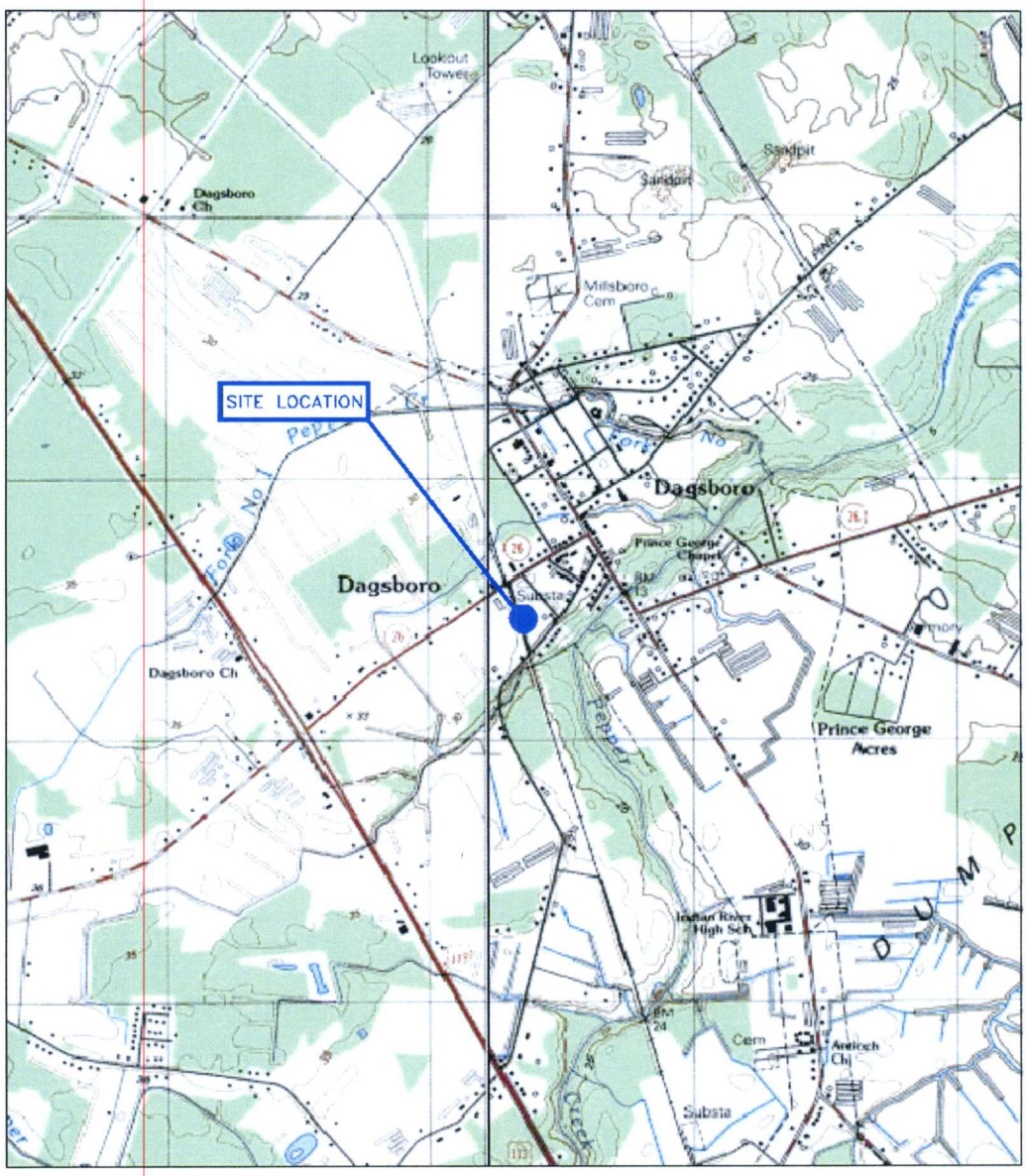
FIGURES



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APPROXIMATE SCALE

REVISION DATE: 10/10/01	Environmental Alliance, Inc. 1812 Newport Gap Pike Wilmington, DE 19808
DESIGNED BY:	
DRAFTED BY: AG	FIGURE 1 SITE TOPOGRAPHIC MAP FORMER CONECTIV SUBSTATION RAILROAD AVENUE DAGSBORO, DELAWARE
CHECKED BY:	

Source: USGS Georgetown & Harbeson, DE Quadrangles

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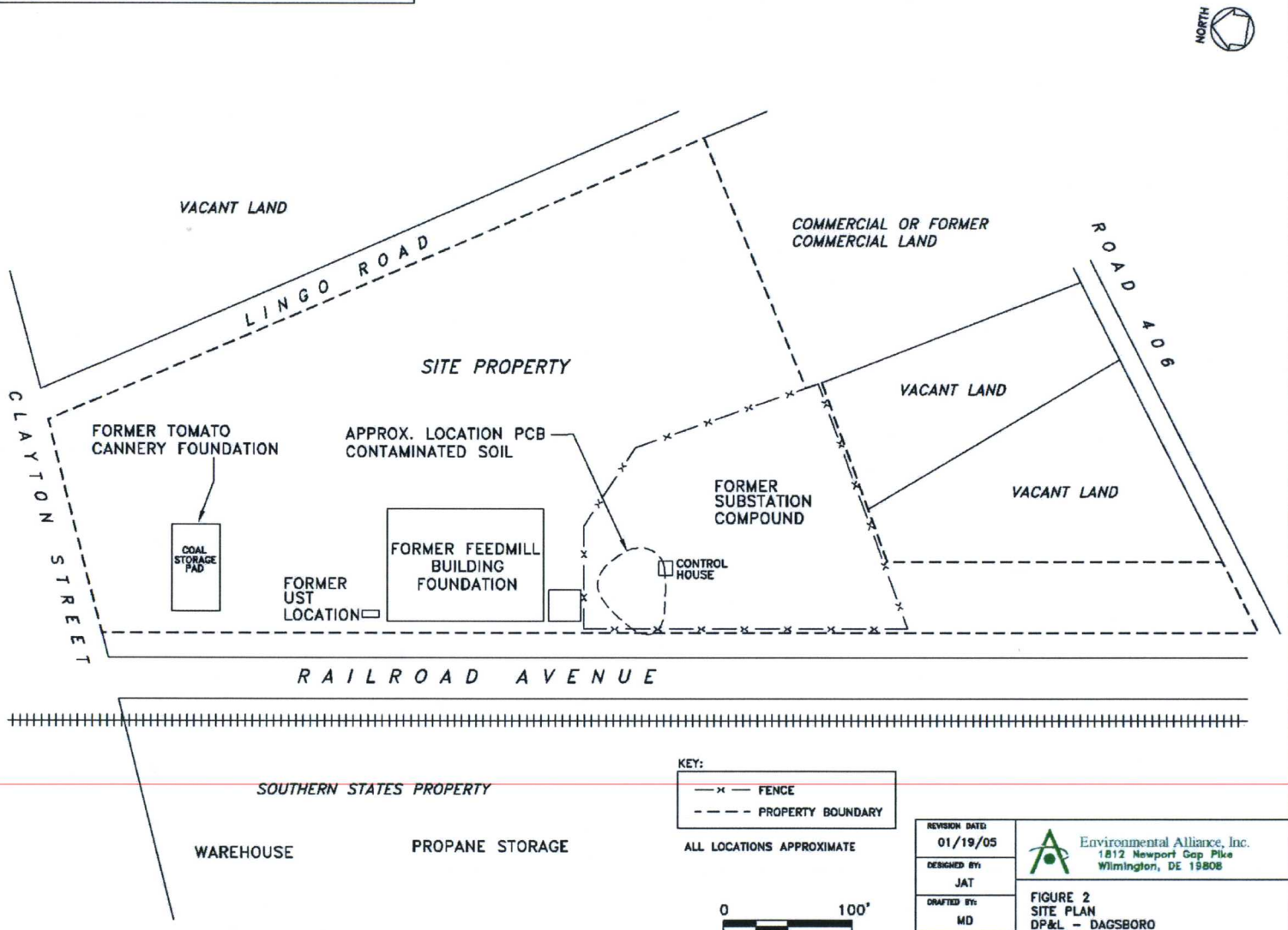

REVISION DATE: 01/19/05	Environmental Alliance, Inc. 1812 Newport Gap Pike Wilmington, DE 19808
DESIGNED BY: JAT	FIGURE 2 SITE PLAN DP&L - DAGSBORO RAILROAD AVENUE DAGSBORO, DELAWARE
DRAFTED BY: MD	
CHECKED BY:	