Conceptual Site Model Report

Axil Belko
Kingsville, MD

MDE Case Number: 1991-0916-BA4

April 14, 2010

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1.0 INTRODUCTION

On behalf of the Axil Corporation (Axil), Brownfield Associates, Inc. (Brownfield) is pleased to submit this Conceptual Site Model Report (CSM or Report) for the Former Axil-Belko Facility (**Figure 1**) in Kingsville, MD (1991-0916-BA4). The development of this CSM was recommended by Brownfield in the November 6, 2009 Supplemental Site Characterization Report and approved via electronic mail on February 2, 2010 by Maryland Department of the Environment (MDE) Project Manger Jenny Martin. This CSM Report combines previous investigations performed in "Area C" (**Figure 2**) as designated by the Phase I and Phase II ESA (TriState, 2001 and 2002). Specifically, this CSM Report will include the following:

- A consolidation of data from previous investigations;
- An evaluation of the Seven Risk Factors as per the MDE's Maryland Environmental Assessment Technology (MEAT) for Leaking Underground Storage Tanks document;
- Graphical presentation of subsurface conditions both horizontally and vertically;
- Corrective action recommendations.

1.1 Methodology

To facilitate the development of this CSM Report, Brownfield hired A2 Geomatics and Surveying to establish a geodetic control point in Maryland State Plane coordinates (North American Datum 1983). The control point was used to survey all monitoring wells, building corners, outfalls and sampling points. The data was used to spatially reference all sampling points and features into a consolidated database which was analyzed using various mapping software packages (ArcMap™, Rockworks™, Surfer™, CAD).

The mapping software was used to generate three-dimensional models which were used to conceptualize subsurface water flow, contaminant migration, lithology and location of fill material. The analyses were then used to evaluate the seven risk factors (Section 1.2) as described in the MDE MEAT Guidance (February 2003). Finally, corrective action decisions were made and are presented in Section 6.0 of this Report.

1.2 Seven Risk Factors

Each of the MDE MEAT Guidance Document's Seven Risk Factors (SRFs) was evaluated within the context of this CSM. Using the data and tools provided in the CSM, each of the SRFs was categorized as follows:

- Not a Concern;
- A Potential Concern;
- A Concern.

Based on the categories above, the response to each of the SRFs will be to either: 1. no longer evaluate the risk factor; 2. recommend additional investigation/analyses; 3. recommend corrective action.

The SRF's which were evaluated are as follows:

1.2.1 Liquid phase hydrocarbons;

1.2.2 Current and future use of impacted groundwater;

1.2.3 Migration of contamination;

1.2.4 Human exposure;

1.2.5 Environmental ecological exposure;

1.2.6 Impact to utilities and other buried services;

1.2.7 Other sensitive receptors;

1.3 Summary of Reports Used for CSM Development

A summary of the reports used in creating this CSM report are listed below:

1.3.1 Phase 1 Environmental Site Assessment – TriState Environmental Management Services, Inc, Bensalem, PA (August 2001);

A Phase I investigation was performed at the facility as part of a potential real estate transaction. The Phase I included a records review, site reconnaissance, interviews with owners and an evaluation of the findings. The Phase I identified potential recognized environmental conditions.

1.3.2 Phase 2 Environmental Site Assessment - TriState Environmental Management Services, Inc, Bensalem, PA (February 2002);

A Phase II was performed to assess the extent and magnitude of potential impacts in the areas identified as potentially recognized environmental conditions in the Phase I report. The Phase II included soil and ground water sampling in up to ten (10) designated areas (A-J). Area C is the focus of this CSM report; the eastern portion of the property (Figure 2).

1.3.3 Focused Site Investigation, Interim Measures and Monitoring Activities – Langan, Philadelphia, PA (August 2004 and November 2004);

Langan proposed site investigation activities in a May 7, 2004 letter to the MDE. Activities were conducted May 24th-May 27th, 2004. This subsequent report detailed the following activities:

- Evacuating and cleaning four tanks which contained oil;
- Removing and replacing an exterior pipe that extended from a drain in the mechanical room;
- Performing exploratory test pits in Area C;
- Collecting product samples from tanks, test pits, wells and seeps for fingerprint analysis to determine age and degree of weathering;
- Performing routine inspections of seeps and wells.

1.3.4 Drinking Water Supply Well Sampling – Langan, Philadelphia, PA (December 2006);

Drinking water supply wells were sampled on November 27, 2006. No volatile organic compounds (VOCs) were detected in the supply well samples.

1.3.5 Phase 1 Environmental Site Assessment – Environmental Remediation Corporation, Inc. (March 2008);

A Phase I update was prepared by Environmental Remediation Corporation, Inc. for a pending property transaction. The Phase I update included a site walk, interview and file review.

1.3.6 Supplemental Site Characterization Report – Brownfield Associates, West Grove, PA (November 2009).

Brownfield performed a supplemental site characterization which included test pits, monitoring well installation, outfall sampling, sediment sampling and surface water sampling.

2.0 SITE DESCRIPTION

The description and history of the facility have been well documented in previous reports. Tristate (August 2001) describes the property as irregular shaped and approximately 3 acres in size. The facility is made up of three contiguous parcels (11-10-03900, 11-10-039001 and 11-10-039002). Historically, the facility has functioned as a cotton mill in the late 1800's and later became a rubber products manufacturing plant owned and operated by the Belko Corporation. The facility is no longer in use and the three buildings located on site are either empty or contain non operatingequipment (tanks, boilers, machinery, storage, etc.).

In addition to the three buildings, the facility contains a water tower, paved areas, security fence, and various storm water drains, outlets and conduits. The drains and pipes discharge to the southern banks of the Little Gunpowder Falls (LGF) River. Remnants of an old pump house and concrete tank foundation exist along the easternmost portion of the facility.

While it was in operation, the facility's potable water was supplied primarily by a groundwater well located in the western portion of the property. Another potable well was located on the eastern side of the office building but was not being used for potable water when the facility closed due to bacteria concerns. The focus of this CSM Report is in the area labeled "Area C" in the Phase II report by Tristate (Figure 2).

2.1 Natural Setting

The facility is located along the LGF River in Kingsville, MD. As stated in the August 2001 Phase I Report submitted by Tristate, the property is located in the Piedmont physiographic province and slopes gently to the northeast towards the LGF. Due to the uneven natural terrain of the metamorphic and igneous Precambrian aged bedrock in this area, the facility had been mostly filled in to accommodate industrial use (parking, construction and storage). As a result, the terrain surrounding the buildings slopes rather gently with little to no rock outcropping. Where the fill areas terminate, the terrain drops sharply to the rocky stream bank.

Precipitation (recharge) infiltrates gently graded areas to recharge groundwater perched above bedrock. The perched groundwater discharges at the river bank through a series of seeps and underground conduits (Outfalls). It is unclear how the conduits are connected to the storm water management system on the property. With over 50,000 square feet of building on the property, at least 31,000 gallons of water must be managed for every one inch of rain. Due to the poor condition of the roofing system and buildings in general, storm water migration and recharge is difficult to predict.

Outfalls 1, 2 and 3 increase flow during rain and snow melt events and water is continuously stored in the foundation of the mechanical building. As reported in the *Supplemental Site Characterization Report* submitted by Brownfield in November 2009, test pits installed near the mechanical building recharged with water significantly faster than those performed away from the mechanical building. In addition, water level gauging of a well installed nearest the mechanical building (MW-3) and a well installed in line with Outfall 3 (MW-1) exhibited the largest fluctuation in water levels (Section 3.1). This is evidence that storm water is having a direct impact on perched water conditions and ultimately contaminant transport.

The facility is split between two distinct flood zone designations. As shown in **Figure 3**, the north eastern most portion of the property is located in the designated Zone A which is an area with a 1% chance of flooding and a 26 % chance of flooding over the life of a 30 year mortgage. Since detailed analyses are not typically performed in Zone A designations, the depths and base flood elevations are not known. The remainder of the property is designated as Zone X which is an area of minimal flood hazard. Historic flood records are unavailable at this time.

2.2 Environmental History of "Area C"

A chronology of environmental events was developed by the MDE and is available in **Appendix I** of this report. The chronology begins with the first observation of LNAPL seeping into the LGF River on November 30, 1986. At that time, the MDE required that the owner Belko (a division of Alco Industries, Inc.) submit an investigation and corrective action work plan for the release and various equipment repairs. From 1987 to 2001, Belko performed; well installations, aquifer testing, product recovery, and well gauging. The following list of activities provides a summary of what was documented by the MDE:

- Four monitoring wells were installed on May 22, 1991 (MW-1, 2, 3 and 4);
- June 28, 1991 – A LNAPL remedial progress report documented the recovery of 200 gallons of LNAPL through two weeks of bailing MW-1 and MW-2.
- August 1991 – LNAPL thickness in MW-1 and MW-2 were 1 and 1 3/4 inches respectively;
- November 1991 - No influence was observed in surrounding wells from a pumping test performed on MW-1;
- January 1992 – A vacuum truck extraction event removed 2,500 gallons of fluids from MW-2 but only 50 gallons of LNAPL. LNAPL thicknesses were between 1 and 2 inches;
- January 30, 1992 – An *Environmental Assessment Report* reported that the results of pumping tests were very localized (little influence to aquifer) and 1,150 gallons of NAPL was recovered;
- July 11, 2000 – Wells were gauged following eight years. MW-1 contained no measurable LNAPL while MW-2 contained .08' of LNAPL;
- February 2004 – Oil was reported to be entering LGF River at two outfall locations. NAPL was not observed in the monitoring wells;
- May-November 2004 – Test pits were performed, drain pipes were removed from the building, samples were collected for soil characterization and fingerprinting and above ground storage tanks (ASTs) were cleaned and abandoned;
- June 2005 – Twelve soil borings including six shallow bedrock cores and two monitoring wells were installed. Groundwater samples were collected;
- December 2006 – Potable wells were non-detect for petroleum constituents;
- June 2008 – Monitoring wells were gauged and no measurable LNAPL was detected. No seeps observed, however, oil was observed on the floor in the boiler and hydraulic rooms;
- October 2008-present – Monthly well gauging and river bank inspections have been performed and monitoring wells have been sampled quarterly;

- October 2009 – Five additional monitoring wells were installed and sediment, surface water and outfall samples were collected and analyzed for all petroleum contaminants of concern.

3.0 SUBSURFACE CONDITIONS

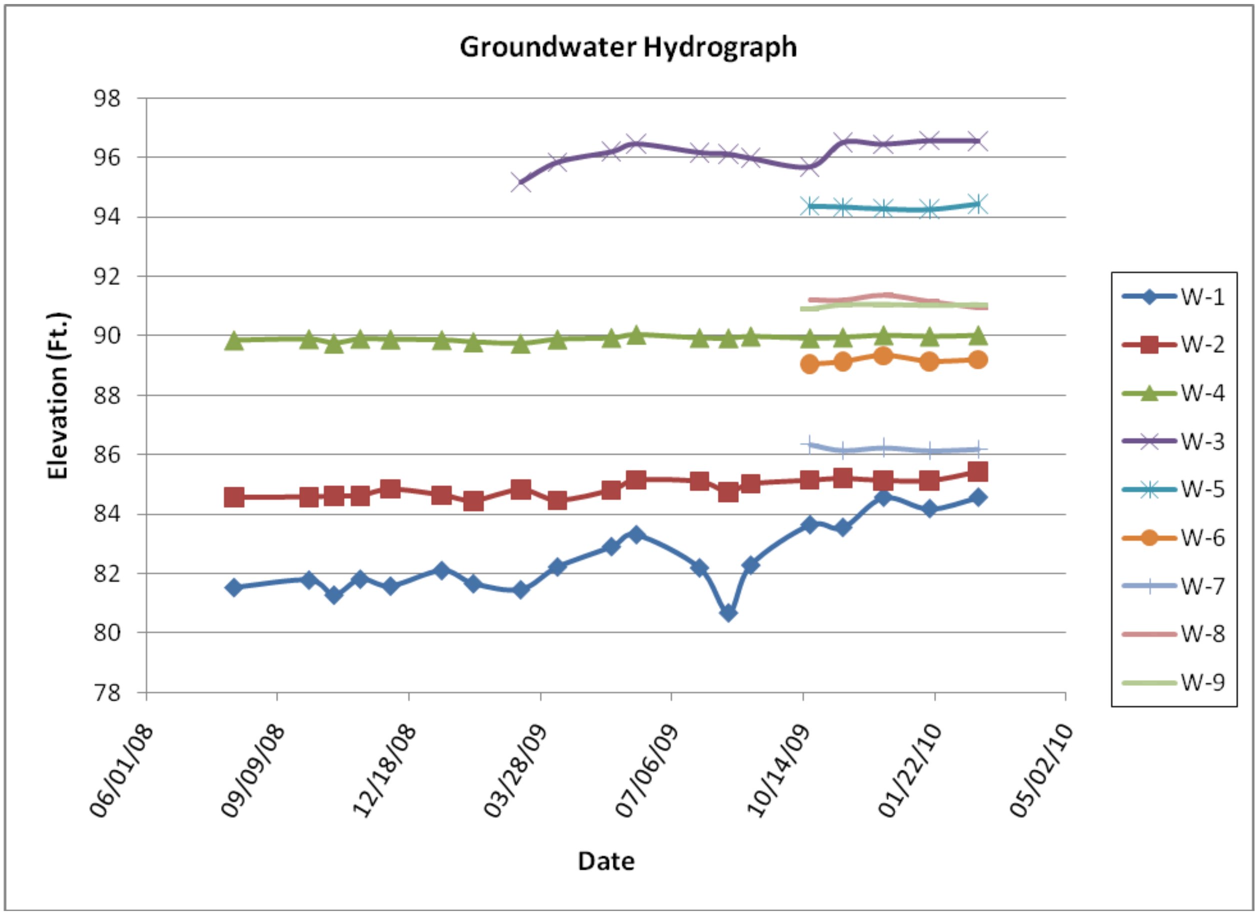
The subsurface conditions at the facility have been assessed through several environmental investigations and monitoring activities. Such activities include; monitoring well installation, test pit excavations, direct push soil borings, surface water sampling, sediment sampling, outfall sampling, groundwater gauging and sampling.

3.1 Liquid Level Measurements

Nine monitoring wells exist on site and are currently gauged monthly for liquid levels and presence of light non-aqueous phase liquids (LNAPL). Monitoring wells 1-4 were installed in May 1994 and were drilled into bedrock with the deepest well terminating 22 feet below ground surface (bgs). Wells 5-9 were installed in October, 2009 and were installed down to bedrock (refusal) with the deepest terminating approximately 18 feet bgs. Shallow groundwater is perched between 3 and 13 feet below ground surface. As precipitation infiltrates the ground surface, the water migrates down to the top of the irregular bedrock layer where it moves laterally towards the LGF River. This lateral migration appears to migrate in preferential pathways depending on the distribution of the bedrock.

Depth to water measurements and calculated groundwater elevations for the monitoring wells are summarized in the attached **Table 1**. The apparent groundwater flow direction is toward the east with an average groundwater hydraulic gradient of 0.138 ft/ft. A total of nineteen (19) groundwater gauging events have been completed since August 2008 with wells 5-9 starting in October 2009 (5 events). The corresponding average groundwater elevation contour map (August 2008 – February 2010) is attached as **Figure 4** and a graph of the data is presented below.

Groundwater Elevations for Corresponding Monitoring Wells



3.2 Subsurface Geology

The geologic features at this facility are quite irregular. There were five primary subsurface features observed during investigation activities:

- A layer of asphalt, concrete, brick, loam and stone;
- A layer of mixed brown and gray silty sand fill;
- Silty fill with varying quantities and sizes of rubber material;
- Weathered gneiss;

- Bedrock.

Well logs from Brownfield’s well installation activities were combined with borings from previous investigations performed by Langan and TriState Environmental to develop a Geographic Information System database for subsurface modeling. **Figure 5** shows the location of three cross sections; one along the building (W-5 through CPH-7), one at the top of the slope along the river (W-9 through CPH-8) and one centerline from the source area (CHP-3) toward outfall 3 (CHP-10). **Figures 6-8** reveal the distribution of the five layers described above for each cross section. The cross section diagrams reveal rubber fill material down to ten feet below ground surface (bgs) along the W-9 to CPH-8 line (**Figure 7**) and bedrock from 12 to 18 feet bgs. Along the W-5 to CPH-7 line (**Figure 6**), rubber fill material is between 0-4’ bgs while bedrock is encountered between 6-18’ bgs. The LNAPL layer, also shown in the cross sections, will be discussed in subsequent sections.

4.0 SEVEN RISK FACTORS

In order to assess the site based on risk and make corrective action decisions, the site was evaluated using the "Seven Risk Factors" as described in the MDE's "Maryland Environmental Assessment Technology (MEAT)" Guidance Document. Each of the "Seven Risk Factors" is discussed below.

4.1 Liquid Phase Hydrocarbons (LPH) or Light Non-Aqueous Phase Liquids (LNAPL)

On November 30, 1986, the MDE received a citizen's complaint of "oil" seeping into the LGF River. A similar complaint was made on October 17, 1990. As a result, the MDE required the owner, Alco Corporation/Belko, to begin corrective action and investigative activities. Belko subsequently hired Environmental Resource Management to develop the investigation and remediation plan.

For a period of six (6) years, Belko performed some equipment upgrades, monitoring well installations and periodic LNAPL removal from monitoring wells using bailing techniques and vacuumed enhanced extraction (vac-truck). Initially, up to ten (10) inches of free-phase LNAPL was measured in MW-2. However, over time, LNAPL thicknesses were typically between 1 and 2 inches in both MW-1 and MW-2. An estimated 1,125 gallons of free-phase LNAPL were removed via bailing and vacuum truck extraction from June 1991 through January 1992. No information is available for activities performed by Belko, if any, during the years between 1992 and 2000 at the time this report was written.

4.1.1 LNAPL Type and Source

No singular source for the LNAPL has been identified. In past reports, ERM identified the two former fuel oil ASTs, abandoned waste oil AST, and the central hydraulic pump as potential sources during the 1980s and 1990s. In 2004, Langan performed fingerprint analyses on LNAPL samples collected from the fuel oil AST, the hydraulic oil tank in the pipe room, test pit # 5, and the LGF seep (Outfall 3). The fingerprint analyses concluded that the LNAPL which was found in the subsurface and groundwater seeps did *not* match the fuel oil in the ASTs or the water soluble hydraulic oil used after the mid 1980's. The report concluded that "*Oil handling practices and historic releases of hydraulic oil before the change over to a water soluble oil in the mid 1980's had impacted the environment.*" The LNAPL collected from Outfall 3 during 2004 was not a new occurrence for that location and had likely been discharging there since the 1980s. The periodic nature of the LNAPL discharge at Outfall 3 is likely the result of large, random, rainfall events.

4.1.2 LNAPL Distribution

Soil

LNAPL distribution in soil was evaluated based on soil boring logs and test pits performed by Langan and Tri-State and split spoon sampling performed by Brownfield during the installation of MW -5 through 9. **Figures 6-8** reveal, by way of cross section, the boring locations where residual or potentially free-phase LNAPL was detected in soils. Displayed as a black layer, the residual LNAPL was mapped based on well/pit log notations where severe staining or sheens were observed.

Residual and/or free phase LNAPL was observed anywhere between 2 and 15 feet below ground surface and spread out to as much as five feet in the soil column. Generally, LNAPL distribution follows the irregular bedrock layer beneath the site with the "source" areas appearing to be in the vicinity of MW-3 and MW-8. The potential for LNAPL to migrate is a function of the volume and occurrence of LNAPL (Free-phase) and the transport mechanism (water). It is not believed that LNAPL is migrating due to its own LNAPL head pressure considering that measurable quantities have not been recently observed.

Groundwater

Since August, 2008, free phase LNAPL has only been observed in monitoring wells MW-1 and MW-3 at maximum thicknesses of ¼" and ½" respectively. Nothing more than a sheen has been observed during monthly visits since November, 2009. Monitoring wells MW-5 through 9 have remained free of LNAPL since their installation in October, 2009. Historically, up to ten (10) inches of free phase LNAPL was detected in MW-2, however, at least 1,125 gallons of LNAPL were recovered from 1991 through 1992.

Seeps and Surface Water

LNAPL was first observed seeping into the Little Gunpowder Falls River in 1986. LNAPL was also observed in two separate riverbank seeps down slope from the pump house several times between 1987-present.

The most recent occurrence of LNAPL in a seep was at Outfall 3 and was observed February 28, 2010. During this time, large volumes of water were being flushed through the subsurface as a result of melting snow and rain. Outfall 3, typically observed as a natural seep, was flowing steadily in many locations. Oil absorbent booms (**pictured below**) were immediately installed in the discharge “pool” for Outfall 3. It should be noted that “Outfall 3” is in line with MW-1 and the source area indicating a preferential flow path for the perched groundwater.

4.1.3 LNAPL Concern

The LNAPL at this facility has been identified through analytical testing as non-water soluble hydraulic oil. The source of the LNAPL is from several historic releases of hydraulic oil prior to the mid 1980's. Although LNAPL is not readily measurable in any of the nine monitoring wells on site, it continues to discharge as a sheen at a groundwater seep down slope of the pump house. As a result, LNAPL has been identified as a concern and warrants corrective action and further investigation. LNAPL serving as a potential source to daughter plumes (dissolved and vapor) will be discussed in later sections.

4.2 Current and Future Use of Impacted Groundwater

The impacted groundwater at the site is perched water existing above the bedrock formation. The facility and surrounding communities are served mostly by private supply wells; however, the wells are typically 150-300 feet deep into bedrock. Perched groundwater is not used for direct consumption and would not yield enough water to be used for industrial purposes. The perched water does not meet the requirements of a Type I or II aquifer.

4.2.1 Well Sampling

The facility's potable water was supplied primarily by a groundwater well located in the western portion of the property (POT-1). Details of the construction of the well are not available; however, it has been measured to be 200 feet deep (Langan 2006). Another potable well (POT-2) is located on the eastern side of the now-destroyed office building but has not been used for potable water due to bacteria concerns since the facility closed. POT-2 is at a total depth of 106 feet below ground surface (bgs) and has not been able to be located by Brownfield. POT-2 may be permanently out of commission.

Langan collected water samples from potable wells POT-1 and POT-2 on November 27, 2006. Static water levels in the wells were 27.20 and 22.77 ft bgs respectively. VOCs were not detected in either of the samples collected. In addition, Brownfield sampled POT-1 on October 23, 2008, April 24, 2009 and October 19, 2009 and all samples were non-detect for VOCs.

4.2.2 Use of Groundwater Concern

The shallow, perched, aquifer beneath the site is not adequate for human consumption, agricultural use or industrial use. Contaminated groundwater beneath the site is not, and shall never be, used for these purposes. Groundwater flow in this perched zone is highly dependent upon how surface/storm water is managed on site. Multiple sampling events performed on the potable well, POT-1, suggest that the 200 ft deep well is free of petroleum contamination and is not connected to the perched water bearing unit. Use of this perched groundwater is thus not a concern and conditions protecting against future use (i.e. new well installations) should be included in a Uniform Environmental Covenant established at the completion of this project.

4.3 Migration of Contamination

Groundwater flow is generally toward the northeast. A preferential flow path exists along a MW-8 to MW-1 centerline which discharges at Outfall 3 (**Figure 5**). Perched groundwater flow discharges at multiple seep and outfall locations along the river bank.

4.3.1 Dissolved Contaminants

The primary dissolved phase contaminant of concern is Total Petroleum Hydrocarbon – Diesel Range Organics (TPH-DRO). Although individual petroleum compounds have been either non-detect or near detection limits for the past three quarters, TPH-DRO concentrations in monitoring wells from the December 14, 2009 monitoring event ranged from 587 to 15,900 ug/L with an arithmetic mean of 3,562 ug/L. This analysis agrees with the fingerprint analysis performed by Torkelson Geochemistry (Langan November 2004 report) where the weathered hydraulic oil samples consisted mainly of unidentified peaks in the C13-C35 range. **Figure 9** depicts a modeled concentration gradient for DRO with a "core" area appearing in the area of MW-8.

Of the 32 groundwater samples collected by Brownfield since October 2008, only five contained VOC's over detection limits (**Table 2**). Specifically, chlorobenzene was detected in MW-6 and MW-8 during both the October 19, 2009 and December 14, 2009 sampling events ranging between 1.4 and 1.6 ug/L. Similarly, 2-Butanone (MEK) was detected in MW-1 at 179 ug/L; well below the MDE-GNCS of 700 ug/L. TPH- Gasoline Range Organics (GRO) were not detected in any of the samples.

4.3.2 Migration of Contamination Concern

For reasons stated above, VOCs and TPH-GRO are not a concern at this facility. The TPH-DRO detected in the dissolved phase is primarily comprised of unidentifiable peaks in the DRO carbon range and is therefore difficult to assess from a risk perspective as toxicological data is not available.

The MDE- Generic Numeric Cleanup Standards (GNCS) for TPH-DRO in Type I and II aquifers is 47ug/L, however, the perched water bearing unit does not meet the criteria of a Type I or II aquifers and is not used for potable water. Therefore, the groundwater cleanup standards for Type I and II aquifers are not applicable for this project.

TPH-DRO is present throughout the project area and has been detected in Outfall 2 (a storm pipe) and Outfall 3 (natural seep) at concentrations of 154 and 710 ug/L respectively. It is unknown whether, or not, TPH-DRO contaminated groundwater is being discharged to the LGF River at any other points along the riverbank. The magnitude at which dissolved phase TPH-DRO is being discharged to the LGF River remains a potential concern.

4.4 Human Exposure

The pathways for human exposure are inhalation, ingestion and dermal contact. Inhalation pertains to the vapor phase of the petroleum contamination while ingestion and dermal contact relate to the dissolved and adsorbed phases (soil and groundwater). Each pathway and potential exposure scenario is discussed below.

4.4.1 Inhalation Exposure

Due to the lack of VOCs at the site and the nature of the petroleum product (hydraulic oil), vapor phase contamination is not a concern. The building is unoccupied and there are no subsurface structures. During the installation of monitoring wells MW-5, 6, 7 and 8, photoionization detector (PID) readings were all below instrument detection limits for the first 6-10 feet of soil column during split spoon sampling. The highest PID reading for the four borings was 5 parts per million. Considering that vapor phase contamination is minimal and the pathway to any potential receptor is incomplete, inhalation exposure is not a concern.

4.4.2 Dermal Contact

Petroleum staining and contamination were not observed in the shallow (<4' deep) soils of the soil borings installed by Brownfield in October 2009. However, Tristate Environmental Management Services, Inc. detected up to 4,900 ppm DRO in shallow soils in the "source" areas of CPH-4 and CPH-9. The petroleum contamination encountered by Tristate exceeds the DRO non-residential clean-up standard of 620 mg/kg. These are the most likely areas for potential exposure to petroleum contamination through digging, trenching, or excavation. The current dermal contact exposure risk is not a concern due to the closing of the facility and lack of receptors, however, this exposure pathway should be addressed with proper institutional controls should the facility be re-developed or re-used in the future. It should also be noted that the areas which may be a concern for dermal contact are most commonly located within the source area and will be addressed to achieve other project goals such as source removal (**Section 6**).

Another potential dermal exposure pathway is through recreational contact during wading activities in the LGF River. Although TPH-DRO and some semi-volatile organic compounds (SVOCs) were observed in outfall locations and outfall sediment surface water samples were void of all petroleum contaminants of concern (Brownfield 2009). Therefore, it appears as though dermal contact through wading is not a concern, however, a mass loading analysis and additional river sampling should be performed to determine what degree, if any, contaminants are impacting the surface water.

4.4.3 Ingestion

When in use, the facility is supplied by an on-site supply well installed 200 feet into bedrock. The well has been void of all chemicals of concern with respect to this project. As stated in section 3.2.2, the contaminated perched groundwater is not sufficient for a potable well and will never be used for such purposes. Human ingestion of the contaminated perched groundwater is not possible due to an incomplete pathway to receptors.

4.5 Environmental Ecological Exposure

Individual chemicals of concern were not detected in outfall samples, surface water samples or monitoring wells above the MDE numerical criteria for toxic substances in surface waters (COMAR 26.08.02.03-2). This agrees with the results of the fingerprint analysis (Langan 2004) performed on the weathered LNAPL which stated that individual toxic chemicals of concern were not present. Dissolved TPH-DRO is present in monitoring wells and outfalls 2 and 3; however, its toxicological effect is negligible.

Of primary concern, with respect to the degradation of a natural resource from this petroleum release, is the intermittent presence of an LNAPL sheen discharging through the outfalls/seeps to the LGF River. LNAPL sheens can impact flora and fauna via direct contact and can also inhibit natural processes. This concern is similar to that discussed in section 4.1.3 regarding LNAPL corrective action and will be addressed in the Recommendations section of this Report.

4.6 Impact to Utilities and Other Buried Services

There are no longer active utilities in the project area. The main subsurface structures which exist in the project area are an abandoned drain field for a septic system and storm water pipes which discharge to the banks of the LGF River. In October, 2009, Brownfield and Tier performed test pits and an exploratory excavation in the area of a suspected Underground Storage Tank discovered during a ground penetrating radar study. The excavation revealed a large diameter (3 feet) concrete pipe leading from the building to Outfall 2. Using a calibrated PID, VOCs were not detected in the pipe. The pipe could potentially be serving as a transport mechanism for contaminated water to the LGF River. The underground structures are a potential concern and will be addressed in the Recommendations section of this report.

4.7 Other Sensitive Receptors

There are no other sensitive receptors to be addressed for this project. The surface water body, Little Gunpowder Falls River, is adequately addressed in the sections above.

5.0 CONCLUSIONS

Of primary concern for corrective action at this facility is the discharge of LNAPL sheen to the surface water. Fingerprinting analyses revealed that the LNAPL at this facility is from historic (prior to mid 1980's) hydraulic fluid releases through supply lines and equipment leaks.

The on-site potable well has not been impacted by this release and volatile organic compounds do not appear to be a concern at this site. The LNAPL consists mainly of diesel range organic compounds. VOC and SVOCs have not been identified in groundwater or surface water sampling events for the past year.

The MDE "Seven Risk Factors" were evaluated with respect to this project and were labeled; a concern, a potential concern, or not a concern. The summary of the analysis is provided in the matrix below. LNAPL discharge to the surface water body is causing a concern for three of the seven risk factors (LNAPL distribution, Migration of Contamination, and Ecological Exposure).

Seven Risk Factor Matrix	Risk Factor Concern?			Response	
Seven Risk Factors	Concern	Potential Concern	Not a Concern	Corrective Action	Investigation
LNAPL Distribution	√			√	√
Current and Future Use of Groundwater			√		
Migration of Contamination	√			√	√
Human Exposure			√		
Ecological Exposure	√			√	√
Utilities and Buried Structures		√			√
Other Sensitive Receptors			√		

As demonstrated by the matrix above, four of the Seven Risk Factors (SRFs) trigger a concern or potential concern. Three of the SRFs, including human exposure, cause no need for concern. For SRFs falling into the Concern or Potential Concern categories, a combination of corrective action measures and additional investigations are necessary. **Section 6** proposes the recommended response for each of the concerns.

BROWNFIELD ASSOCIATES, INC.

6.0 PROPOSED RESPONSE TO CONCERNS

6.1 LNAPL Distribution and Ecological Exposure Risk Factors

The primary concern associated with the LNAPL Distribution and Ecological Exposure Risk Factors is preventing the migration of LNAPL through the subsurface and to the LGF River through conduits, outfalls and seeps. Due to the fact that the only LNAPL occurrence in wells is a sheen, hydraulic recovery is not possible. As a result, the response to these concerns will be a combination of corrective action and investigative measures.

6.1.1 Maintain Absorbent Socks and Booms

Twice a month, until corrective action measures as described below commence, inspect the absorbent socks and booms near outfall 3 to ensure they maintain their integrity and purpose of preventing any petroleum sheen from reaching the LGF River. In addition, visually inspect the other outfall locations for petroleum odors or sheens.

6.1.2 Partial Building Demolition, Excavation and Sampling

As described in the Supplemental Site Characterization Workplan dated April 14, 2009, Brownfield proposes to implement Stage 2 of the Workplan which involves demolition of the portion of the building containing the mechanical equipment and tanks. Accomplishing this task will allow access to characterize the soils beneath this area and identify potential sources of LNAPL. In addition, it will allow for source removal activities, via excavation, in areas known to contain free and residual LNAPL close to the building. Upon approval of this workplan, Brownfield will immediately begin coordinating this activity which includes:

- Performing an internal inspection of the building to prepare for demolition;

- Contracting a demolition company to dewater, empty and dismantle the rear building;
- Obtain applicable permits for water treatment and disposal of water stored in tanks, containment areas and for dewatering of excavations (if applicable);
- Performing exploratory test pits and/or soil borings to identify potential LNAPL "source areas" beneath and/or near the rear building;
- Performing exploratory, or source removal, excavations as necessary as a LNAPL remedial action;
- Performing confirmatory soil sampling of excavations every 20 linear feet of sidewall exposed. Soil samples will be analyzed for TPH-DRO (8015) and SVOC analyses via method 8270;
- Properly disposing the contaminated material at a certified non-hazardous waste treatment facility (Clean Earth) using licensed solid waste haulers;
- Back filling excavations with clean stone and/or fill material, compacting and restoring to original grade.

6.1.3 Outfall Inspections (Utilities and Buried Structures)

In order to further evaluate the impact of the outfalls potentially serving as a conduit for contamination to the LGF River, the origin of the conduits must be known. As a result, Brownfield proposes to review historic as-built drawings and inspect the outfall conduits to help determine their intent and origin. If necessary, Brownfield will utilize special utility cameras to determine the starting point of the conduits. Once it is determined where the conduits begin, and the purpose they serve, Brownfield will evaluate options associated with decommissioning them in the future.

6.2 Migration of Contamination

Contaminant migration at this location is primarily in the form of LNAPL (addressed above) and TPH-DRO. Individual petroleum contaminants of concern have not been detected in groundwater, surface water or outfall water for three quarters. An additional quarter of data was collected but not analyzed by the time this report was written. It is known that dissolved contaminants (mainly DRO) have been discharged through the outfall locations through water and sediment sampling; however, it is not known if contamination is being discharged along "non-conduit" areas of the river. As a result, Brownfield proposes the following actions with regards to contaminant migration:

- Perform an additional round of outfall and surface water sampling during the next quarter. Samples will be analyzed for TPH-DRO (8015) and SVOC analyses via method 8270;
- Perform sediment/soil sampling along the river bank at areas midway between the outfalls in order to assess potential contaminant discharging in non-outfall areas;
- Perform an analytical assessment of contaminant transport in the sub surface including mass loading to the river in order to evaluate plume stability.

7.0 ADDTIONAL PROPOSALS

Brownfield proposes to begin implementing the above actions immediately upon approval by the MDE. In addition, Brownfield estimates that within six (6) months of MDE approval, the above actions may be completed and a report detailing such activities can be submitted to the MDE-OCP. In addition, with respect to the information contained in the sections above, Brownfield requests the following:

- For reasons stated in section 4.3.1, VOCs and TPH-GRO should be removed from all sampling protocol;
- For reasons stated in section 4.3.3, the potable well should no longer require sampling;
- If SVOC's remain non-detect or below detection limits for four consecutive quarters, they should be reduced to being sampled annually in all wells.

TABLES

Table 1
Well Gauging Data
Axil Belko
Kingsville, MD

Well Desgnation :	W-1				W-2			W-3				W-4			W-5			W-6			W-7			W-8			W-9		
Casing Elevation :	94.41				98.44			99.37				97.28			99.19			96.33			95.84			98.71			97.85		
DATE	DTP	DTW	PT	*ELEV.	DTP	DTW	ELEV.	DTP	DTW	PT	*ELEV.	DTP	DTW	ELEV.	DTP	DTW	ELEV.	DTP	DTW	ELEV.	DTP	DTW	ELEV.	DTP	DTW	ELEV.	DTP	DTW	ELEV.
08/07/08	--	12.87	--	81.54	--	13.88	84.56	NM	NM	--	--	--	7.42	89.86	NA	NA	--	NA	NA	--	NA	NA	--	NA	NA	--	NA	NA	--
10/03/08	--	12.62	--	81.79	--	13.87	84.57	NM	NM	--	--	--	7.38	89.9	NA	NA	--	NA	NA	--	NA	NA	--	NA	NA	--	NA	NA	--
10/22/08	--	13.12	--	81.29	--	13.83	84.61	NM	NM	--	--	--	7.52	89.76	NA	NA	--	NA	NA	--	NA	NA	--	NA	NA	--	NA	NA	--
11/11/08	--	12.59	--	81.82	--	13.82	84.62	NM	NM	--	--	--	7.37	89.91	NA	NA	--	NA	NA	--	NA	NA	--	NA	NA	--	NA	NA	--
12/04/08	--	12.82	--	81.59	--	13.6	84.84	NM	NM	--	--	--	7.39	89.89	NA	NA	--	NA	NA	--	NA	NA	--	NA	NA	--	NA	NA	--
01/12/09	--	12.3	--	82.11	--	13.8	84.64	NM	NM	--	--	--	7.41	89.87	NA	NA	--	NA	NA	--	NA	NA	--	NA	NA	--	NA	NA	--
02/05/09	--	12.74	--	81.67	--	13.99	84.45	NM	NM	--	--	--	7.48	89.8	NA	NA	--	NA	NA	--	NA	NA	--	NA	NA	--	NA	NA	--
03/13/09	--	12.94	--	81.47	--	13.62	84.82	4.19	4.23	0.04	95.18	--	7.53	89.75	NA	NA	--	NA	NA	--	NA	NA	--	NA	NA	--	NA	NA	--
04/10/09	--	12.18	--	82.23	--	13.98	84.46	3.52	3.53	0.01	95.85	--	7.39	89.89	NA	NA	--	NA	NA	--	NA	NA	--	NA	NA	--	NA	NA	--
05/21/09	--	11.5	--	82.91	--	13.63	84.81	3.17	3.19	0.02	96.20	--	7.34	89.94	NA	NA	--	NA	NA	--	NA	NA	--	NA	NA	--	NA	NA	--
06/09/09	--	11.1	--	83.31	--	13.29	85.15	--	2.91	0	96.46	--	7.23	90.05	NA	NA	--	NA	NA	--	NA	NA	--	NA	NA	--	NA	NA	--
07/27/09	--	12.21	--	82.2	--	13.34	85.1	--	3.2	0	96.17	--	7.34	89.94	NA	NA	--	NA	NA	--	NA	NA	--	NA	NA	--	NA	NA	--
08/18/09	13.71	13.73	0.02	80.70	--	13.7	84.74	3.25	3.26	0.01	96.12	--	7.35	89.93	NA	NA	--	NA	NA	--	NA	NA	--	NA	NA	--	NA	NA	--
09/04/09	trace	12.12	0	82.29	--	13.42	85.02	trace	3.39	0	95.98	--	7.29	89.99	NA	NA	--	NA	NA	--	NA	NA	--	NA	NA	--	NA	NA	--
10/19/09	trace	10.77	0	83.64	--	13.29	85.15	3.64	3.69	0.01	95.69	--	7.35	89.93	--	4.82	94.37	--	7.27	89.06	--	9.5	86.34	--	7.5	91.21	--	6.94	90.91
11/13/09	trace	10.86	0	83.55	--	13.23	85.21	trace	2.86	0	96.51	--	7.32	89.96	--	4.85	94.34	--	7.19	89.14	--	9.69	86.15	--	7.51	91.2	--	6.81	91.04
12/14/09	trace	9.85	0	84.56	--	13.3	85.14	trace	2.92	0	96.45	--	7.25	90.03	--	4.91	94.28	--	7	89.33	--	9.6	86.24	--	7.35	91.36	--	6.8	91.05
01/18/10	--	10.23	0	84.18	--	13.31	85.13	--	2.8	0	96.57	--	7.29	89.99	--	4.93	94.26	--	7.18	89.15	--	9.7	86.14	--	7.55	91.16	--	6.83	91.02
02/24/10	--	9.85		84.56	--	13	85.44	trace	2.81	0	96.56	--	7.25	90.03	--	4.75	94.44	--	7.13	89.2	--	9.65	86.19	--	7.75	90.96	--	6.81	91.04

DTW: Depth to water

DTP: Depth to product

PT: Product thickness

ELEV: Water table elevation (* corrected for product thickness)

NM: Not measured

NA: Not Applicable

All units in feet

Note: Casing elevation presented below well designation

BROWNFIELD ASSOCIATES, INC.

Table 2
Groundwater Analytical Data
Axil Belko
Kingsville, MD

Well #: W-1			10/22/2008		1/12/09		4/21/2009 [2]		8/18/09 [2]		10/19/09 [2]		12/14/09 [2]	
Constituent	**MDE Standard**	**Units**	**Results**	**RDL**	**Results**	**RDL**	**Results**	**RDL**	**Results**	**RDL**	**Results**	**RDL**	**Results**	**RDL**
VOCs (PPL + Xylene) [1]	NA	µg/L	ND	-	ND	-	ND	-	NS (LNAPL)	-	NS (LNAPL)	-	ND	-
2-Butanone (MEK)	700	µg/L	ND	1.6	ND	1.6	ND	1.6	NS (LNAPL)	1.6	NS (LNAPL)	0.1	179	1.6
PAHs	NA	-	-	-	-	-	-	-	-	-	-	-	-	-
Anthracene	180	µg/L	0.023 J	0.019	ND	0.019	ND	0.1	NS (LNAPL)	0.1	NS (LNAPL)	0.1	ND	0.1
Benzo (b) fouranthene	0.2	µg/L	0.0090 J	0.0075	0.0080 J	0.0076	ND	0.1	NS (LNAPL)	0.1	NS (LNAPL)	0.1	ND	0.1
Benzo (k) flouranthene	0.3	µg/L	0.0080 J	0.0075	ND	0.0076	ND	0.1	NS (LNAPL)	0.1	NS (LNAPL)	0.1	ND	0.1
TPH-GRO	47	µg/L	ND	20	ND	20	ND	200	NS (LNAPL)	200	NS (LNAPL)	200	ND	200
TPH-DRO	47	µg/L	8,000	320	5,500	150	4,840	100	NS (LNAPL)	100	NS (LNAPL)	100	1,340	100

Well #: W-2			10/22/2008		1/12/09		4/21/2009 [2]		8/18/09 [2]		10/19/09 [2]		12/14/09 [2]	
Constituent	**MDE Standard**	**Units**	**Results**	**RDL**	**Results**	**RDL**	**Results**	**RDL**	**Results**	**RDL**	**Results**	**RDL**	**Results**	**RDL**
VOCs (PPL + Xylene) [1]	NA	µg/L	NA	-	ND	-	ND	-	ND	-	ND	-	ND	-
PAHs	NA	-	-	-	-	-	-	-	-	-	-	-	-	-
Flourene	24	µg/L	0.11 J	0.094	0.59	0.095	ND	0.1	ND	0.1	ND	1.0	ND	1.0
Phenanthrene	180	µg/L	2.6	0.038	14	0.038	0.344	0.1	ND	0.1	ND	1.0	ND	1.0
Anthracene	180	µg/L	0.45	0.019	1.8	0.019	0.257	0.1	ND	0.1	ND	1.0	ND	1.0
Flouranthene	150	µg/L	3.5	0.019	15	0.19	ND	0.1	ND	0.1	ND	1.0	ND	1.0
Pyrene	18	µg/L	3.3	0.094	13	0.095	1.62	0.1	ND		ND	1.0	ND	1.0
Benzo (a) anthracene	0.2	µg/L	1.4	0.0094	5	0.095	ND	0.1	ND	0.1	ND	1.0	ND	1.0
Benzo (b) flouranthene	0.2	µg/L	1.3	0.0075	4	0.076	0.971	0.1	ND	0.1	ND	1.0	ND	1.0
Benzo (a) pyrene	0.2	µg/L	1.3	0.0094	4	0.095	ND	0.1	ND	0.1	ND	1.0	ND	1.0
Dibenzo (a,h) anthracene	0.2	µg/L	0.11	0.019	0.32	0.019	ND	0.1	ND	0.1	ND	1.0	ND	1.0
Indeno (1,2,3-cd) pyrene	0.2	µg/L	1.3	0.038	4.2	0.038	ND	0.1	ND	0.1	ND	1.0	ND	1.0
Benzo (g,h,i) perylene	18	µg/L	2.2	0.057	6.5	0.057	ND	0.1	ND	0.1	ND	1.0	ND	1.0
Chrysene	3	µg/L	2	0.038	5.1	0.038	ND	0.1	ND	0.1	ND	1.0	ND	1.0
Benzo (k) flouranthene	0.3	µg/L	0.71	0.0075	2.3	0.0076	1.01	0.1	ND	0.1	ND	1.0	ND	1.0
TPH-GRO	47	µg/L	ND	20	ND	20	ND	200	ND	200	ND	200	ND	200
TPH-DRO	47	µg/L	6,400	330	9,300	300	144,000	1,000	5,310	1,000	1,730	100	2,740	100

Well #: W-3			10/22/2008		1/12/09		4/21/2009 [2]		8/18/09 [2]		10/19/09 [2]		12/14/09 [2]	
Constituent	**MDE Standard**	**Units**	**Results**	**RDL**	**Results**	**RDL**	**Results**	**RDL**	**Results**	**RDL**	**Results**	**RDL**	**Results**	**RDL**
VOCs (PPL + Xylene) [1]	NA	µg/L	NS (CNL)	-	NS (CNL)	-	NS (LNAPL)	-	NS (LNAPL)	-	ND	-	ND	-
PAHs	NA	µg/L	NS (CNL)	-	NS (CNL)	-	NS (LNAPL)	-	NS (LNAPL)	-	ND	-	ND	-
TPH-GRO	47	µg/L	NS (CNL)	-	NS (CNL)	-	NS (LNAPL)	-	NS (LNAPL)	-	ND	-	ND	-
TPH-DRO	47	µg/L	NS (CNL)	-	NS (CNL)	-	NS (LNAPL)	-	NS (LNAPL)	-	1,350	100	1,030	100

Well #: W-4			10/22/2008		1/12/09		4/21/2009 [2]		8/18/09 [2]		10/19/09 [2]		12/14/09 [2]	
Constituent	**MDE Standard**	**Units**	**Results**	**RDL**	**Results**	**RDL**	**Results**	**RDL**	**Results**	**RDL**	**Results**	**RDL**	**Results**	**RDL**
VOCs (PPL + Xylene) [1]	NA	µg/L	NA	-	ND	-	ND	-	ND	-	ND	-	ND	-
PAHs	NA	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	180	µg/L	0.087 J	0.039	ND	0.07	ND	0.1	ND	0.1	ND	1.0	ND	1.0
Anthracene	180	µg/L	0.044 J	0.019	ND	0.07	ND	0.1	ND	0.1	ND	1.0	ND	1.0
Flouranthene	150	µg/L	0.023 J	0.019	0.020 J	0.019	ND	0.1	ND	0.1	ND	1.0	ND	1.0
TPH-GRO	47	µg/L	ND	20	ND	20	ND	200	ND	200	ND	200	ND	200
TPH-DRO	47	µg/L	1,500	32	460	31	854	100	574	100	353	100	587	100

Table 2
Groundwater Analytical Data
Axil Belko
Kingsville, MD

Well #: W-5			10/22/2008		1/12/09		4/21/2009 [2]		8/18/09 [2]		10/19/09 [2]		12/14/09 [2]	
Constituent	**MDE Standard**	**Units**	**Results**	**RDL**	**Results**	**RDL**	**Results**	**RDL**	**Results**	**RDL**	**Results**	**RDL**	**Results**	**RDL**
VOCs (PPL + Xylene)[1]	NA	µg/L	NS	-	NS	-	NS	-	NS	-	ND	-	ND	-
PAHs	NA	-	NS	-	NS	-	NS	-	NS	-	ND	-	ND	-
TPH-GRO	47	µg/L	NS	-	NS	-	NS	-	NS	-	ND	200	ND	200
TPH-DRO	47	µg/L	NS	-	NS	-	NS	-	NS	-	4,690	100	5,200	100

Well #: W-6			10/22/2008		1/12/09		4/21/2009 [2]		8/18/09 [2]		10/19/09 [2]		12/14/09 [2]	
Constituent	**MDE Standard**	**Units**	**Results**	**RDL**	**Results**	**RDL**	**Results**	**RDL**	**Results**	**RDL**	**Results**	**RDL**	**Results**	**RDL**
VOCs (PPL + Xylene)[1]	NA	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Benzene	5	µg/L	NS	-	NS	-	NS	-	NS	-	0.47 J	1.0	0.34 J	1.0
Chlorobenzene	11	µg/L	NS	-	NS	-	NS	-	NS	-	1.6	1.0	1.5	1.0
cis-1,2-Dichloroethene	600	µg/L	NS	-	NS	-	NS	-	NS	-	0.31 J	1.0	0.22 J	1.0
1,2-Dichloroethene (total)	600	µg/L	NS	-	NS	-	NS	-	NS	-	0.31 J	1.0	0.22J	1.0
PAHs	NA	-	NS	-	NS	-	NS	-	NS	-	ND	-	ND	-
SVOCs (Full Suite)	NA	-	NS	-	NS	-	NS	-	NS	-	ND	-	-	-
1,4 - Dichlorobenzene	75	µg/L	NS	-	NS	-	NS	-	NS	-	ND	-	1.7 J	2.0
Fluorene	24	µg/L	NS	-	NS	-	NS	-	NS	-	ND	-	0.46 J	1.0
N-Nitrosodiphenylamine	14	µg/L	NS	-	NS	-	NS	-	NS	-	ND	-	3.8 J	5.0
TPH-GRO	47	µg/L	NS	-	NS	-	NS	-	NS	-	ND	200	ND	200
TPH-DRO	47	µg/L	NS	-	NS	-	NS	-	NS	-	8,590	100	1,840	100

Well #: W-7			10/22/2008		1/12/09		4/21/2009 [2]		8/18/09 [2]		10/19/09 [2]		12/14/09 [2]	
Constituent	**MDE Standard**	**Units**	**Results**	**RDL**	**Results**	**RDL**	**Results**	**RDL**	**Results**	**RDL**	**Results**	**RDL**	**Results**	**RDL**
VOCs (PPL + Xylene)[1]	NA	µg/L	NS	-	NS	-	NS	-	NS	-	ND	-	ND	-
Chlorobenzene	11	µg/L	NS	-	NS	-	NS	-	NS	-	ND	-	0.51	1.0
PAHs	NA	-	NS	-	NS	-	NS	-	NS	-	ND	-	ND	-
SVOCs (Full Suite)	NA	-	NS	-	NS	-	NS	-	NS	-	ND	-	-	-
1,4 - Dichlorobenzene	75	µg/L	NS	-	NS	-	NS	-	NS	-	ND	-	1.0 J	2.0
N-Nitrosodiphenylamine	14	µg/L	NS	-	NS	-	NS	-	NS	-	ND	-	0.58 J	5.0
TPH-GRO	47	µg/L	NS	-	NS	-	NS	-	NS	-	ND	200	ND	200
TPH-DRO	47	µg/L	NS	-	NS	-	NS	-	NS	-	12,900	100	2,800	100

Well #: W-8			10/22/2008		1/12/09		4/21/2009 [2]		8/18/09 [2]		10/19/09 [2]		12/14/09 [2]	
Constituent	**MDE Standard**	**Units**	**Results**	**RDL**	**Results**	**RDL**	**Results**	**RDL**	**Results**	**RDL**	**Results**	**RDL**	**Results**	**RDL**
VOCs (PPL + Xylene)[1]	NA	µg/L	NS	-	NS	-	NS	-	NS	-	ND	-	ND	-
Chlorobenzene	11	µg/L	NS	-	NS	-	NS	-	NS	-	1.4	1.0	1.4	1.0
PAHs	NA	-	NS	-	NS	-	NS	-	NS	-	ND	-	ND	-
SVOCs (Full Suite)	NA	-	NS	-	NS	-	NS	-	NS	-	ND	-	-	-
1,4 - Dichlorobenzene	75	µg/L	NS	-	NS	-	NS	-	NS	-	ND	-	0.61 J	2.0
Fluorene	24	µg/L	NS	-	NS	-	NS	-	NS	-	ND	-	0.59 J	1.0
TPH-GRO	47	µg/L	NS	-	NS	-	NS	-	NS	-	ND	200	ND	200
TPH-DRO	47	µg/L	NS	-	NS	-	NS	-	NS	-	6,900	100	15,900	100

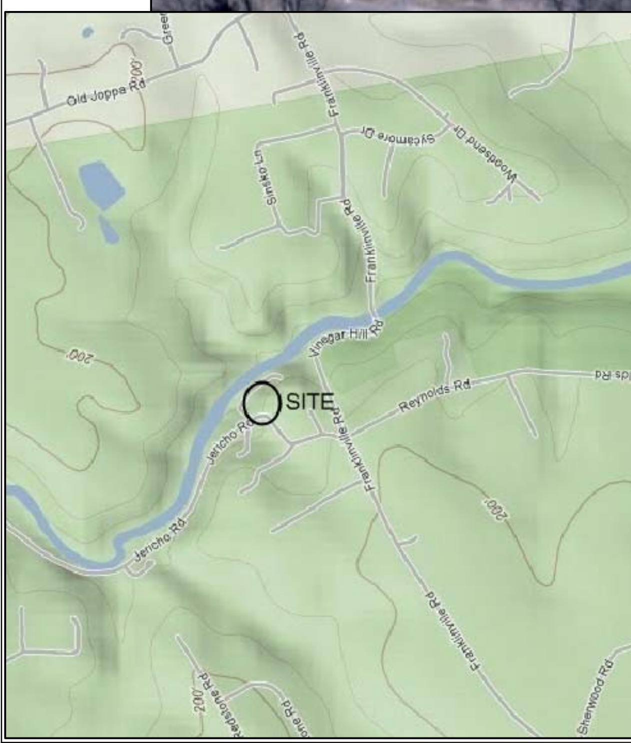
Well #: W-9			10/22/2008		1/12/09		4/21/2009 [2]		8/18/09 [2]		10/19/09 [2]		12/14/09 [2]	
Constituent	**MDE Standard**	**Units**	**Results**	**RDL**	**Results**	**RDL**	**Results**	**RDL**	**Results**	**RDL**	**Results**	**RDL**	**Results**	**RDL**
VOCs (PPL + Xylene)[1]	NA	µg/L	NS	-	NS	-	NS	-	NS	-	ND	-	ND	-
PAHs	NA	-	NS	-	NS	-	NS	-	NS	-	ND	-	ND	-
TPH-GRO	47	µg/L	NS	-	NS	-	NS	-	NS	-	ND	200	ND	200
TPH-DRO	47	µg/L	NS	-	NS	-	NS	-	NS	-	840	100	627	100

Trip Blank			10/22/2008		1/12/09		4/21/2009 [2]		8/18/09 [2]		10/19/09 [2]		12/14/09 [2]	
Constituent	**MDE Standard**	**Units**	**Results**	**RDL**	**Results**	**RDL**	**Results**	**RDL**	**Results**	**RDL**	**Results**	**RDL**	**Results**	**RDL**
VOCs (PPL + Xylene)[1]	NA	µg/L	ND	-	ND	-	NS	-	NS	-	NS	-	NS	-

Notes:
1. All VOCs analyzed are non-detect unless listed.
2. Samples analyzed by new lab (Accutest)
- All concentrations presented in µg/L
- MDE Standard is for Type I and Type II aquifers (TPH standards are residential standards)
- Shaded results indicates values above MDE standards for groundwater.
- J = Indicates estimated value
- NA = Not applicable
- ND = Non-detectable
- NS= Not Sampled
- RDL - Reportable detection limit
- CNL - Can Not Locate
- LNAPL-Light Non-Aqueous Phase Liquid

BROWNFIELD
ASSOCIATES, INC.

FIGURES



0 32' 65'
APPROXIMATE SCALE

Map source: Google Map

BROWNFIELD ASSOCIATES, INC.

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West Grove, PA 19390
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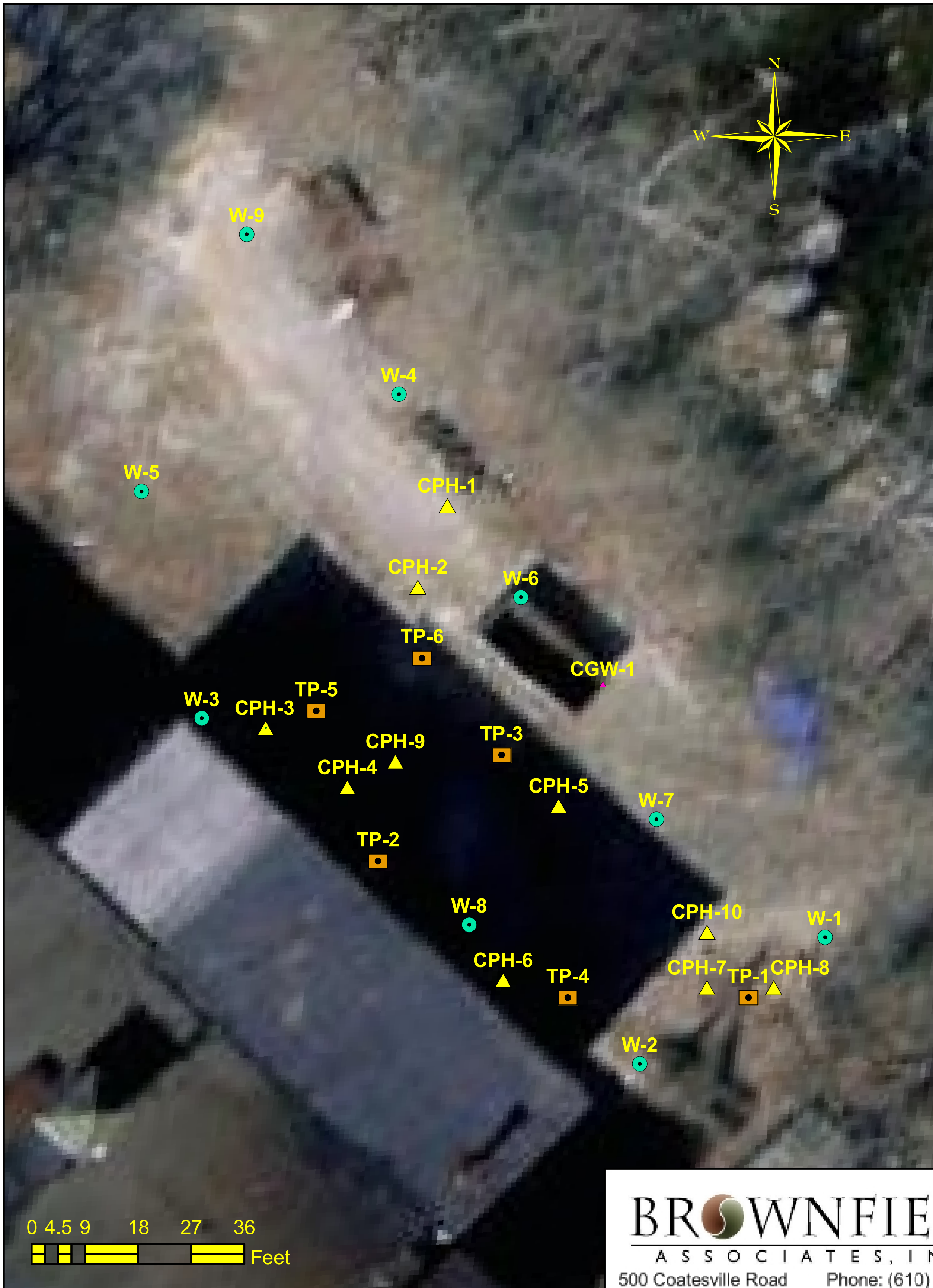
DATE: 11/2/09	FIGURE 1
DRAWN BY: GW	SITE LOCATION MAP
CHECKED BY: WTF	AXIL BELKO FACILITY KINGSVILLE, MD



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Date: 4/14/10	FIGURE 2
Drawn By: GW	AREA "C" Location MAP
Checked By: WTP	AXIL BELKO FACILITY KINGSVILLE, MD

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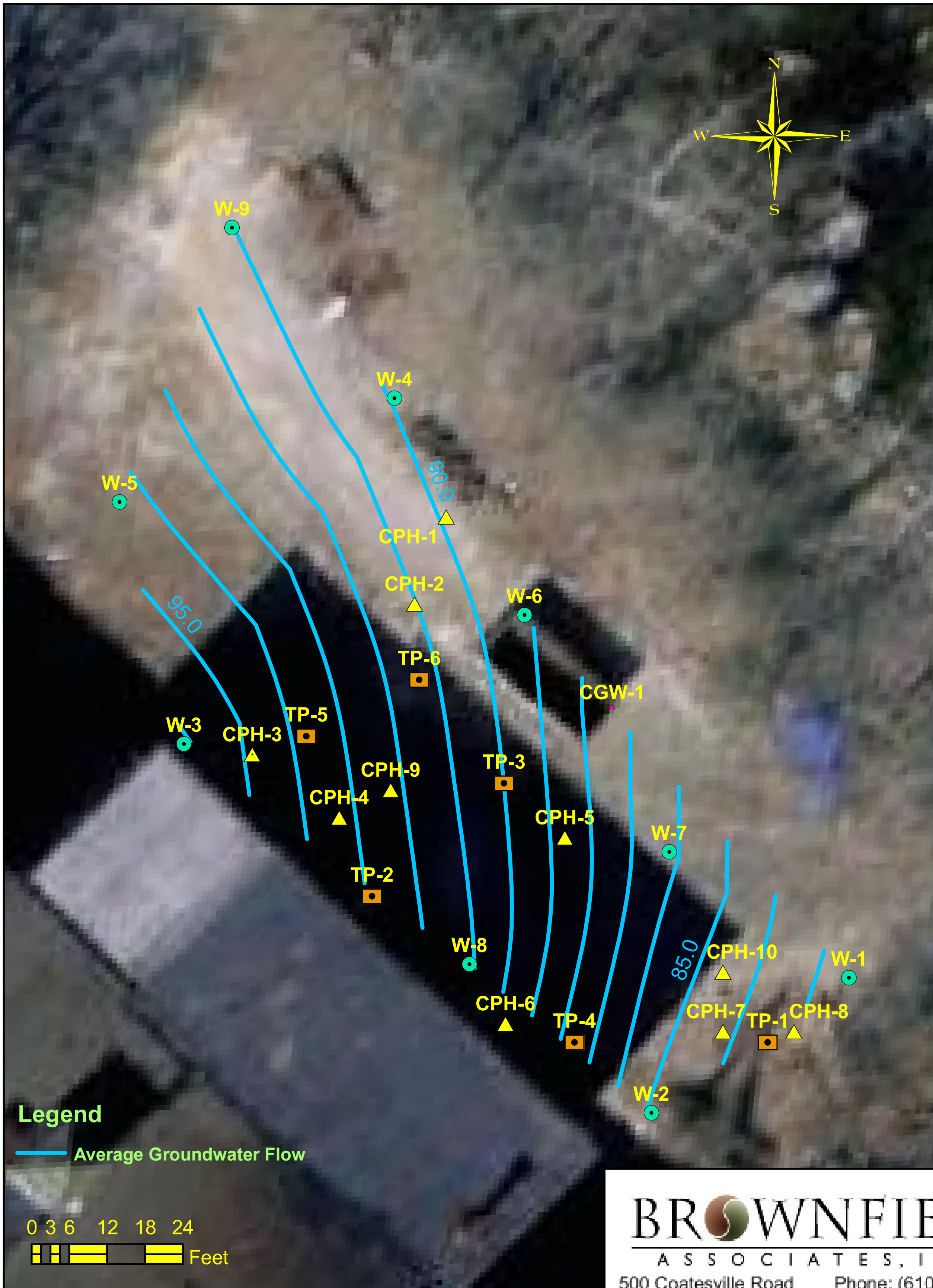
Date: 4/14/10	FIGURE 3 FLOODPLAIN MAP AXIL BELKO FACILITY KINGSVILLE, MD
Drawn By: GW	
Checked By: WTP	



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Date: 4/14/10	FIGURE 4 AVERAGE GROUNDWATER FLOW AXIL BELKO FACILITY KINGSVILLE, MD
Drawn By: GW	
Checked By: WTP	

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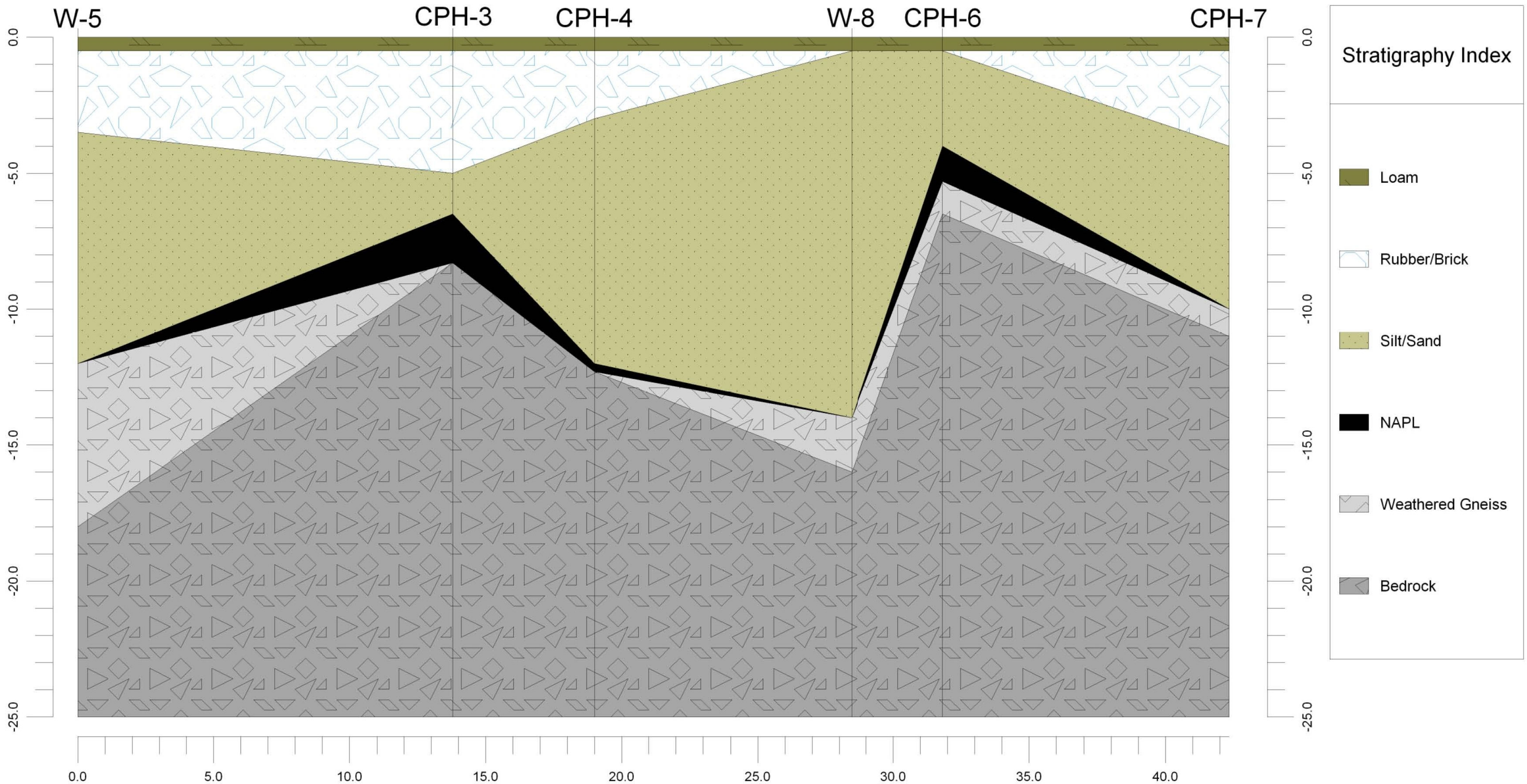
Date: 4/14/10	FIGURE 5 LITHOLOGIC CROSS SECTION MAP AXIL BELKO FACILITY KINGSVILLE, MD
Drawn By: GW	
Checked By: WTP	

Cross-Section W-5 through CPH-7



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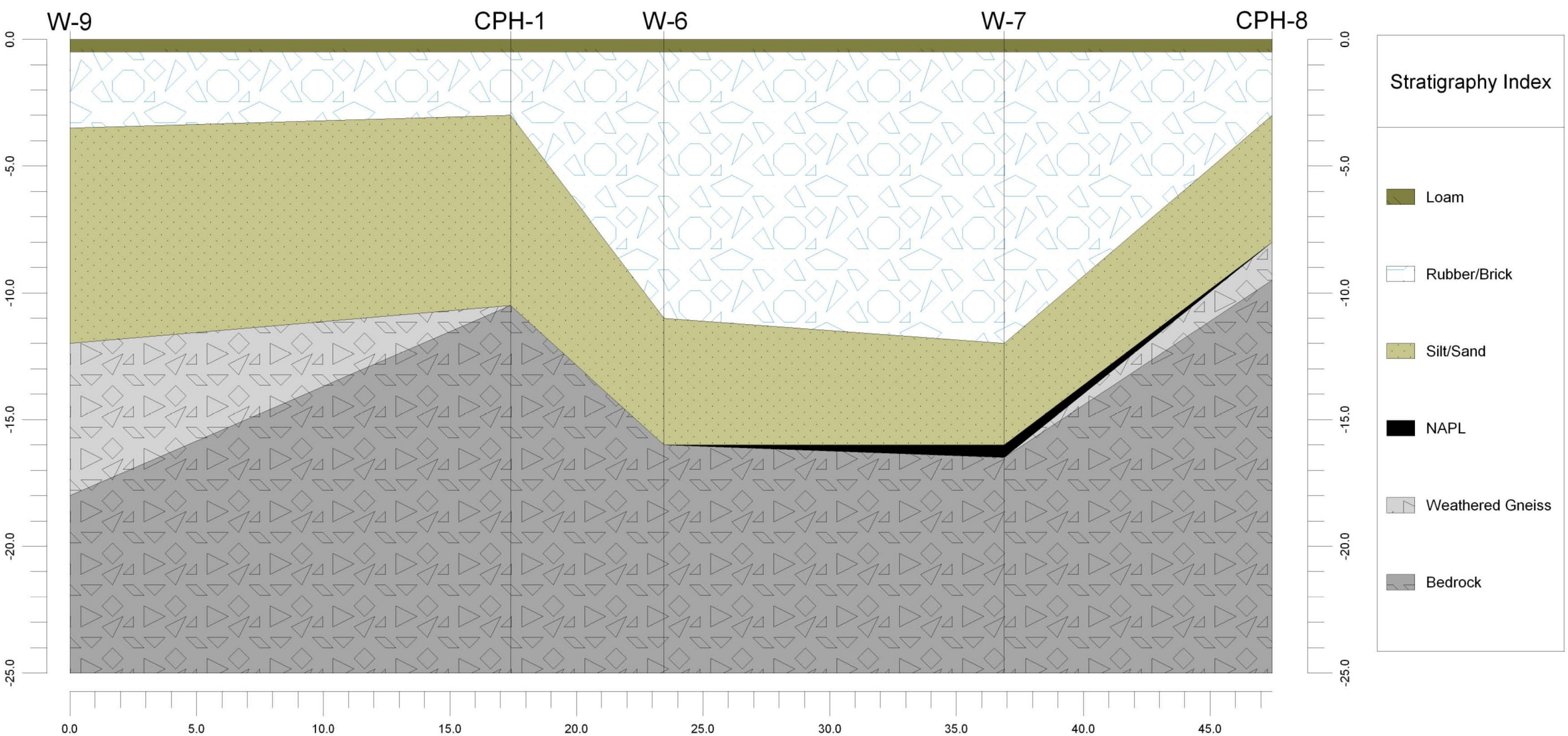
Date: 4/14/10	FIGURE 6 CROSS SECTION MAP AXIL BELKO FACILITY KINGSVILLE, MD
Drawn By: GW	
Checked By: WTF	

Cross-Section W-9 through CPH-8



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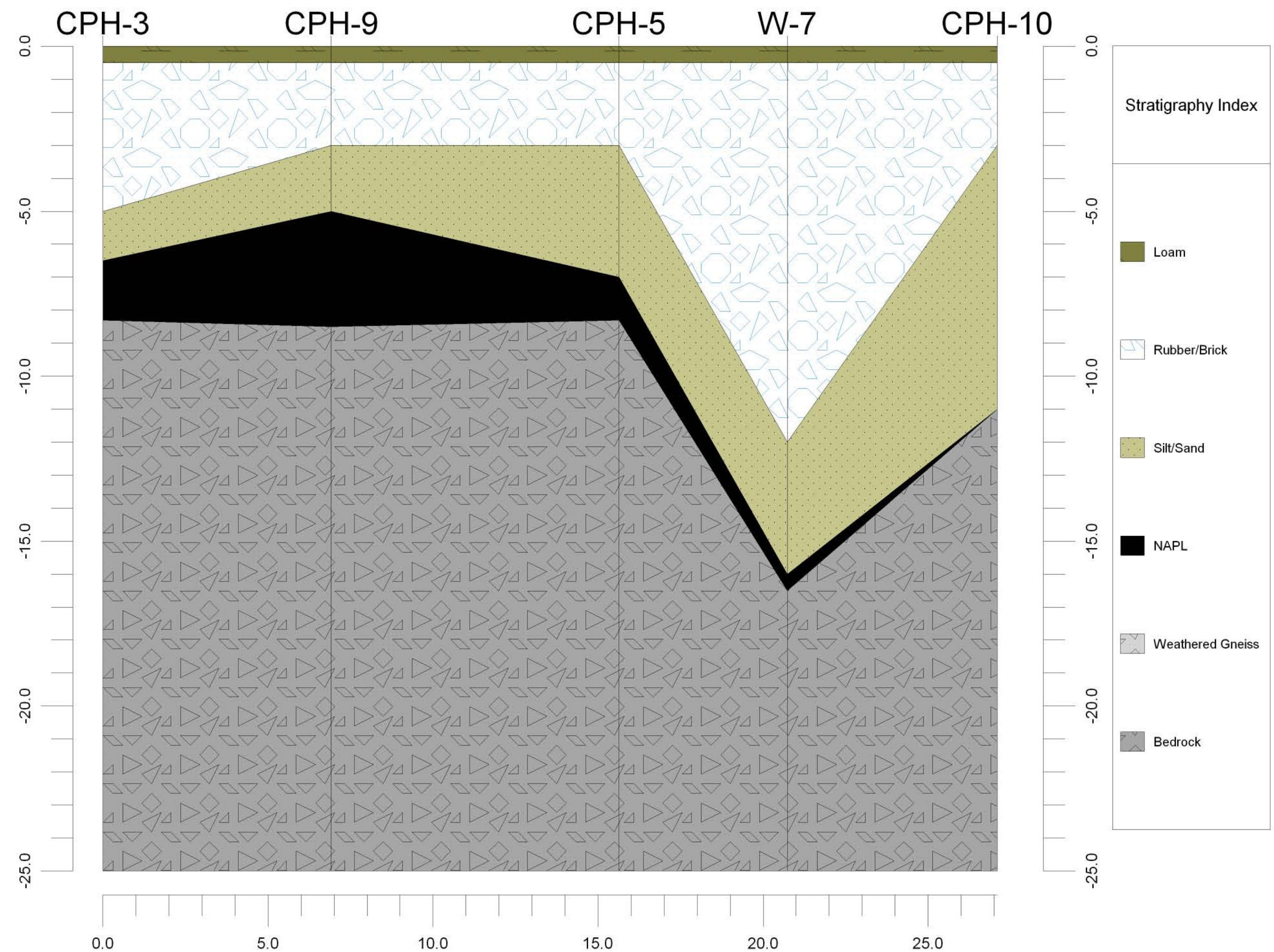
Date: 4/14/10	FIGURE 7 CROSS SECTION MAP AXIL BELKO FACILITY KINGSVILLE, MD
Drawn By: GW	
Checked By: WTF	

Cross-Section CPH-3 through CPH-10



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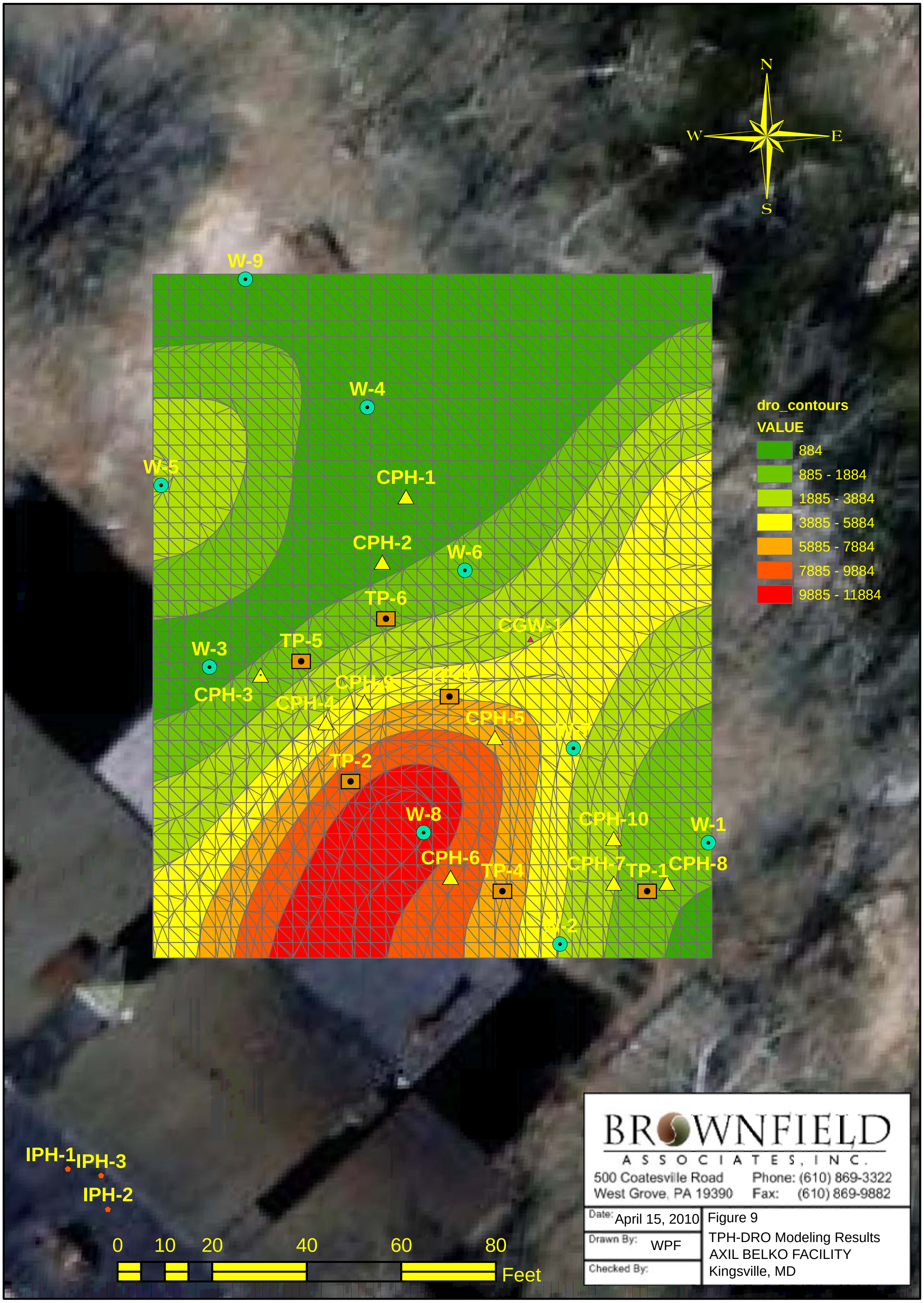
Date: 4/14/10	FIGURE 8 CROSS SECTION MAP AXIL BELKO FACILITY KINGSVILLE, MD
Drawn By: GW	
Checked By: WTF	


N
S
E
W
W-9
W-4
W-5
CPH-1
CPH-2
W-6
TP-6
CGW-1
W-3
TP-5
CPH-3
CPH-4
CPH-5
TP-2
W-8
CPH-10
W-1
CPH-6
TP-4
CPH-7
TP-1
CPH-8
IPH-1
IPH-3
IPH-2
dro_contours
VALUE
884
885 - 1884
1885 - 3884
3885 - 5884
5885 - 7884
7885 - 9884
9885 - 11884
0
10
20
40
60
80
Feet
BROWNFIELD
ASSOCIATES, INC.
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Fax: (610) 869-9882
Date: April 15, 2010
Drawn By: WPF
Checked By:
Figure 9
TPH-DRO Modeling Results
AXIL BELKO FACILITY
Kingsville, MD

APPENDIX I

Environmental Investigation
Former Belko Corporation Facility
11931 Jericho Road, Kingsville
Baltimore County, Maryland
Case No. 1991-0916BA4

The Maryland Department of the Environment (MDE), Oil Control Program (OCP), is evaluating the impact of petroleum constituents at the Belko property in northern Baltimore County. The Belko site comprises approximately three (3) acres of land located on the banks of the Little Gunpowder Falls River. In 1986, oil seeps were observed along the banks of the river downgradient of the facility. Prior to this discovery, an aboveground storage tank (AST) had released approximately 200 gallons of No. 4 oil on-site. In addition, several releases of hydraulic oil occurred during plant production activities. Subsequently, four (4) monitoring wells were installed on-site and liquid phase hydrocarbons (LPH) were observed in two of these wells. Historic recovery activities have included product pumping, hand-bailing, sorbent wick/boom placement, and groundwater monitoring. To date approximately 1,150 gallon of product have been recovered.

The Belko Corporation (Belko) owned and operated an approximately 56,000-sq.ft. rubber manufacturing plant at the subject property since circa the 1960s. In June 2001, the Axil Corporation (Axil) acquired the site and plant operations were shut down. Historically, two 10,000-gallon No. 4 fuel oil ASTs and a 10,000-gallon waste oil AST were located on the subject property. Three hydraulic oil ASTs of various sizes were also operated on-site. In addition, a system of open trenches, open pits, piping, pumps, and ASTs was located on-site to transport and circulate hydraulic oil through various manufacturing equipment. The Department understands that all the ASTs have been properly decommissioned.

An application to enter the MDE Voluntary Cleanup Program (VCP) was recently submitted by a prospective purchaser seeking to remediate the property for future residential use. Based on this VCP application, Axil Corporation is not currently conducting remediation activities at the site. In the future, Axil intends to coordinate remediation efforts to ensure that activities meet the requirements of both the VCP and OCP departmental programs.

At this time, the MDE-OCP does not anticipate expanding the off-site residential sampling effort beyond sampling needed to ensure community safety. The two on-site drinking water supply wells were sampled on November 27, 2006 and were non-detect for petroleum constituents.

Chronology:

- November 30, 1986. MDE-OCP received a report of oil seeping into the Little Gunpowder Falls River.

- December 1, 1986. MDE-OCP inspection confirmed report of seepage, presence of storage tanks, and oil in pipe room.

- December 24, 1986. MDE-OCP letter to Belko citing failure to report the loss of 200 gallons of #4 oil and requiring the following:
  - Submit a Subsurface Investigation Work Plan;
  - Improve impermeability of the AST dike area; and
  - Discontinue storing cooling solution on the hydraulic room floor.

- March 3, 1987. MDE-OCP received *Work Plan – March 2, 1987* to seal dike area and install a cooling solution storage tank system.

- March 16, 1987. MDE-OCP approved the *Work Plan.*

- June 10, 1987. During a site visit, MDE-OCP observed oil still seeping into the Little Gunpowder Falls River. Dike repairs were completed; cooling solution storage tank was not yet in place.

- October 17, 1990. MDE-OCP received report of oil seeping into the Little Gunpowder Falls River. MDE-OCP required sorbents to be changed on a frequent basis.

- November 6, 1990. During a site inspection, MDE-OCP observed oil seeping out of the pump house and ditches with sorbent booms installed next to the river. MDE-OCP required Belko to continue maintaining sorbents, to complete a site assessment, and to submit a Remediation Work Plan.

- November 15, 1990. MDE-OCP received letter from Belko stating that they were working on a scope of work for the required site assessment.

- December 27, 1990. MDE-OCP received letter from Belko stating that they had received a scope of work from a consultant and were concerned about the expense. They were soliciting other bids.

- March 18, 1991. Representatives of Belko met with MDE-OCP on-site to discuss scope of services, including sampling activities, soil boring investigation, and report preparation.

- April 12, 1991. MDE-OCP letter to Belko requiring completion of a site assessment and volumetric test on the line from the processing oil AST to the implant building.

- May 14, 1991. MDE-OCP received volumetric test results - tested tight.

- May 22, 1991. Monitoring wells were installed (MW-1, MW-2, MW-3, and MW-4).

- May 31, 1991. MDE-OCP gauged the four monitoring wells; MW-1 and MW-2 contained LPH.

- June 28, 1991. Belko submitted progress report: MW-2 bailed for two weeks; 200 gallons of product recovered. Pump house seepage stopped and they plan to bail wells and maintain sorbent booms along the river for one year.

- July 16, 1991. MDE-OCP gauged monitoring wells: MW-1 and MW-2 contained product (thickness measured at $1^{3}/_{8}$ inch and $1^{3}/_{4}$ inch).

- August 18, 1991. MDE-OCP received a proposal to perform a pumping test.

- August 28, 1991. MDE-OCP gauged monitoring wells MW-1 and MW-2: product thickness measured at 1 inch and $1^{3}/_{4}$ inch.

- November 5-6, 1991. MDE-OCP was on-site to observe a portion of a Step Test performed on MW-1. The test was conducted prior to a pumping test (at 1 gpm) to determine flow rate. No influence was seen in the surrounding wells.

- January 20, 1992. MDE-OCP received letter that required site assessment report would be submitted for review in late January. A vacuum truck event on monitoring well MW-2 recovered 2,500 gallons of total fluids and approximately 50 gallons of petroleum product.

- January 21, 1992. MDE-OCP conducted a site visit to gauge monitoring wells: MW-1 contained sheen and MW-2 contained $1^{1}/_{8}$ inch of product.

- January 30, 1992. MDE-OCP received *Environmental Assessment Report - January 30, 1992*.
  - Results of pumping test were very localized.
  - Hand bailing and vacuum truck events recovered approximately 1,150 gallons of LPH.
  - Recommended monthly bailing or pumping and maintaining stream sorbents.

- February 10, 1992. MDE-OCP approval letter to Belko for product removal activities and maintenance of sorbents.

- August 5, 1992. MDE-OCP gauged wells: MW-1 and MW-2 contained LPH (thickness of 1/4 inch and 3/8 inch).

- July 11, 2000. MDE-OCP gauged wells: MW-1 was clear and MW-2 contained 0.08 ft. of product.

- April 4, 2002. MDE-OCP gauged wells: no LPH detected in MW-1; MW-2 contained 0.02 ft. of product. MDE-OCP required Belko to maintain well sorbents.

- May 6, 2002. MDE-OCP issued *Site Status Letter* to Belko and recommended periodic vacuum truck events to remove remaining LPH.

- February 27, 2004. MDE-OCP-received report that oil was again entering the Little Gunpowder Falls River. MDE-OCP site inspection found petroleum product seeping into the river from two locations.

- February 28, 2004. MDE-OCP site visit to install sorbents and to gauge the four monitoring wells. No product was measured in MW-1 and MW-2. Sorbent present in well was removed.

- May 14, 2004. MDE-OCP received a letter concerning the *Proposed Scope of Work – May 7, 2004*, including evacuating and cleaning four old storage tanks, removing a discharge pipe that lead from the building floor drains to the embankment, conducting product fingerprinting analysis, and installing test pits.

- May 27, 2004. MDE-OCP site visit to observe test pit activities on-site.

- November 12, 2004. MDE-OCP received *Focused Site Investigation, Interim Measures and Monitoring Activities - November 12, 2004* report.
  - Samples of product were collected from tanks, test pits, wells, and seeps for petroleum fingerprint analysis.
  - Test pits excavated in rear of property detected waste rubber and hydraulic oil in some pits.
  - Exterior pipe was removed (and replaced), which extended from drain in pipe room to an embankment.
  - Four various sized ASTs were cleaned and evacuated.
  - Interviews with a former plant manager suggest that the oil seeps may be from hydraulic oil used in the production of molded rubber products and not exclusively from problems with the AST release.

- June 7, 2005. MDE-OCP received *Focused Site Characterization and Sampling Activities – November 12, 2004,* in which additional site activities were proposed.
  - Advancement of 12 soil borings, 6 shallow bedrock cores, and installation of 2 additional monitoring wells.
  - Groundwater samples to be collected from all pre-existing and newly installed monitoring wells and two on-site drinking water wells.

- September 28, 2005. MDE-OCP approval letter to Axil Corp. *Focused Site Characterization and Sampling Activities – November 12, 2004,* to implement addition field activities.

- November 23, 2005. MDE received *Response to Comments, Focused Site Characterization and Sampling Activities*.
  - Sampling of monitoring wells for petroleum constituents was inappropriate based on the type of petroleum product (i.e., heavy) observed in previous test pit activities on the site.
  - However, samples collected from the two on-site drinking water wells will be sampled for full-suite VOCs.
  - Results from a review of previous subsurface investigations performed on-site were provided.

- December 12, 2005. MDE-OCP representatives met on-site with consultants for Axil Corp. to discuss the location of borings. The Department required the submittal of quarterly status reports.

- January 25, 2006.   MDE-OCP received a letter from Axil Corp. consultants, which provided a schedule for beginning soil boring and monitoring well installation on the site.

- November 2, 2006. MDE-OCP letter to Axil requiring all on-site drinking water wells to be sampled by 12/04/06. A report of results of the *Scope of Work - September 28, 2005* must be completed by 02/05/07.

- December 18, 2006. MDE-OCP received *Drinking Water Supply Well Sampling – December 15, 2006.*
  - Sampling event 11/27/06
    - On-site supply well PW1 non-detect for petroleum constituents
    - On-site Supply Well PW2 non-detect for petroleum constituents

- February 5, 2007. Letter from Axil Corp. attorneys dated 02/01/07 to MDE-OCP requesting an extension to conduct the previously approved subsurface investigation *Focused Site Characterization and Sampling Activities* (i.e., advance 12 soils borings, two monitoring wells, etc…).

- March 9, 2007. MDE-OCP issued a *Notice of Violation (NV-2007-065)* to Axil Corp. requiring the following;,
  - Sample the on-site supply wells no later than April 9, 2007.
  - Submit the results of the approved *Focused Site Characterization and Sampling Activities* no later than May 7, 2007.

- March 28, 2007. Axil Corp. letter to MDE-OCP requesting that *Notice of Violation NV-2007-065* be withdrawn based on the sale of the property to a developer that has entered into the MDE Voluntary Cleanup Program (VCP), and proposes to remediate and redevelop the property.

- April 5, 2007. MDE letter to Axil Corporation rescinding *Notice of Violation NV-2007-065.*
  - The site is to be investigated and remediated under MDE-VCP by a prospective developer P&L Investment III, LLC seeking to remediate and redevelop this site for residential purposes.
  - However, in the event that the application is withdrawn, Axil Corp. still remains be responsible party for future remediation activities at this facility.

Current Activities:
- The property is currently being considered for redevelopment though the MDE Voluntary Cleanup Program.

Future Updates:
- Future updates on this case investigation will be posted at www.mde.state.md.us [at the MDE home page, (select) Land, (select) Program, (select) Oil Control, (select) Remediation Sites].

Contact:
- Maryland Department of the Environment, Oil Control Program: 410-537-3443
- Maryland Department of the Environment, Voluntary Cleanup Program: 410-537-3493
- Baltimore County Department of Environmental Protection and Resource Management: 410-887-4888

Disclaimer:
The intent of this fact sheet is to provide the reader a summary of site events as they are contained within documents available to MDE. To fully understand the site and surrounding environmental conditions, MDE recommends that the reader review the case file that is available at MDE through the Public Information Act. The inclusion of a person or company's name within this fact sheet is for informational purposes only and should not be considered a conclusion by MDE on guilt, involvement in a wrongful act, or contribution to environmental damage.