



June 27, 2019

RANDY COIL
BP PRODUCTS NORTH AMERICA INC
201 HELIOS WAY – HELIOS PLAZA 6.370A
HOUSTON TX 77079

RE: Technical Assistance Request – Site Investigation Report
Amoco Oil Co. Superior Terminal
2904 Winter Street, Superior, Wisconsin
BRRTS #02-16-000331
Douglas County Parcel ID # 04-804-010220-00

Dear Mr. Coil,

On December 15, 2017 Mr. Johnathan Zimdars of the Antea Group (Antea), on behalf of BP Products of North America Inc. (BP), submitted a Site Investigation Report (SIR) to the Wisconsin Department of Natural Resources (DNR) Remediation and Redevelopment Program. The SIR is associated with the Amoco Oil Co. Superior Terminal BRRTS #02-16-000331 (Site).

A request for technical assistance, including appropriate fees, was made by Antea on April 8, 2019. The request was for a technical review of the SIR. This correspondence is in response to the technical assistance request.

Below is a summary of site investigation and interim actions associated with the Site:

- Notification of a discharge of hazardous substances was made to the DNR in 1985.
- Investigation and interim actions have occurred since 1988.
- \$1,000,000 of funding has been provided to BP by the Petroleum Environmental Cleanup Fund Award through the State of Wisconsin for investigation and interim remedial actions.
- Antea estimates approximately 16,000 gallons of light non-aqueous phase liquid (LNAPL) is currently present on approximately 3.6 acres of groundwater surface underlying the Site.
- Groundwater contamination cover an area of approximately 25 acres.
- Deep and shallow groundwater contamination as well as LNAPL has migrated onto neighboring properties.
- Interim actions as reported by Antea include:
 - Removal of approximately 5400 tons of contaminated soil in 2014.

- Recovery of approximately 30,000 gallons of LNAPL and contaminated groundwater.
- Case Closure was requested by Antea in March 2016 resulting in a closure not recommended decision by the DNR in July 2016.
- Case Closure requested again in January 2017, DNR recommended not to close the site in March 2017.
- Two (2) meetings were held with representatives from Antea and the DNR to review the March 2017 closure not recommended decision, the first on March 23, 2017 and again on June 20, 2017.

Review of Site Investigation Report:

The review of the SIR is to determine compliance with Wis. Admin. Code ch. NR 716, *Site Investigation*, the purpose of which, as stated in Wis. Admin. Code ch. § NR 716.01, is as follows:

- Define the nature, degree and extent of contamination.
- Define the source or sources of contamination.
- Determine (and allow) whether any interim actions, remedial actions or both are necessary at the site or facility.

Site History

Section 2.0 of the SIR described the history of the Site indicating the Amoco Oil Terminal facility (Source Property) was a bulk petroleum storage and distribution facility for over 100 years. At one time there were 14 above ground storage tanks (ASTs) with up to 50 million-gallon capacity. There were also the associated piping/distribution systems, loading facility and offices on the Source Property. The ASTs, piping and distribution facilities were removed from the Source Property in 1999.

The former Source Property is no longer owned by BP Products North America Inc., the responsible party of the Site. The Source Property is now owned by several different entities. The properties are either vacant or have been redeveloped for different commercial/light industrial purposes. Section 2.3 of the SIR indicates there are several BRRTS listed sites of contamination on properties adjacent to the Source Property.

Site Characterization

Section 3.0 Site Characterization is divided into 10 subsections. The majority of these subsections do not come to conclusions regarding objectives of SIR. The following review comments pertain only to SIR subsections where DNR comment or concurrence are provided:

- Section 3.1 *Sensitive Receptors Survey* is further divided into 5 subsections including water wells, underground utilities, St. Louis Bay, surface water and drainage, Roadways and Right-of-Ways.
 - Section 3.1.5 *Roadways and Rights of Ways*, includes information regarding a 2003 fire during road construction. Apparently, while pavement was being removed, highly contaminated soil, ignited resulting in an emergency response by the City of Superior Fire Department. The Department regards this incident and

the location as an extreme health and safety concern. It does not appear that any investigation of soil conditions or documentation of contaminated soil removal at the location of the emergency response incident has taken place.

- Section 3.5 *Site Soil and Geology*, The Department concurs with the findings and interpretation of the surficial geology at the Site. However, it should be noted that SIR Figure 8, *Clay Thickness in Feet*, indicates a small area near the former Amoco Oil Terminal office where the clay thickness is less than 4 feet.
- Section 3.6 *Site Hydrogeology*, this section has 2 subsections, Monitoring Well Network and Groundwater Flow Gradient. The subsections indicate groundwater flow is generally to the northwest with a downward vertical component which changes to an upward vertical component with closer proximity to St. Louis Bay. The Department concurs with this general flow model. However, in subsection 3.6.2 it states “*Because of the vertical upward gradients closer to St. Louis Bay, dissolved phase impacts are effectively locked in place, unable to overcome the hydrogeological forces of St. Louis Bay. Therefore, dissolved phase concentrations in this region are likely to exhibit stable and decreasing trends over time.*” The Department does not concur with this statement; upward vertical gradients indicate groundwater is discharging into St. Louis Bay. It should also be noted that as benzene concentration in well MW-41D (located 150 feet from St. Louis Bay) has shown a recent increasing trend indicating that dissolved phase plume is migrating toward St. Louis Bay.

Section 4.0, Contaminant Distribution, this section is presented in 4 subsections including, *Extent of Soil Contamination*, *Extent of Non-Aqueous Phase Liquid (LNAPL)*, *Extent of Dissolved Contamination* and *Summary of Remedial Actions for BRRTS #02-16-000331*. The following review comments pertain only to SIR subsections where DNR comment or concurrence are provided:

- Section 4.1 *Extent of Soil Contamination* is further subdivided into 3 sections including Surface Soil Contamination and Excavation, Soil Gas and Storm Sewer Vapor Survey. The following reviews those sections:
 - Section 4.1.1 *Extent of Soil Contamination* states several hundred soil borings have been advanced at the Site to delineate soil contamination. Additionally, approximately 5400 tons of contaminated soil was removed from the site. The SIR does not include any summary tables of laboratory data from soil analysis or figures displaying soil sample locations or residual soil contamination. Additionally, it should be noted that Section 3.1.5 of the SIR documents a fire that occurred during road construction on Winter Street immediately north of the Terminal Property. This incident indicates there is highly contaminated soil underlying Winter Street, most likely from pipelines utilized by the Source Property. There is not any documentation indicating investigative activities to shallow soil has occurred in this area.
 - Section 4.1.2 *Soil Gas*. The DNR does not concur with that conclusion that soil gas and vapor intrusion is not an issue at the Site. The Department recognizes that there is a thinning of the clay formation in the Lake City Towing office area (as displayed in Figure 8) and soil gas concentrations can vary greatly with time. As vapor intrusion

by soil gas, especially methane, can be a significant health and safety threat, this issue should be approached as a long-term threat.

- Section 4.2 *Extent of Light Non-Aqueous Phase Liquid (LNAPL)* is further divided into 6 subsections including *LNAPL Thickness*, *LNAPL Extents*, *LNAPL Volumes*, *LNAPL Transmissivities*, *LNAPL Immobility and Plume Stabilities* and *LNAPL Viscosities and Chemical Signatures*. The following is a review of these sections:
 - Section 4.2.1 *LNAPL Thickness*, 4.2.2 *LNAPL Extents* and 4.2.3 *LNAPL Volumes*.
The SIR indicates LNAPL is vertically located at the interface of the silty sand and clay formations, between 15 and 25 feet BGS at 5 different area with an estimated volume of 16,000 gallons. The Department recognizes estimating LNAPL volume is difficult especially when data utilized is from a limited number of groundwater monitoring wells with LNAPL and laser-induced fluorescence (LIF) borings. The Department does not concur with the estimated volumes and areas of LNAPL as stated in the SIR. It should be noted LNAPL was observed in MW-12 and MW-19R prior to those wells being abandoned. There is no evidence provided that LNAPL does not exist at the former MW-12 and MW-19R locations and should be identified as such. Additionally, LNAPL was observed in MW-2 prior to abandonment, indicating the boundary of LNAPL area #5 should be expanded. For these reasons the estimated volume and area of LNAPL should be revised. Additionally, there is a lack of data points to estimate LNAPL volume at the area identified in the SIR as AOC 1.
 - Section 4.2.4 *LNAPL Immobility and Plume Stability*, summarizes an assessment of the LNAPL plumes using physical and chemical properties. The SIR concludes the LNAPL plumes are not expanding or migrating. The Department does not concur with this conclusion as there is limited recent data regarding the extent of the LNAPL plumes and the apparent expansion of the deep plume of contaminated groundwater (detailed in Section 4.3) indicates the LNAPL plume is not stable.
 - Section 4.2.5 *LNAPL Transmissivities*, summarizes field testing of LNAPL transmissivities performed on 9 wells at the Site. The SIR states higher LNAPL transmissivity indicate high LNAPL mobility. LNAPL transmissivities are also used to determine if physical recovery of LNAPL would be effective. Field test results ranged from 0.03 ft²/day to 27.5 ft²/day. The Department views the high LNAPL transmissivity results displayed in 4 of 9 wells tested may indicate that LNAPL plumes may be more mobile (and therefore more recoverable) than stated in Section 4.2.4 of the SIR.
- Section 4.3 *Extent of Dissolved Contamination*, indicates benzene is the primary chemical of concern (COC) associated with dissolved phase contamination in groundwater at the Site. Although there are other petroleum volatile organic compounds (PVOC) that contaminate groundwater, the DNR recognizes that groundwater sample analysis data indicates benzene can effectively be used as a surrogate for other COC. It should be noted that all chemical compounds released at the Site are subject to Wis. Admin. Code ch. NR 716 and Wis. Admin. Code ch. NR 140 requirements. Figure 14 in the SIR displays the area of shallow dissolved phase groundwater contamination (shallow

plume) where the Wis. Admin. Code ch. NR 140 Enforcement Standard (ES) for benzene is exceeded. The area of the shallow plume is approximately 12 acres. The 5 areas of LNAPL (approximately 3.6 acres) are included within the boundary of the shallow dissolved phase benzene plume. The DNR concurs with the definition of the degree and extent of benzene contamination to shallow groundwater at the Terminal Site.

The SIR also discusses the vertical extent of contamination to groundwater stating there is a dissolved phase contaminated plume with groundwater benzene concentrations greater than the Wis. Admin. Code Ch. NR 140 ES in deeper groundwater (deep plume). This deep plume is approximately 55 feet below ground surface and is first observed in MW-30D which is the most upgradient (south) well in the monitoring network. From MW-30D going northwest toward St. Louis Bay there are 8 deep wells that have high benzene concentrations including well MW-41D, located 150 feet from St. Louis Bay. This deep plume extends nearly 1700 feet northwest from the Source Property and covers an area of approximately 11 acres. The SIR states that due to the surface clay formation and an upward vertical gradient at MW-41S/D, located near St. Louis Bay, that the Bay is not a potential receptor of contaminated groundwater.

It should be noted that no figure displaying this deep plume or laboratory data from many of the deep plume wells have been included in the SIR. The DNR concurs that the deep plume is a result of the release(s) at the Source Property. Recent monitoring data from the deep plume monitoring wells indicate the deep plume is not stable, MW-41D displays an increasing trend in benzene concentration indicating the deep plume is migrating toward St. Louis Bay. DNR does not concur with the SIR's conclusion that St. Louis Bay is not a potential receptor of contaminated groundwater from the deep plume.

Section 5.0 *Summary and Conclusions* is subdivided into 4 sections including *Potential Receptor Survey*, *Soil Contamination Extent*, *LNAP Extent* and *Dissolved Phase Extent*. Review comments to these items have been made in the Section 4.0 portion of this review letter. A summary of review comments also appears at the end of this correspondence.

Section 6.0 *Recommendations* is subdivided into 4 subsections, *LNAPL Recovery Systems*, *Vapor PIN*, *Winter Street Soil Contamination* and *Natural Attenuation*. Review comments to these items have been made in the Section 3.0 and 4.0 portion of this review letter. A summary of review comments also appears at the end of this correspondence.

The DNR recognizes the great amount of investigative work and interim actions conducted at the Site, however the scope and complexity of the contamination warrant the work at the Site. Currently the DNR considers the SIR not fully compliant with the requirements of Wis. Admin. Code ch. NR 716, *Site Investigation*.

The Department wishes to remind BP that they are the "responsible party" under Wis. Admin. Code § NR 700.03(51) and must follow applicable law to address the discharge of a hazardous substance to the environment or other environmental pollution. Wisconsin Statutes ("Wis. Stats.") ch. 292 and Wis. Admin. Code chs. NR 700 through NR 754 provide specific

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requirements for undertaking appropriate response actions to address contamination, including requirements for emergency and interim actions, public information, site investigations, remedy selection, design and operation of remedial action systems, and case closure.

If you have any questions or comments regarding this project, please feel free to contact me at 715-623-4190 ext. 3115 or at john.t.hunt@wisconsin.gov.

Sincerely,



John T. Hunt
Hydrogeologist
Remediation & Redevelopment Program

cc: Jonathan Zimdars, Antea (email)