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WISCONSIN DEPT. OF NATURAL RESOURCES

August 31, 2016

COPY

Mr. Evan Schreiner
1800 North Point Drive
Stevens Point, WI 54481

Subject: Department Comments on NR 722 Remedial Action Options Report
Wauleco SNE Corp., 125 Rosecrans St. Wausau, WI
BRRTS# 02-37-000006

Dear Mr. Schreiner:

The Department of Natural Resources (the "department") has reviewed the Ch. NR 722 Wis. Adm. Code Remedial Action Options Report (RAOR) submitted by your consultant, TRC. The RAOR presented five remedial action alternatives for the groundwater contamination at the Wauleco site. TRC evaluated each alternative and concluded that Monitored Natural Attenuation (MNA) was the best alternative compared to the four other alternatives. Per Ch. NR 749 Wis. Adm. Code, you requested that the department review and provide comments to you on your submittal. The appropriate review fee was provided with your request. In addition to these comments and technical memorandum the department would like to offer a meeting with representatives for the Wauleco site to discuss the department's comments on the draft RAOR.

Background:

The Wauleco site was used for wood window frame and patio door manufacturing from the early 1900's until 1991. Starting in 1944 wood was treated on site with a preservative commonly known as Penta. Penta is a solution of 5% pentachlorophenol (PCP) dissolved in 85% mineral spirits and 10% inert materials. Trolleys stacked with wood were submerged in a dip tank filled with 3,400 gallons of penta to treat the wood. 4,000 and 3,000 gallon underground storage tanks supplied penta for this process. Following treatment, the loaded trolleys were moved to a dry room with a wooden plank floor. Site information provided to the department describes this floor as having soil visible between the planks. PCP concentrations discovered in the soil were as high as 14,000 parts per million (ppm) near the dip room. The residual contaminant level for PCP in soil is 0.89 ppm. Starting in 1972, a sash line process was added to the site which used a penta-spray application process to treat wood products. An 8,000 gallon underground storage tank containing penta was used with this system.

Site investigation and remedial actions have taken place at the Wauleco site since 1991. Free product recovery and groundwater containment on site have removed approximately 147,000 gallons of free product of penta. "Free product" means a discharged hazardous substance that is present in the environment in its pure form. Over 400,000,000 gallons of water have been extracted and treated using a groundwater extraction and above ground biological fluid bed treatment system (GWE system). Despite several decades of groundwater treatment, the 2015 Annual Groundwater Monitoring Report submitted to the department reports that the annual average PCP concentration in the groundwater entering the extraction system was 4,377 parts per billion (ppb). For perspective, the Ch. NR 140 Wis. Adm. Code groundwater quality enforcement standard for PCP is 1 ppb. That same 2015 report also states that the groundwater extraction and treatment system was able to reduce PCP concentration to an annual average of 1.84 ppb before discharging to the City of Wausau's sanitary sewer system, indicating that the current GWE system is still highly effective at removing dissolved contaminant mass.

You have proposed a shutdown of this remedial system in favor of MNA. Monitored natural attenuation essentially means that, while a minimal amount of groundwater well monitoring will be conducted, the active groundwater treatment system will be shut down, and the site will rely on naturally occurring processes to degrade contaminant mass over time. In essence, you are proposing that no further active remediation will be conducted at this site.

TRC has calculated that the remaining volume of free product in the subsurface is conservatively estimated at 171,000 gallons. The department estimates that it could potentially be as high as 420,000 gallons. The free product plume extends 1300 feet to the most downgradient groundwater monitoring point (before the plume reaches the Wisconsin River) and product ranges in thickness from 6 feet in the discharge area to 1.4 feet at the most downgradient monitoring point. PCP concentrations in multiple wells remain in the 5,000 – 10,000 ppb range across the site until the plume discharges to the Wisconsin River. As mentioned earlier, the ch. NR 140 enforcement standard for PCP is 1 ppb, and those concentrations are not to be exceeded at any point groundwater is monitored as required by state law.

As you are aware, the department has previously communicated its opinion to you and your consultant that the conditions at this site are very challenging. Thus, it was likely that MNA was not going to be approved by the department as a viable remedial alternative. This was stated during your presentation to the department's closure committee on May 1, 2014. The department's concerns with this remedial action option were also communicated in a letter to you from Lisa Gutknecht on March 10, 2015. After consideration of the current Ch. NR 722 Wis. Adm. Code RAOR by the West Central Region closure committee, further department peer review was conducted to evaluate free product conditions at this site. The department's peer review effort focused on evaluation of the thickness, volume, mobility, estimated extent of free product and degradation potential based on the information provided. In addition, the department closely examined dissolved phase plume dynamics at this site.

The purpose of this current letter and supporting technical memorandum is to communicate the department's written response to your Ch. NR 722 Wis. Adm. Code submittal that relying solely on MNA is not a sufficient remedial strategy to achieve case closure and comply with Ch. 292 Wis. Stats., and the NR 700 rule series.

For the following reasons the department does not concur that MNA should be relied on at this time as the final remedial strategy at the Wauleco site:

1) Proceeding with MNA as remedial strategy does not conform to applicable state statutes and codes (as detailed in the attached technical memorandum).

2) The information provided in TRC's September 24, 2015 RAOR does not support that MNA is a viable remedial option for this site given the data presented to the department at this time.

The department can well appreciate the technical and economic challenges inherent in a cleanup with this level of complexity; however, it does appear that steady progress is being made overall. Although the department concludes that recent sampling data does not justify consideration of MNA as a final remedy at this time, the department is confident that Wauleco and TRC can successfully attain the goal of adequate source control through treatment, removal or a combination of those methods. Reconsideration of MNA as final remedy could be made at a later time once more source control is achieved. As authorized by s. NR 722.15(2)(c) Wis. Adm Code, the revisions to the RAOR should be submitted to the department by December 2, 2016.

The department appreciates the efforts your company has taken to date to address this historic contamination site. If you have any questions or regarding your site or this letter, please do not hesitate to call me at (715) 839-3750, or email: MatthewA.Thompson@wisconsin.gov.

Sincerely,

Matt Thompson
Hydrogeologist
Remediation and Redevelopment Program

CC: Bruce Iverson, TRC Environmental

Ken Quinn, TRC Environmental

David Crass, Michael Best & Friedrich

Attachments: Technical Memorandum - Response to Request for Comments on NR 722 Remedial Action Options Report

TECHNICAL MEMORANDUM

State of Wisconsin

DATE: August 31, 2016

FILE REF: BRRTS# 02-37-000006

TO: Mr. Evan Schreiner
1800 North Point Drive
Stevens Point, WI 54481

COPY

FROM: Matt Thompson, WDNR
Dave Rozeboom, WDNR

SUBJECT: Response to Request for Comments on NR 722 Remedial Action Options Report
Wauleco SNE Corp.
125 Rosecrans Street, Wausau

As requested by you under Ch. NR 749 Wis. Adm. Code, the Department of Natural Resources (the "department") has reviewed the Remedial Action Options Report (RAOR) submitted by your company for this site. This supporting technical memorandum constitutes the department's response to you pursuant to its authority under s. NR 722.15(2)(b) Wis. Adm. Code that Monitored Natural Attenuation (MNA) will not be approved at this time as the sole, remedial action option to comply with all applicable local, state and federal laws, including achieving case closure under ch. NR 726, Wis. Adm. Code . The applicable sections of statute and code, which will be discussed in detail in this memo, include but are not limited to the following:

1) Ch. 292, Wis. Stats.
2) s. NR 140.24(2)(a), Wis. Adm. Code.
3) s. NR 140.26(2), Wis. Adm. Code.
4) s. NR 140.28(4)(b)1., Wis. Adm. Code.
5) s.. NR 722.07(3), Wis. Adm. Code.
6) s. NR 722.07(4)(a)1.a., Wis. Adm. Code.
7) s. NR 722.07(4)(a)2., Wis. Adm. Code.
8) s. NR 722.07(4)(a)4., Wis. Adm. Code.
9) s. NR 722.07(4)(a)4.e., Wis. Adm. Code.
10) s. NR 722.07(4)(a)3.h., Wis. Adm. Code.
11) s. NR 722.07(4)(a)4.h., Wis. Adm. Code.
12) s. NR 722.07(4)(a)4.i., Wis. Adm. Code.
13) s. NR 722.09(2), Wis. Adm. Code.
14) s. NR 722.09(2)(b)1., Wis. Adm. Code.
15) s. NR 726.05(6)(b), Wis. Adm. Code.

Section 1

Before detailing the department's specific comments regarding the technical aspects of the Remedial Action Operations Report the department will respond to what the department views as several technical interpretations put forth in the RAOR. In particular, these technical interpretations make certain conclusions about how the state's Chs. NR 140, Wis. Adm. Code and NR 700, Wis. Adm. Code rule series apply to this site. These technical interpretations appear to be cornerstones of the proposal to move forward with the proposed MNA remedy at the site. Further explanation of the department's position and clarification of specific sections of code cited in the RAOR should provide an understanding of the

fundamental concerns that the department has and the reasoning for the department's not approving the proposed remedial action of MNA.

Technical Conclusion #1: Section 1.7 - In discussion of the evaluation of the potential requirement of a Wisconsin Pollutant Discharge Elimination System (WPDES) permit for the ongoing discharge of PCP to the Wisconsin River, TRC states:

> "Therefore, discharge of groundwater from Wauleco to the Wisconsin River is acceptable to the WDNR and does not require a WPDES permit."

While the department's Bureau of Water Quality has made a determination that a WPDES permit will not be necessary to address the groundwater discharges that are entering the Wisconsin River, it must be clarified that this determination does not mean the department finds the ongoing discharge of approximately 6,000 parts per billion of PCP to the Wisconsin River to be acceptable under other state laws. A determination that a WPDES permit is not necessary does not constitute department approval of the discharge; it does not negate the obligations of the responsible party to comply with other applicable laws, and should not be construed to be a determination that no further remedial action is necessary due to dilution into the receiving water body.

As required in state law, (including but not limited to s. 292.11(3), Wis. Stats., ch. NR 140.26(2), Wis. Adm. Code, and s. NR 726.05(6)(b), Wis. Adm. Code) the responsible party must take all actions necessary to restore the environment to the extent practicable and minimize the harmful effects from the discharge. As specified in ch. NR 140, Wis. Admin. Code, the contaminated groundwater shall be restored within a reasonable period of time. Both the source control and the groundwater restoration components of the response shall be designed to achieve compliance with the enforcement standard at the point of standards application, which is anywhere that groundwater is monitored at this site, as required in ch. NR 140, Wis. Adm. Code. At this site, it is a misinterpretation of state law to conclude that the point of standards application for assessing groundwater compliance with ch. NR 140, Wis. Admin. Code, is the Wisconsin River.

Technical Conclusion #2: The first note on page 4 of Table 1 states:

> "* NR722 restoration time frame refers to 'the expected time frame needed to achieve the necessary restoration.' NR 140.28 allows for an exemption from the PALs and ESs where a continued response is required or on-going. Therefore, the surface water receptors are considered to be the 'necessary restoration' at this site."

While s. NR 140.28(4), Wis. Adm. Code, does allow for an exemption from the enforcement standard of a public health parameter, this limited exemption only applies when "the background concentration is above an enforcement standard." Further, this exemption, as stated in s. NR 140.28(4)(b)1., Wis. Adm. Code, only applies if "[t]he facility has not caused and will not cause the further release of that substance to the environment." Contaminant concentrations at the Wauleco site are not such that the background concentrations of PCP are above the enforcement standard. Thus, this exemption is not applicable to this site-specific situation. Nor is this exemption legally available to waive compliance with the "reasonable period of time" restoration requirement. Therefore, the conclusion that compliance with surface water laws are considered to be the only necessary restoration at the site is inaccurate, and prevention of further discharges to the groundwater and groundwater restoration to the extent practicable are also necessary as required in s. 292.11(3), Wis. Stats., ch. NR 140.26(2), Wis. Adm. Code, and s. NR 726.05(6)(b), Wis. Adm. Code.

Section 2 of this document details the sections of Wisconsin statute and code applicable to the proposed remedial action (and previously mentioned technical conclusions proposed in the RAOR).

Section 2 – General Concerns with Preferred Remdial Action Option of MNA

Section 292.11 (3), Wis. Stats., explains that a responsible party "shall take the actions necessary to restore the environment to the extent practicable and minimize the harmful effects from the discharge to the air, lands and waters of this state." Based on discussion above and discussion to follow, the department concludes that the "extent practicable" threshold has not been adequately met in the RAOR, specifically related to restoration time frame, adequate source control, free product removal, groundwater pathway, surface water pathway and biodegradation.

Based on information regarding: 1) the volume and extent of free product remaining in the subsurface – estimated between 170,000 and 420,000 gallons; 2) the extent and concentrations of the dissolved phase plume; 3) the degradation potential; 4) lack of adequate source control proposed by MNA, and; 5) the lack of evidence that the plume is attenuating naturally, the department does not concur with your conclusion that MNA is a viable remedial option to attain compliance with chs. NR 140, NR 722, and/or NR 726, Wis. Adm. Code. Additional response actions can and should reasonably be taken in order to comply with applicable local, state and federal laws.

A. Enforcement Standard Exemption

As previously stated, section NR 140.28(4)(b)1, Wis. Adm. Code states, "[t]he department may grant an exemption under this section to a facility, practice or activity which is regulated by the department in an area where the background concentration of a substance of public health concern, other than nitrate, attains or exceeds the enforcement standard for that substance if... The facility has not caused and will not cause the further release of that substance into the environment..."

Background concentrations (for a substance other than nitrates) at the Wauleco site, do not attain or exceed the enforcement standard for the substance, and the Wauleco facility caused the discharge to the environment, therefore the department concludes that an exemption may not be granted for the enforcement standards for these contaminants. Therefore, s. NR 140.26(2), Wis. Adm. Code, is applicable, which specifically requires that the response action will achieve compliance with the enforcement standard at the point of standards application. As specified in s. NR 140.22(2)(d), Wis. Admin. Code, the point of standards application for this site "shall be every point at which groundwater is monitored..."

B. Restoration Time Frame

Section NR 722.07, titled "Identification and evaluation of remedial action options," gives explanations and criteria regarding the evaluation process for determining a remedial action option, as well as information on actions needed to be taken within a "reasonable period of time," as referenced in ch. 140.26(2), Wis. Adm. Code.

Specifically, s. NR 722.07(3), Wis. Adm. Code, states, "responsible parties shall use all of the criteria in sub. (4) to further evaluate appropriate remedial action options that have been identified for further evaluation under sub. (2), for each contaminated medium or *migration or exposure pathway*..." (emphasis added). Section NR 722.07(4)(a)4., Wis. Adm. Code states, " 'Restoration time frame.' [is t]he

expected time frame needed to achieve the necessary restoration, taking into account all of the following qualitative criteria..." The department concludes that the RAOR has not appropriately evaluated the restoration time frame requirement for all required exposure pathways, specifically for the groundwater and surface water exposure pathways. The revised RAOR should clearly evaluate the restoration timeframes for all pathways and alternatives evaluated.

C. Evaluation of MNA as a Viable Remedial Option

Chapter NR 722, Wis. Adm. Code, requires a number of factors be considered when determining whether or not a remedial action option will achieve compliance with applicable state and federal laws. Further, s. NR 722.07(4), Wis. Adm. Code, states, "[e]xcept as provided in s. NR 722.07(3)(b), the remedial action options identified by the initial screening shall be evaluated based on the following requirements and in compliance with the requirements of s. NR 722.09."

Specifically, s. NR 722.07(4)(a)1a., Wis. Adm. Code, requires evaluation of "[t]he long-term effectiveness of appropriate remedial action options, taking into account all of the following... The degree to which the toxicity, mobility and volume of the contamination is expected to be reduced."

Further, s. NR 722.07(4)(a)2., Wis. Adm. Code, requires the evaluation of, "[t]he short-term effectiveness of appropriate remedial action options, taking into account any adverse impacts on public health, safety, or welfare or the environment that may be posed during the construction and implementation period until case closure under ch. NR 726."

Monitored natural attenuation, as proposed in the RAOR, essentially means 'no action' other than monitoring a limited number of the existing groundwater wells. Yet in the RAOR, the evaluation of the short-term and long-term effectiveness of MNA with respect to the degree to which the contamination will be reduced ranked as favorably, or more favorably than almost all of the other potential remedial actions that were evaluated which would actively treat, reduce or remove contaminant mass.

This initial, favorable evaluation provided in the RAOR was potentially based on the misunderstanding (discussed in Section 1) that the department would provide an enforcement standard exemption for the groundwater pathway, and that the department approves of the groundwater discharging to the Wisconsin River. A re-evaluation by Wauleco of the short-term and long-term effectiveness of MNA should yield a much less favorable outcome supporting a more active approach to achieving adequate source control and restoration of the environment.

Further, s.NR 722.07(4)(a)4.e., Wis. Adm. Code, requires an evaluation of the restoration time frame taking into account, in part, "[m]agnitude, mobility, and toxicity of the contamination."
The magnitude of the contaminant mass at this site - an estimated 170,000 to 420,000 gallons of free product and very high dissolved phase concentrations - must be taken into consideration when estimating the restoration time frame. The department concludes that the statutory obligation to comply with applicable state and federal laws cannot be accomplished by relying solely upon natural attenuation, given the mass of source material and contaminant concentrations that exist at this site.

Section NR 727.07(4)(a)4.i., Wis. Adm. Code requires evaluation of the restoration time frame taking into account, in part,"[t]he degradation potential of the compounds." As discussed in greater detail in section 3, the department concludes that natural biodegradation has not been adequately demonstrated to be occurring at this site; at least not to a degree significant enough to validate department approval of natural

attenuation as the final remedy given the magnitude, the concentration the extent of contamination remaining at this site and the degradation potential of the PCP.

Please note that under s. NR 722.07(3)(a), Wis. Adm. Code, the second note states: "[f]or cases involving a discharge and migration of organic contaminants that do not readily degrade in soil or groundwater, an active remedial action that will reduce the contaminant mass and concentration will typically be necessary. Natural attenuation, covers, and barriers do not actively reduce contaminant mass and concentrations. *Chlorinated compounds are the most common contaminants that fall under this provision...*" (emphasis added).

Section NR 722.09(2), Wis. Adm. Code, states, "[r]esponsible parties shall select a remedial action or combination of remedial actions that achieve restoration of the environment to the extent practicable, minimize the harmful effects from the contamination on the air, lands and waters of the state and comply with all applicable state and federal public health and environmental laws and environmental standards."

Section NR 722.09(2)(b)1., Wis. Adm. Code, states,"[f]or substances that are listed in ch. NR 140, the groundwater restoration goal is the preventive action limit. The preventative action limits shall be achieved to the extent technically and economically feasible, pursuant to ss. NR 140.24 and 140.26, unless a PAL exemption is granted pursuant to s. NR 140.21."

Based on the reasons listed above, the department cannot approve of the RAOR's recommended option of MNA. The Department, pursuant to its authority in s. NR 722.15(2) (a), Wis. Adm. Code, requires a re-evaluation of the remedial action options in order to achieve requirements in NR 722.09, including all the requirements in the ch. NR 700 administrative rule series. This evaluation should take into account that an enforcement standard exemption in s. NR 140.28, Wis. Adm. Code, is not appropriate for the conditions at this site and will not be granted, and that compliance with ch. NR 140, Wis. Admin. Code, is required anywhere groundwater is monitored for this site.

Section 3 of this document will provide additional justification for the department's determination that MNA is not an acceptable remedial strategy for this site at this time.

Section 3 – SITE-SPECIFIC TECHNICAL COMMENTS

In addition to the applicable sections of state law cited above, the department does not concur that MNA should be implemented at this time as the final remedial action at the Wauleco site for the following reasons:

1) The information provided in the September 24, 2015 RAOR does not support that MNA is an effective remedial option for this site.

2) The cost estimate for alternative 3 underestimates the cost of MNA, as it includes routine monitoring of only 13 wells of the present 38 wells.

The information provided in the September 24, 2015 RAOR does not support that MNA is an effective remedial option for this site.

As required in s. NR 722.07(4), Wis. Adm. Code, the closure committee evaluates many factors and variables when determining whether or not a proposed remedial action is a viable remedial alternative. Considering: 1) the volume and extent of free product remaining in the subsurface; 2) the extent and concentrations of the dissolved phase plume; 3) the degradation potential; 4) the lack of adequate source control proposed, and; 5) the lack of evidence that the plume is attenuating naturally, the department concludes that MNA is not a viable remedial option to achieve compliance with state and federal laws – particularly, those relating to restoring the environment to the extent practicable, demonstrating adequate source control and to attaining compliance with NR 140.10 groundwater quality standards within a reasonable period of time as required in s. 292.11(3), Wis. Stats., s. NR 140.26(2), Wis. Adm. Code, s. NR 722.07 (3), Wis. Adm. Code, and s. NR 726.6 (b) Wis. Adm. Code.

Documentation of Stable or Receding Plume:

A concentration vs. distance profile for pentachlorophenol (PCP) was presented as Figure 3 in the RAOR in order to illustrate the attenuation of PCP over time. This figure is similar to the profiles presented on Slide 17 of TRC's May 1, 2014 Draft Closure Request presentation, which included PCP concentration profiles from monitoring wells W41 to W21 and from W22 to W29. Both of these profiles are oriented side gradient of and tangential to the primary central axis of the plume. If a MNA profile is to be used to define natural degradation, it is essential that the profile follow the centerline of the plume. In this case, a profile corresponding to the centerline of the plume, beginning in the discharge area and terminating at W10A, would demonstrate a minimal decrease in PCP concentrations over that distance.

The profile in Figure 3 also highlights the variability of PCP concentrations in the southeastern part of the site. PCP concentrations at W11 are shown to have varied by an order of magnitude (100 ppb - 1000 ppb) over an eight-year period starting in July 2006 and ending in July 2014. PCP concentrations in W11 are not shown to trend downward over time. The same variability is shown by this profile in W41 PCP concentrations. An order of magnitude difference (1,000 ppb - 10,000 ppb) separates July 2011 from July 2014 with little indication of a downward trend in PCP concentrations in this well, especially considering the apparent variation in recent water levels. Well W27, while not varying as considerably as W41 or W11, shows no semblance of a decreasing trend in PCP concentrations since 2001.

Expanding the analysis of PCP concentrations beyond what is provided in Figure 3 of the RAOR shows relatively stable trends on other portions of the site; however, the absolute concentration levels are extremely high. Well W40 shows a stable trend with concentrations ranging from 6,400 ppb in July 2011 to 10,000 ppb in July 2012. Well W22, which is inside the ground water extraction (GWE) treatment area, shows stable, yet high PCP concentrations since July 2005. High water levels in 2011 correlate with reduced contaminant levels reflecting mixing zone sampling bias.

In stark contrast to the wells discussed above are W13, W18, and W28. These wells show a profound decrease in PCP concentration unparalleled elsewhere on the Wauleco site. TRC's 2015 Annual Groundwater Monitoring Report points to redox conditions within this area of the plume being more aerobic and able to biodegrade PCP. The precipitous decline in PCP concentration with the introduction of GWE suggests that another mechanism such as dilution may be occurring in this area.

Documentation of Restoration Timeframe being Achieved:

When determining whether MNA will be an effective remedy, the department must evaluate sites for their ability restore the environment to the extent practicable, with a restoration goal of the preventive action limit, within a reasonable period of time as required in s. NR 140.26(2), Wis. Adm. Code, s. NR 722.07(3), Wis. Adm. Code, s. NR 722.09(2)(b), Wis. Adm. Code, and s. NR 726.6(b), Wis Adm. Code. In doing so the department takes many factors into consideration. Some of the primary factors in determining if MNA is potentially going to be an effective remedy are:

1) adequacy of source removal;

2) contaminant concentrations;

3) contaminant trends;

4) degradation potential of the compound [per NR 722.07 (4) (a) 4. I], and;

5) demonstration that natural attenuation is occurring, as required in NR 722.07 (4) (a) 4. h.

The remaining volume of free product in the subsurface is conservatively estimated at 171,000 gallons; while the department estimates it could be as high as 420,000. It is acknowledged that most of the estimated volume is residual and resides below the water table. The LNAPL plume extends 1300 feet to the most downgradient monitoring point (before the plume discharges into the Wisconsin River) and ranges in thickness from 6 feet in the discharge area to 1.4 feet at the most downgradient monitoring point. This residual product acts as a continual source, as contaminants partition to the groundwater, and contribute to dissolved phase plume concentrations.

PCP concentrations in multiple wells remain in the 5,000 – 10,000 ppb range across the site; for reference, the groundwater quality standard (ES) is 1 ppb. While concentrations at some wells appear stable, other locations appear to display historically unstable concentrations, and natural attenuation does not appear to be occurring outside of the area influenced by the GWE system – which would be shut off if the MNA option would be approved by the department. In cases where water levels appear to influence PCP concentrations, trend analyses must take these influences into consideration.

Absolute concentrations of PCP across the site remain extremely high with respect to the preventive action limit. Considering the volume of free product remaining, the high absolute concentrations, and the weakness of evidence for natural attenuation, the department does not concur that natural attenuation alone will deplete the free product source and allow dissolved phase plume concentrations to achieve compliance with state laws, including ch. NR 140.

The cost estimate for alternative 3 underestimates the cost of MNA, as it includes routine monitoring of only 13 wells.

Groundwater data shows three distinct PCP plumes emanating from the current GWE system treatment area: one to the northeast that commingles with the 3M fuel or slate oil near DFOMW-11; one in the middle that flows east toward W10A; and one that appears to flow toward the southeast, defined by W-74. The center plume travels approximately 1400 feet before terminating at the Wisconsin River. The width of the overall plume(s) is approximately 1000 feet. Given the complexity of the plume dynamics, as well as the extent and nature of the plume across the site, 13 wells will not be adequate to define the

short- and long-term effects of shutting down the GWE system. Sampling all existing wells during the proposed monitoring period would significantly increase the cost, making MNA a less favorable option.

Additional Information Requested

The LNAPL volume estimate included in the 2015 LIF survey report appears to be skewed low. The report estimates LNAPL saturation ranging from 15-20% onsite, but only 7% offsite. The Department could find no evidence to substantiate this and thus greatly underestimates the volume of off-site product. In addition, LNAPL thickness contours onsite appear to be contoured incorrectly. Well L06 appears to have measured 6 feet of LNAPL and is shown with only 1.6 feet on the map. Also, the 3 foot thickness contours are mapped as 'islands' around L02, L06, and L07. There appears to be no reason not to contour a more contiguous central LNAPL area (i.e., monitoring well thicknesses are not indicative of LNAPL formation thickness). Remapping this central area with contiguous contours up to 6 feet and using TRC's parameter values (15-20% LNAPL saturation and 25% porosity) yields nearly double the amount of LNAPL volume for the on-site area. In other words, the site-wide LNAPL volume calculation of 171,000 gallons appears to be a low-side estimate based on favorable input parameters for porosity and residual LNAPL saturation. The Department concludes that should slightly higher and possibly more realistic values be used, a reasonable high side estimate of LNAPL volume could be 420,000 gallons.

Before additional volume estimates are completed, site-specific parameter values for LNAPL PCP concentration, residual LNAPL saturation and porosity should be established. Presentation materials provided by TRC indicate 5% PCP content for the LNAPL, while the 2015 LIF product estimate uses 4%; this resulted in a 20% reduction in PCP mass presented in the RAOR. The 25% porosity parameter does not appear to be based on site-specific data and may be skewed lower than actual site conditions. Relatively clean sand/gravel may have porosity values of up to 15% higher. This warrants further clarification by TRC, as Section 2.B.3 of TRC's April 14, 2014 Draft Justification for Case Closure and Case Closure Form states that porosity is 30%.

As mentioned above, some data show relationships between water levels and contaminant concentrations. Water level measurements need to be contemporaneous with sampling in order to accurately portray any relationship that may exist between the two. In the future, initial water level measurements should be taken from all wells on the same day, prior to each sampling round, followed by water level measurements from each well immediately prior to sampling. This will provide accurate water level information for mapping and contaminant correlation purposes.

The department also requests influent samples from each of the existing GWE system wells. The department also requests that all monitoring wells be sampled, regardless of the presence of product. If product is present it should be bailed prior sampling the well.

Steps Forward

In addition to the on-site GWE system, source material (free product) outside the historic extent of the GWE treatment system also requires a more active remedial action, including treatment and/or removal in order to achieve adequate source control at the site. The 2015 laser-induced fluorescence (LIF) survey shows areas of more than a foot of free product remains outside the current treatment area. Stable-but-high absolute concentrations of PCP are present in the southern and southeastern portions of the site as well. Because MNA alone will not achieve adequate source control as required by state law, treating

and/or removing this material will require the employment of other remedial options to be evaluated and selected in the revised RAOR. Adequate remediation of both free product and dissolved phase contaminants needs to be achieved before the Wauleco site can be considered for case closure under state law.

The department requires a re-evaluation of the remedial action options based on previous discussion. The re-evaluation should take into account the following factors:

1) The department does not find the on-going discharge to the Wisconsin River to be "acceptable". The point of standards application for groundwater compliance for this site is every point groundwater is monitored, as specified in s. NR 140.22(2)(c).

2) The department cannot grant an enforcement standard exemption based on criteria in NR 140.28 (4) based on the conditions at this site.

3) "Necessary restoration", as referenced in NR722.07 (4) (a) 4, pertains to all exposure pathways.

4) The restoration goal for the groundwater pathway is the preventive action limit within a reasonable period of time [NR 722.09(2)(b) 1, NR 140.26(2), NR 726,05(6)(b)].

5) Adequate source control must be achieved.

6) Stable or receding plume must be demonstrated.

The department would also like TRC to include an additional remedial option for evaluation – a second groundwater extraction (GWE) system to be operated downgradient of the existing GWE area of influence. This may potentially involve retrofitting the existing system to include shutdown of some existing wells to create capacity for new treatment wells. The purpose of this GWE system would be to address potential rebound from shutdown of existing system, as well as to control LNAPL source mass and high dissolved phase concentrations present outside the existing treatment area that are discharging to the river.

The department appreciates your approach to this remediation and we look forward to working with you on the details of your plan to move forward with the remedial action at this site.