

June 14, 2021

Mr. John Hunt
Wisconsin Dept. of Natural Resources
223 E Steinfest Road
Antigo, WI 54409

**Subject: Addendum to: Well Abandonment Work Plan
Attachment to Request to Manage Materials Form 4400-315**
FedEx Ground Package System
2929 Halvor Lane
Superior, Wisconsin

BRRTS No. 07-16-583046 (FedEx Facility)
BRRTS No. 02-16-000331 (Amoco Oil Terminal)

Dear Mr. Hunt:

In the Well Abandonment Work Plan submitted to the Wisconsin Department of Natural Resources (WDNR) on March 12, 2021, Antea Group proposed for the abandonment of three existing monitoring and recovery wells installed by Antea Group on behalf of BP Products North America Inc. (BP). The Well Abandonment Work Plan serves as an attachment to Form 4400-315, submitted by BBJ Group on May 24, 2021. After additional discussion with BBJ Group on the Materials Management Plan, two additional monitoring wells are proposed to be added to the list of wells to be abandoned. In addition to the original request to abandon existing monitoring and recovery wells MW-3, MW-23, and RW-06, Antea Group proposes the addition of EW-09 and EW-10 to the well abandonment proposal to accommodate the expansion of the adjacent property FedEx facility. The history and conditions of these wells, including EW-09 and EW-10, were detailed in the contents of the Well Abandonment Work Plan. Based on the summary and conclusions presented in the Well Abandonment Work Plan, Antea Group recommends that all wells be abandoned without replacement.

Additional evaluation has also been completed on wells MW-23 and RW-6 since the Well Abandonment Work Plan has been submitted and includes an analysis on the LNAPL thicknesses and recoverability in the wells. Regular well gauging and LNAPL bailing has been completed on the wells since April 29, 2021, and the results are presented in greater detail below. The results of the LNAPL recovery events indicate that the apparent LNAPL thickness gauged within the wells is not indicative of LNAPL recoverability, and mass recovery technology such as a pumping or skimming system would not be effective.

LIGHT NON-AQUEOUS PHASE LIQUID (LNAPL) RECOVERY

Between April 29, 2021 and June 8, 2021, LNAPL gauging and recovery events were completed at wells MW-23 and RW-06 to assist in the determination of whether additional recovery could be conducted on the wells using mass recovery systems. A total of six gauging and recovery events were completed. The wells were gauged prior to LNAPL removal, and LNAPL was removed with bailers to the maximum extent practicable.

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Graphs of the depth to water and depth to LNAPL gauged in MW-23 and RW-06 before LNAPL recovery was performed and the total estimated volume of LNAPL recovered via bailer are included as **Appendix A**. Both of the wells yielded the most product during the first baildown event, and recovery quickly decreased until a recovery of 0.1 gallons was observed during the third baildown event. Recovery was consistent and limited to 0.2-0.1 gallons for all remaining recovery events.

Recovery of the LNAPL through mass removal technologies such as a skimming system would not be a feasible at these wells. LNAPL skimming is limited to the recovery of mobile LNAPL where LNAPL saturations are sufficient to produce LNAPL transmissivities greater than the recoverability threshold of 0.8 ft²/day (ITRC, 2009). The LNAPL transmissivity at monitoring well MW-23 was previously reported as 0.37 ft²/day (Antea Group, March 12, 2021) which is below the ITRC threshold value. Based on these observed field conditions and the conclusions presented in the Well Abandonment Work Plan, wells MW-23 and RW-06 are proposed to be abandoned without replacement. Additional LNAPL recovery on the wells is not feasible, and the existing LNAPL is immobile with limited residual dissolved phase benzene contaminant mass as documented by downgradient groundwater sampling over the past 33 years (analytical and gauging tables and benzene concentrations trends are included in the Well Abandonment Work Plan).

Questions regarding this memorandum can be directed to Layne Kortbein at the phone number and email listed below.

Sincerely,

A handwritten signature in black ink that reads "Layne Kortbein".

Layne Kortbein
Project Professional
+1 651 697 5117
Layne.Kortbein@anteagroup.us
Antea Group

ATTACHMENTS

APPENDIX

Appendix A – LNAPL Gauging and Recovery

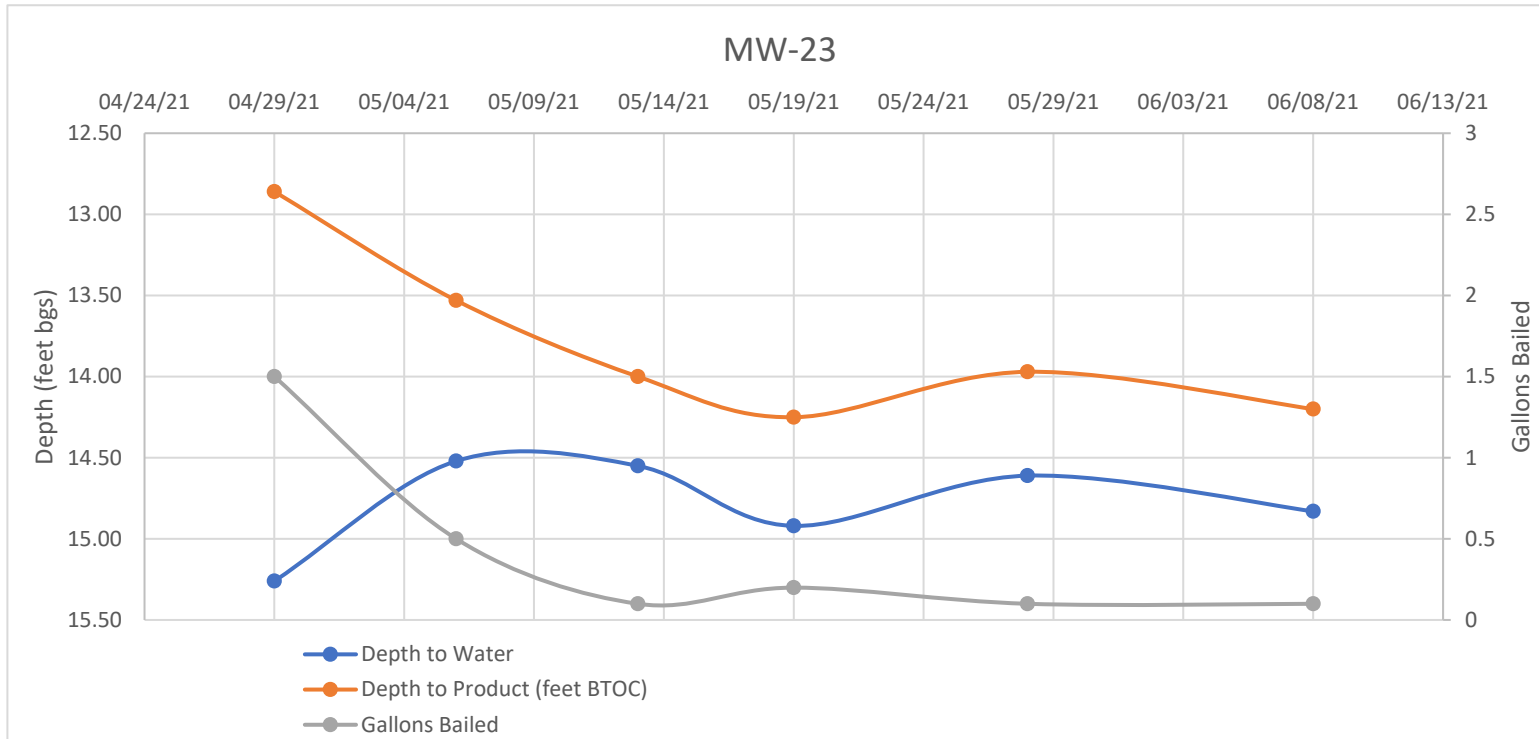
REFERENCES

Antea Group, (March 12, 2021). *Well Abandonment Work Plan*.

The Interstate Technology & Regulatory Council. (2009, December). Evaluating LNAPL Remedial Technologies for Achieving Project Goals.



Appendix A - LNAPL Recovery



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