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October 27, 2022

Clayton (Matt) Dayoc
US Army Environmental Command
2455 Reynolds Road
Joint Base San Antonio Fort Sam Houston, TX 78234

SENT BY ELECTRONIC MAIL

Subject: Response to 2022 Monitoring Well Installation Plan
Former Badger Army Ammunition Plant, Baraboo, WI
WDNR BRRTS Activity #02-57-001002 & 02-57-526445

Dear Mr. Dayoc:

The Wisconsin Department of Natural Resources (WDNR) has received and reviewed the document entitled "2022 Monitoring Well Installation Plan" (the Plan), dated September 29, 2022. The Plan was submitted by SpecPro Professional Services, LLC (SpecPro), on the Army Environmental Command's (Army) behalf, for review and response by the WDNR. WDNR has reviewed the Plan and approves the Army's proposal with the following comments:

The Plan proposes the installation of eight Wis. Adm. Code s. NR 141 compliant monitoring wells, consisting of three well nests, to monitor groundwater contamination associated with the Deterrent Burning Ground (DBG) and Propellant Burning Ground (PBG) plumes. Two of the proposed monitoring wells will be near the leading edge of the DBG plume, three of the proposed monitoring wells will be within the PBG plume approximately 2,600 feet southeast of the former Badger Army Ammunition Plant boundary, and three of the proposed monitoring wells will be near the leading edge of the PBG plume. The Plan did not include recommendations for the installation of additional monitoring wells to define the degree and extent of the Central Plume.

WDNR approves of the Plan's proposed installation of Wis. Adm. Code s. NR 141 compliant monitoring wells to monitor downgradient groundwater contamination associated with the DBG and PBG plumes.

WDNR requests that the Army propose the installation of additional Wis. Adm. Code s. NR 141 compliant monitoring wells to monitor downgradient groundwater contamination associated with the Central Plume. This request was discussed during the May 18, 2022 call, cited by the Plan, between WDNR, the Army, SpecPro, and United States Geological Survey (USGS). WDNR provides the following justification for this request:

- In a letter dated May 15, 2020, WDNR provided comments on the Army's "Draft Remedial Investigation/Feasibility Study for Site-Wide Groundwater at the Former Badger Army Ammunition Plant, Baraboo, Wisconsin" (RI/FS), dated November 2019. Two of WDNR's comments discussed the need for additional monitoring wells in the downgradient area of the Central Plume. In the Final RI/FS, dated June 2021, the Army provided responses to WDNR's comments.
    - WDNR Comment #1: "Detections of [contaminants of concern (COC)] in monitoring wells near the downgradient edges of the Deterrent Burning Ground Plume and Central Plume suggest plume expansion in those areas. An enhanced monitoring network for those areas should be developed and installed. Long term use of residential wells as the primary means of plume delineation is unacceptable."

        - Army Response #1: *"For the past 15 years, the Army has been closely monitoring the groundwater in the downgradient portion of the Central Plume. Throughout this time, the Army has also made a commitment to monitor the homeowner's drinking water and replace impacted wells. During 2018 and 2019, the Army sampled the residential wells located south of Gruber's Grove Bay and potentially downgradient of the Central Plume. Dinitrotoluene (six isomers) was not detected in these residential wells, indicating there was no likely migration of the Central Plume beneath Gruber's Grove Bay. The Army will consider these recommendations and discuss them with the WDNR."*
    - WDNR Comment #2: "The characterization of the downgradient extent of the Central Plume is inadequate. The fact that this plume is impinging upon a residential area accentuates the needs for additional study. The hydrogeologic flow patterns (particularly at depth) near Grubers Grove Bay and beyond are poorly defined. The likely ultimate fate of this plume, if it were to continue to propagate, needs to be better defined."
        - Army Response #2: *"The Army has been working with the USGS to evaluate the current groundwater monitoring network. The Army will use the USGS' recommendations to enhance the monitoring well network in the downgradient portion of the Deterrent Burning Ground and Central Plumes."*
- The USGS published a report entitled, "Assessment of Contaminant Trends in Plumes and Wells and Monitoring Network Optimization at the Badger Army Ammunition Plant, Sauk County, Wisconsin" (USGS Report), dated March 2021. The purpose of the USGS Report was to delineate contaminant plume boundaries and assess trends in contaminant concentrations.
    - The USGS Report used statistical approaches in determining plume delineation and contaminant trends. However, this approach had apparent difficulties assessing the Central Plume.
        - Plume analysis could not be completed for the Central Plume for any COC due to an insufficient number of wells with detections.
        - The large spacing of wells with exceedances and the proximity of other wells with contaminant concentrations less than the ES made the degree of connectedness between wells vary at different times, affecting plume delineation.
    - The USGS Report used residential wells as the primary means for plume delineation in the downgradient portion of the Central Plume. The Central Plume was delineated for dinitrotoluene (DNT) in the vicinity of SEN-0503B because of the high density of residential wells being sampled in this area.
    - The USGS Report provided recommendations to optimize the PBG and DBG plume monitoring networks, but not the Central Plume monitoring network due to limited groundwater monitoring data for the Central Plume.
- WDNR still believes the characterization of the downgradient extent of the Central Plume is inadequate and the continued use of residential wells as the primary method for plume delineation is unacceptable.
    - As shown in the USGS Report and the most recent Central Plume data provided in the document entitled, "June 2022 Monitoring and Residential Well Groundwater Data", dated August 17, 2022, the DNT groundwater plume continues to impinge upon residential areas located near the downgradient edge of the plume. One residential well, WE-XK342, has had a history of 2,6-DNT detections and several residential wells in Water's Edge Subdivision have had to be replaced due to DNT contamination.
    - WDNR appreciates the Army's commitment to sampling residential wells, however, residential wells are not compliant with acceptable design standards for groundwater monitoring wells as required by Wis. Adm. Code s. NR 141, and are thus unacceptable for defining the nature, degree, and extent of groundwater contamination as required by Wis. Adm. Code s. NR 716.

Additionally, WDNR requests that the Army propose installation of Wis. Adm. Code s. NR 141 compliant monitoring wells to determine the northwestern extent of the Central Plume. Since June 2020, concentrations of DNT in groundwater have increased from non-detect to above the Wis. Adm. Code s. NR 140 Enforcement

Standard in the following monitoring wells within the northwestern extent of the plume: RPM-8901, RIN-0702C, and RIM-1003. The western extent of the Central Plume in this area is poorly defined.

WDNR appreciates your efforts to investigate and remediate this site. If you have any questions, please contact me at (608) 206-5809 or luke.lampo@wisconsin.gov.

Sincerely,

Luke Lampo
Hydrogeologist
Remediation & Redevelopment Program

cc: Quang Nguyen, Army Environmental Command
Joel Janssen, SpecPro