

Ms. Alyssa Sellwood, P.E.
Complex Sites Project Manager, Remediation and Redevelopment Program
State of Wisconsin Department of Natural Resources
101 South Webster Street
Box 7921
Madison, WI 53707-7921

November 19, 2021

BRRTS No.: 02-38-580694

Our Ref: 30088772.00001

Subject: Response to WDNR Letter and Addendum 1 – Air Pathway Site Investigation Work Plan: Approval with Additional Requirements; Tyco FTC PFAS 2700 Industrial Parkway South, Marinette, WI

Dear Ms. Sellwood,

Tyco Fire Products LP (Tyco) has prepared this response to the Wisconsin Department of Natural Resources (WDNR) letter dated September 14, 2021, regarding the Air Pathway Site Investigation Work Plan, Approval with Additional Requirements; Tyco FTC PFAS 2700 Industrial Parkway South, Marinette, WI, BRRTS #02-38-580694.

Tyco appreciates the WDNR's review and approval of the phased approach to investigate the potential air migration pathway for per- and polyfluoroalkyl substances (PFAS) in the April 23, 2021 Air Pathway Site Investigation Work Plan (Work Plan). Although the WDNR does not require a response to its September 14th letter, this letter summarizes Tyco's positions on the additional field investigations and documentation reporting prior to implementing the Work Plan. This letter serves as Addendum 1 to the Work Plan.

Field Investigation Additions to Assess Aerial Deposition

The WDNR's September 14, 2021 letter added the following tasks to the first phase of the Work Plan:

- **Soil Sampling – Wetland Areas**
 - Collection of shallow soil samples in wetland areas.
 - Separate categorization of the soil samples taken from wetlands.

- Evaluation “if patterns in the results from wetlands are consistent or different from non-wetland areas”.
- **Soil Sampling – Multiple Horizons**
 - Collection of “distinct samples” from multiple soil horizons, at least topsoil (A) and subsoil (B), from all or a subset of the sample locations.
 - Use of the data to evaluate migration and retention of PFAS in different soil horizon layers that have different organic carbon and geochemical conditions.
- **Groundwater Sampling**
 - Installation of NR 141 monitoring wells in at least three locations west of Ditch A on the FTC property.
 - Collection of groundwater samples for PFAS from these wells during the first phase of field work, with the allowance that shallow wells could be constructed near the water table as proposed in the Work Plan.

At this point, there is a sound technical basis for conducting the field investigation elements of the Air Pathway Work Plan as originally recommended because it is designed to focus on obtaining data from soils that could be affected by air deposition while reducing the possibility of other outside influence(s) that may affect data interpretation. The approved work plan is the best approach to directly address Data Gap #3 in WDNR’s comment letter dated February 23, 2021, i.e., Soil sampling to evaluate potential airborne deposition of PFAS.

The WDNR’s February letter also points to surficial sampling in undisturbed locations, which we agree is most appropriate for the FTC given the shallow water table and the potential that the wetlands and subsurface soils will reflect impacts from the groundwater plume rather than potential aerial deposition of PFAS from the intermittent, seasonal testing of aqueous film-forming foam (AFFF). Tyco appreciates the WDNR’s acknowledgement of the concern regarding the interaction between PFAS concentrations in surface and groundwater. This remains our most critical concern regarding soil sampling at deeper horizons and in wetland areas in the context of aerial deposition. We therefore propose to defer these additional potential investigations to future work if appropriate for the overall site investigation.

In developing the Work Plan, Tyco reviewed available guidance and studies on soil sample depths to assess the potential for aerial deposition of PFAS. There is no standardized United States Environmental Protection Agency (USEPA) guidance on soil sampling for PFAS

regarding aerial deposition questions.¹ Available guidance on procedures for soil sampling of PFAS regardless of pathway is limited. The June 2020 USEPA Region 4 Guidance on soil sampling for PFAS identifies 0 to 6 inches as the “most common interval” for surface or shallow sampling. The Region 4 guidance was referenced for the FTC sampling program presented in the Work Plan. June 2021 guidance from the New York State Department of Environmental Conservation (NYSDEC) also identifies 0 to 6 inches as an appropriate depth to collect surface soils for analysis of PFAS irrespective of pathway.² We understand that the WDNR expects to develop a standardized soils sampling program through its December 2020 PFAS Action Plan, but it is not clear whether this will include samples specifically collected to evaluate the potential for aerial deposition. Guidance produced by the neighboring state of Michigan and the Interstate Technology Regulatory Council (ITRC) focuses on procedures to avoid cross contamination of soil samples collected for PFAS analysis but does not address sample collection depths.³ The few available studies addressing aerial deposition have included surface samples as well as some samples collected from 12 or 16 inches deep; however, depth to groundwater was considered in the design of these studies and the PFAS emissions sources in each case were stacks at manufacturing or incineration facilities.⁴ Such facilities would be expected to have a higher potential for aerial deposition of PFAS as compared to fugitive sources. Thus, the Work Plan appropriately considered site and local conditions in setting a soil depth that focuses on surface soils 0 to 6 inches in this phase to assess the potential for aerial deposition.

From a statistical perspective, the planned soil samples will answer the question being asked regarding the potential for aerial deposition without the need to collect additional samples from wetlands, subsurface soils, or groundwater. The Work Plan was developed to systematically evaluate cause and effect by initiating the air pathway investigation via a dense grid of 52 shallow soil sample locations. The recommended soil sampling locations in the Work Plan reflect significant areas of predominant wind directions, which allows evaluation of one of the

¹ See “PFAS Atmospheric Deposition Sampling Methods” at <https://www.epa.gov/chemical-research/status-epa-research-and-development-pfas>, accessed October 2021.

² See Region 4 USEPA, Laboratory Services and Applied Science Division, “Soil Sampling Operating Procedure”, ID LSASDPROC-300-R4, Athens, Georgia, June 11, 2020 <https://www.epa.gov/sites/default/files/2015-06/documents/Soil-Sampling.pdf>; and NYSDEC, “Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC’s Part 375 Remediation Programs”, June 2021. https://www.dec.ny.gov/docs/remediation_hudson_pdf/pfassampanaly.pdf

³ See Michigan Department of Environment, Great Lakes, and Energy, Michigan PFAS Action Response Team, “General PFAS Sampling Guidance”, October 2018 and “Soil”, November 2018, at https://www.michigan.gov/pfasresponse/0,9038,7-365-88059_91297---,00.html, accessed October 2021 and ITRC “PFAS – Per- and Polyfluoroalkyl Substances, 11 Sampling and Analytical Methods, Sections 11.1.7.6 Surface Soil and 11.1.7.7 Subsurface Soil” at https://pfas-1.itrcweb.org/11-sampling-and-analytical-methods/#11_1, accessed October 2021.

⁴ For example, see Tim Schroeder et al., “PFAS soil and groundwater contamination via industrial airborne emission and land deposition in SW Vermont and Eastern New York State, USA” in Royal Society of Chemistry, *Environ.Sci: Processes Impacts*, 2021, 23, 291. DOI: 10.1039/d0em00427h.

WDNR's stated objectives in the September 14, 2021 letter, representation of "a significant area of the property that are within the regional wind flow directions." The resulting data will be evaluated statistically to ascertain whether a correlation exists between concentrations, distance, and/or wind direction, along with supporting information developed through the Work Plan on aerial discharge mechanisms and available PFAS compositional markers. The Work Plan sets forth a decision process on answering the air deposition question in a data-driven, stepwise manner, so any further sampling of soil or groundwater would be determined in response to the first phase data. The addition of these three field elements (i.e., wetlands soil sampling, non-surficial soil sampling, and groundwater sampling) during the first phase would impact controls that were built into the Work Plan to increase the statistical confidence in addressing the potential for aerial deposition of PFAS. The additional investigations may provide confounding information in the context of the air pathway and should be addressed separately as the investigation warrants.

For these reasons, we will initiate the field investigations as defined in the April 23, 2021 Work Plan by November 12, 2021. This timing aligns with the WDNR's direction that the Work Plan must be implemented within 60 days of approval. We respectfully submit that additional field investigations that may be warranted, including installation of NR 141 wells west of Ditch A, are more appropriate to consider in a future work plan that is part of the overall site investigation and not part of this sampling program, which is designed to specifically assess potential aerial deposition.

Documentation Report Additions to Assess Aerial Deposition

Tyco will prepare a report documenting the field activities, results, and statistical evaluation, as well as the other elements of the Work Plan that address aerial discharge mechanisms, PFAS compositional markers, and air modeling inputs. The WDNR's September 14, 2021 letter also added the following documentation elements to be included in the report:

- **PFAS Signature Analysis**
 - Discussion on how known or potential fate and transport processes may affect the PFAS signature if AFFF is mobilized in air.
- **Evaluation of Soil Sampling Results to Assess Aerial Deposition**
 - Hypotheses to be tested and the basis for selection of the statistical analysis.
 - Discussion on questions/areas of uncertainty related to the possible influence of (a) potential microheterogeneities in soil concentrations; (b) leaching or retention of PFAS following historical aerial deposition; (c) vegetation/tree cover in the sampling area; and (d) potential plant uptake of PFAS from soil.

- Figures showing concentration contours for PFAS detected in the soil other than perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS), particularly precursor compounds detected.
 - Specific criteria used to derive whether the PFAS detected in soil may be contributing to PFAS detected in groundwater.
 - Further assessment of background concentrations of PFAS in soil at sites in similar settings and comment on whether site-specific background concentrations through testing in this area are needed.
- **Air Modeling**
 - If available, records on fire training dates, times, weather conditions (wind speed, wind direction, temperature), which may better predict potential air migration pathways from these events.
 - Discussion on how the use of discrete weather conditions as compared to long-term regional averages may affect modeling results.
- **Conclusions and Next Steps**
 - Documentation of management of investigative derived waste.
 - Conclusions and recommendations for next steps, including a schedule.

Tyco will address these additional documentation reporting elements based on available records, scientific literature, modeling guidance, and data collected through the air pathway soils investigation and the larger site investigation. Some requests are in progress, for example, hypotheses to be tested and the basis for selection of the statistical analysis. The requested figures as described above will be included in the report. We are compiling available data regarding background concentrations at similar settings, as available, and will review available records on fire training dates requested for the air modeling documentation. We also plan to analyze all or a subset of the 52 soil samples collected for the fraction of organic carbon (f_{oc}) content to aid in the evaluation of fate and transport of PFAS that may be detected in surface soils. Nevertheless, we anticipate that it will not be possible to fully answer the WDNR's questions/areas of uncertainty or to define specific leaching criteria due to the emerging state of the science around these topics in the academic and research community.

Alyssa Sellwood, P.E.
Wisconsin Department of Natural Resources
November 19, 2021

We appreciate the opportunity to provide these comments to the WDNR and are available to discuss them with you and your team. In the meantime, we have begun initiating the Work Plan as of November 12, 2021.

Sincerely,

A handwritten signature in black ink, appearing to read "Jeffrey Danko". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

Jeffrey Danko
Tyco Fire Protection Products
Director Remediation Programs

CC.
Scott Wahl
Denice Nelson
Scott Potter
Linda Kemp