

Ms. Alyssa Sellwood
Remediation and Redevelopment Program
Wisconsin Department of Natural Resources
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Subject:
Response to Comments on the May 26, 2020 Conceptual Site Model
Tyco Fire Technology Center,
2700 Industrial Parkway South, Marinette, Wisconsin
BRRTS Activity#: 02-38-580694

ENVIRONMENT

Dear Ms. Sellwood:

Date:
January 12, 2021

On behalf of Tyco Fire Products LP (Tyco), Arcadis US, Inc. (Arcadis) submits the following responses to the September 24, 2020 Wisconsin Department of Natural Resources (WDNR) comments on the May 26, 2020 Conceptual Site Model (CSM) for the Tyco Fire Technology Center (FTC) Site (the Site) in Marinette, Wisconsin, referenced above. Each WDNR comment is presented below, followed by Tyco's response.

Contact:
Scott Potter

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The CSM Report was prepared in tandem with the Interim Site Investigation Report (SIR), submitted under separate cover on May 15, 2020. Both documents provided a summary of PFAS investigations associated with the FTC: the SIR describing the work completed and investigation results, and the CSM synthesizing and interpreting the results. Both documents captured the site understanding as of the Spring 2020 and represent our comprehensive interpretation of over 10,000 data points presented in a total of 8 technical submittals related to ongoing investigations. Additional investigations are currently underway that will improve upon the site understanding and continue to advance the project within the Wisconsin Admin. Code § NR 700 process.

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As noted in the comment responses below, and in the separate response-to-comment letter addressing similar WDNR comments on the Interim SIR, Tyco has existing plans and is already implementing the work plans to conduct investigations that will address many of WDNR's concerns.

General

Comment 1: The CSM is reported to provide a framework for data completeness determination; however, a determination has not been made in this CSM. Data has been presented and conclusions given without any

evaluation of remaining data gaps. The CSM should identify data gaps and make recommendations or provide general approaches for how these data gaps are to be addressed.

Tyco Response: The next update to the CSM will include discussion of data gaps and/or uncertainties, where they relate to site-characterization completeness, and as needed to support selection, design, and implementation of remedial actions. Tyco disagrees that the CSM is an appropriate platform to make specific or general recommendations about subsequent investigations. Work plans based on the CSM are better suited for those next steps.

Comment 2: A revised and updated CSM should include a flow chart of Primary Media, Primary Release Mechanisms, Secondary Media, Secondary Release Mechanisms, Pathways and Contaminated Media, and Receptors. This will allow identification of data gaps by media and pathways to evaluate progress and determination as to when the site investigation is complete.

Tyco Response: Agreed. A source and release mechanism flow chart will be included in the next update to the CSM.

Comment 3: The CSM lacks a detailed discussion of all site operations through time. A chronology of activities including history of fire training activities along with types of foams used/stored should be included.

Tyco Response: The CSM provided all of the available data regarding historical activities involving PFAS at the FTC.

Comment 4: The CSM lacks consideration of historical processes on site and historical hydrology. The report briefly describes historical development of structures on site but does not include historical aerial imagery or descriptions of site development and excavations.

Tyco Response: The CSM includes discussion of historical conditions in several places. Section 1.3 of the CSM discusses the history of FTC development. Section 3 of the CSM describes the historical and current PFAS-related processes at each building and outdoor area. Section 4.2.2 of the CSM discusses historical hydrology. Historical aerial photos of the FTC were submitted to WDNR in Appendix A of the April 2018 Revised Site Investigation Work Plan.

Comment 5: The CSM should provide consideration to the 34 PFAS compounds in the Wis. Admin. Code NR 140 Cycle 11. These additional PFAS analytes should be considered based on likelihood for proposed enforcement standards in the fall of 2020.

Tyco Response: As described in the FTC Interim Site Investigation Report submitted to WDNR on June 9, 2020, site investigations were completed under work plans submitted to WDNR. Those work plans described that samples would be analyzed for all 14 PFAS compounds that are reportable using USEPA Method 537. In a January 23, 2020 meeting, WDNR requested that the PFAS analyte list be expanded to 36 PFAS compounds. The Quality Assurance Project Plan, submitted to WDNR on April 15, 2020, listed the 36 PFAS compounds for which future samples would be analyzed. As the data discussed in the CSM were collected prior to WDNR's request for 36 PFAS analytes, the body of data does not include all of these analytes and therefore the CSM does not discuss the 36 PFAS analytes. Samples collected since January 23, 2020, have been analyzed for the 36 PFAS compounds.

Plume Interpretation

Comment 1: The DNR does not concur with the conclusion that extent of PFAS contamination in groundwater is adequately delineated. Figure 27 of the CSM presents a single 20 ng/L line to depict the perceived area of groundwater impacts extending radially from the FTC. Per Wis. Admin. Code § NR 716.15(4)(c), an iso-concentration map is required to depict concentrations in each environmental media. In addition, the plume should be plotted to the proposed DNR preventative action level (PAL) of 2 ng/l, as remedial actions are being decided based on PFAS detections below 20 ng/l. The report indicates detailed plume plots are being deferred to a future submittal of a three dimensional groundwater flow and contaminant transport model; however, preliminary drawings of the PFAS plume data/extent should be provided in order to help visualize the plume based on current data and analysis, and to allow comparison of the current interpretation to future modeled results.

Tyco Response: Detailed groundwater isoconcentration maps were shared with DNR during a "screen sharing" virtual meeting on September 11, 2020. Updated versions of those isoconcentration maps, including 2 ng/l for combined PFOS and PFOA concentration line were included in the November 16, 2020 Groundwater Flow and Solute Transport Model Report submitted to DNR. Soil data isoconcentration maps for the Outdoor Testing/Training Area and Marine Testing Area are attached to the response-to-comment letter relating to May 2020 Interim SIR, also submitted to Tyco on September 24, 2020. Other media for which sample data exist (e.g., surface water, sediment, stormwater, and fish tissue) are not spatially continuous in plan view and therefore are not suitable for isoconcentration mapping.

Current isoconcentration mapping depicts PFOA, PFOS and the sum of the two compounds. Future versions of isoconcentration figures will also present the sum of six compounds (FOSA, NEtFOSE, NEtFOSA, NEtFOSAA, PFOS, and PFOA) based on WDHS's recent Cycle 11 recommendations. Isoconcentration figures of other PFASs will be generated as needed for compounds with WDHS recommended enforcement standards and where detections above the standard exist. Results of PFASs without recommended enforcement standards that are on the current 36-compound analyte list will be reported in tables. The data will be evaluated to determine if isoconcentration figures would facilitate data interpretation.

Comment 2: The northeast lobe of the plume extends well beyond Ditch B which is defined as predominately a gaining stream. Additional explanation should be provided regarding the extent of the plume beyond this ditch if the ditch were not losing during certain periods of time.

Tyco Response: Ditch B is predominantly gaining but is not a complete groundwater discharge boundary. As described in the CSM, Ditch B is interpreted to intercept portions of overburden groundwater flow, while some deeper groundwater migrates underneath. Tyco is in the process of collecting additional groundwater data within the plume at Ditch B as part of pre-design investigation for implementation of groundwater extraction and treatment. These data will provide a better understanding of the groundwater/surface water interactions as well as the underlying plume. These data and interpretation will be used to support the Ditch B remedy and will be described in detail in the Remedial Design Report (RDR), expected to be submitted in early 2021.

Comment 3: The CSM lacks a statistical evaluation of site data including a geostatistical evaluation of PFAS concentrations in groundwater both horizontally and vertically. At minimum, a plume concentration map should be developed showing the full range of PFAS concentrations detected.

Tyco Response: The geology, hydrology, and chemistry of the groundwater plume are not suited for geostatistical evaluation. The scale of the investigation area, data density, and heterogeneity of the natural systems would make such analyses unreliable. Typical algorithms for interpolating data assume continuity between points. Such assumptions are often false, particularly where heterogeneities in the geology exist. The detailed groundwater isoconcentration maps shared with DNR during the September 11, 2020 virtual meeting were generated through a combination iterative analysis by a geoscientist, considering the groundwater quality, hydrostratigraphic and potentiometric data. This approach is more time-consuming than geostatistical interpolation but provides a more realistic interpretation of the data that takes into account the complexities of the aquifer. Updated versions of those isoconcentration maps were included in the November 16, 2020 Groundwater Flow and Solute Transport Model Report submitted to DNR. See also the response to Plume Interpretation Comment 1, above, regarding which PFASs will be contoured.

Wetlands

Comment 1: Wetlands across the general site area are depicted on Figure 5. Further discussion as to their role in potential PFAS contaminant fate and transport should be provided in the CSM. To date, no surface water, sediment or pore water samples have been collected in the wetlands that provide a potential pathway for PFAS migration. Wetlands of interest primarily include those south of the FTC, adjacent to, and along Ditch A; however, wetlands extending east and southeast of the FTC should also be considered in the CSM.

Tyco Response: The hydrology of wetlands is discussed in Sections 2.5.2 and 2.5.3.1 of the CSM, particularly as they relate to groundwater surface water interactions and groundwater recharge.

The hydrologic and transport functions of wetlands were further evaluated via the numerical groundwater modeling, as reported in the November 16, 2020 Groundwater Flow and Solute Transport Model Report.

These evaluations show that the role of wetlands in the hydrologic system can be adequately understood via existing data collected in groundwater, soil and surface water adjacent to the wetlands. Tyco disagrees that additional investigation directly within the wetlands is needed to adequately characterize wetlands media or their function in the CSM. The data collected have demonstrated that this is a groundwater problem and not a wetlands issue. Moreover, data from such investigations would not provide information that materially advances progress toward an effective remedial action for groundwater.

Geology/Hydrogeology

Comment 1: More description and definition of the site area geology/hydrogeology has been provided in the CSM than in previous reports. This has been done with text description and through the portrayal of two cross- sections. Additional site cross-sections should be provided through the western side of the site area, from west to east on the south side of the area and along the Green Bay shoreline. Cross-sections should contain PFAS soil and groundwater concentrations where available along the sections.

Tyco Response: Additional cross sections will be included in the next update to the CSM. The prior cross sections and additional cross sections will include posted concentrations of principal PFAS components in groundwater.

Comment 2: The Report should provide discussion to indicate locations of perceived preferential flow in the unconsolidated deposits based on aquifer heterogeneity in order to better understand contaminant flow and transport, and contaminant nature and extent on a more local scale, including along plume edges.

Tyco Response: Section 2.5.3 of the CSM provides interpretations of groundwater flow that incorporates the influence of heterogeneity and aquitards on flow patterns. Additional analysis of transport patterns will be provided in the Groundwater Modeling Report, expected to be completed in early 2021.

Comment 3: Regional and local geologic structural features should be discussed and shown (i.e., faulting) in the unconsolidated deposits and bedrock along with discussion of any influence on groundwater and contaminant flow.

Tyco Response: No faults are known to exist in the study area; however, additional discussion of structural features will be included in the next update to the CSM.

PFAS Composition vs. Plume Demarcation

Comment 1: Various statements are made in the text relating plume position associated with only the OTA as opposed to other potential sources. Additional data regarding PFAS contaminant fate and transport is required to support the current CSM regarding plume demarcation, along with detailed plume plots, a PFAS source inventory and PFAS signature analysis related to the mixture of AFFF used on the OTA over the operational history of the OTA.

Tyco Response: An expanded analysis of transport patterns will be provided in the November 16, 2020 Groundwater Flow and Solute Transport Model Report submitted to DNR. Additional PFAS signature analysis based on PFAS mixtures will be included in the next update to the CSM. See also Response-to-Comment 3 regarding historical sources.

Air Source

Comment 1: With respect to the CSM, aerial deposition was not fully evaluated as surface soil sampling has only been conducted on-site. Additional surface soil sampling should be conducted in off-site locations particularly in areas where other PFAS migration pathways are incomplete (i.e., upgradient areas) and in undisturbed areas where development or erosion has not altered the depositional area.

Tyco Response: Additional soil sampling was completed in the Fall of 2020 to help evaluate potential air deposition pathways. Sample locations were selected to the west and south of the OTA in areas where other PFAS migration pathways (i.e., groundwater and surface water) are incomplete. An analysis of the soil sampling results, in which only trace concentrations of PFAS were detected, demonstrates that aerial deposition does not transport PFAS offsite. Based on this analysis, additional soil sampling to evaluate a hypothetical air-deposition pathway is not needed.

Conclusion

Comment: Be aware that during your investigation, you are required to comply with Wis. Admin. Code chs. NR 700-754 and all other applicable statutes and administrative rules, including those pertaining to solid and hazardous waste management and/or wastewater discharges. Wis. Admin. Code ch. NR 716 details specific requirements for site investigations and for interpretation and presentation of your findings. Submit an updated CSM in conjunction with the next site investigation report that addresses the comments and data gaps presented in this response letter.

Tyco Response: Comment noted.

If you have any questions regarding these comment responses, please let me know.

Sincerely,

Arcadis U.S., Inc.



Scott T. Potter, PhD
Chief Hydrogeologist/Sr. Vice President

Copies:

Bridget Kelly – WDNR

David Neste – WDNR

Jeffrey Danko – Tyco