Geologic Review

DEQ-RRD Grand Rapids District

Perfluoroalkyl and Polyfluoroalkyl Substances Plume Evaluation of the Northeast Wolven Study Area 11-2018

This evaluation of perfluoroalkyl and polyfluoroalkyl substances (PFAS) impact encompasses this area northeast of the suspected disposal area in the Wellington Ridge neighborhood to the Rogue River. The evaluation includes residential well data collected by Wolverine World Wide (WWW) and the MDEQ-RRD. The primary PFAS groundwater plume migrates from the source area west to the Rogue River; additionally, significant secondary plume impacts groundwater from the source area in Wellington Ridge to the southeast to the Rogue River. In the Wolven Northeast section of the study area, current data suggest two secondary plumes extend from the source area in Wellington Ridge to the Rogue River, one following the un-named creek that runs from the Wellington Ridge Neighborhood to the northeast and another plume that approximately follows 11 Mile Road NE to the Rogue River. The overall Wolven Jewell PFAS groundwater plumes are illustrated below and the PFOA/PFOS as well as total PFAS maps of Northeast Wolven are attached.



PFAS groundwater plumes emanating from the Wolven-Jewell source area in Wellington Ridge. The source area is illustrated by the orange triangle; the principle PFAS groundwater plume is illustrated by the solid lines and the secondary PFAS groundwater plumes are illustrated by the dashed lines.

This area is a kettle and kame glacial depositional environment that overlies bedrock of higher elevation with a bedrock high immediately southwest of the modeled area (see GZA figure below).



Bedrock elevations from GZA document dated 2-8-18. Orange triangle marks the disposal site in the Wellington Ridge Neighborhood.

One of the PFAS plumes mirrors an un-named creek that runs from the disposal area in the Wellington Ridge neighborhood to the Rogue River is likely reflective of a paleo-fluvial feature that the plume is migrating along. The modern stream feature is clearly illustrated on the 1918 Cedar Springs topographic map (see below), on LIDAR (see figure later in the text), and in the field at a culvert that crosses Summit Avenue.



Extract from 1918 Cedar Springs Topographic Map illustrating the stream that runs from Wellington Ridge to the Rogue River.

As the stream valley approaches the Rogue River valley the topography changes into an alluvial fan in the vicinity of Summit Avenue which may account for the apparent widening of the PFAS plume in this area; the alluvial fan can be seen on the below LIDAR image. The widening of the plume is best illustrated on the attached total PFAS maps.



Extract of LIDAR for the Wolven Northeast area. The orange triangle is the Wellington Ridge neighborhood and the black arrows illustrate the stream valleys.

This plume or plumes impact the aquifer from elevations ranging from 705 feet to 670 feet, however, there are a limited amount of drinking water wells in the area to aid in definition of the plume and there is only one WWW monitor well in the process of being installedAdditionally, because of the lack of data it is unclear if it is one or multiple aquifers impacted. A number of additional monitor well locations are necessary to fully understand the plume definition and plume risk throughout the impacted area and to understand the plume's interaction with the Rogue River.

A second plume is present that follows drainage features in the vicinity of 11 Mile Road, the features ultimately leading to the Rogue River. This drainage feature runs from the lowlands in Wellington Ridge (the area bounded by Royal Hannah Dr., Lady Lauren Dr, Sir Charles Dr. and Elstner Ave.) through the area of the 11 Mile Road and Wolven Avenue intersection then east to the Rogue River valley. As with the plume described above, an alluvial fan is present where the drainage feature enters the Rogue River valley that may account for a widening of the plume at that location. The PFAS plume impacts the aquifer at elevations ranging from 700 feet to 660 feet. Many monitor well locations are necessary to better understand the PFAS plume and the

risk from this PFAS plume throughout the drainage feature and to understand the plume's interaction with the Rogue River.

The PFAS impact that can be found in the vicinity of the intersection of Summit Avenue and 11 Mile is not readily described with the above plume models, although it may be associated with the southern plume. This PFAS impact ranges in elevation from 740 feet to 660 feet. A number of additional monitor wells are necessary to fully understand the plume definition at this location.

Attachments:

- Figure 1 PFOS/PFOA for Wolven Northeast
- Figure 2 PFOA/PFOS Zoomed View for Whirlwind and Tradewinds Neighborhoods
- Figure 3 Total PFAS for Wolven Northeast
- Figure 4 Total PFAS Zoomed View for Whirlwind and Tradewinds Neighborhoods

Geologist Signature:

Date: 12-7-18





