SITE INVESTIGATION WORK PLAN

La Crosse Municipal Wells 23 & 24

La Crosse Municipal Wells 23 & 24
Fisherman Rd, La Crosse, WI
WDNR BRRTS # 02-32-000065
Revision 1

Prepared for
City of La Crosse, Wisconsin

January 25, 2020

The OS Group LLC

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Site Information

Site Name

La Crosse Wells 23H & 24H (the Site)

Site Address

Fisherman Road, La Crosse, Wisconsin 54603

Site Location

PLSS: W ½ of Sec 8 and the E ½ of Sec 7, T16N, R07W

Latitude: 43° 52.55' N
Longitude: 91° 14.76' W

WTM: X Coordinate (WTM91): 419894
Y Coordinate (WTM91): 378833

The Site is located at the La Crosse Regional airport in the City of La Crosse, adjacent to the Black River. The La Crosse Municipal Airport is located in the W ½ of Section 8 and the E ¼ of Section 7, Township 16N, Range 7W, in La Crosse, Wisconsin. The airport is located on the northern part of French Island, an island bound by the Black River to the east, the Mississippi River to the west and Lake Onalaska (an impoundment of the two rivers) to the north and northwest. The site's location is depicted in Figure 1, Site Location Map, obtained from WDNR RR Site Maps[1].

Contact Information

Name, Address and Contact for Responsible Party

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The OS Group, LLC
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[1] WDNR, RR Site Maps (https://dnrmaps.wi.gov/H5/?viewer=rrsites&run=RR2&DSN=32998). Accessed by OSG on September 3, 2019.

Information Gathered during Scoping

Scoping of this Site Investigation predominantly relied upon the Wisconsin Department of Natural Resources (WDNR) case file (DNR BRRTS # 02-32-000065). While certain key points are summarized here, the user of this document is directed to the full reference documents.

History of the Site

In the May 10, 2019 "Reopening of Closed Case", Responsible Party letter to the City of La Crosse, the WDNR described the site history thus:

> *On April 18, 2019, the Remediation and Redevelopment program of the Wisconsin Department of Natural Resources (WDNR) was made aware that Polyfluoroalkyl Substances (PFAS) have been routinely detected in municipal well 23, located on the east side of French Island. After discussing the matter with Utilities Manager, Bernard Lenz, and Water Superintendent, Lee Anderson, and after reviewing the file of the above-mentioned site that investigated VOC impacts to municipal wells 23 and 24, the WDNR has determined that contamination on or from the above-described site poses a threat to public health, safety, welfare or the environment.*
>
> *The volatile organic compound (VOC) release for which the City of La Crosse was responsible was closed by WDNR on May 5, 2010. Based on the information that has been submitted to WDNR regarding this site, we believe that this newly reported PFAS contamination is related to firefighting foam that was used at the same fire training burn pits which were the source of VOC contamination in municipal wells 23 and 24. The WDNR also believes that a response action in the form of additional investigation and possible remedial action is needed due to the known impacts above the health advisory level to municipal well 23, and the potential for impacts to municipal well 24.*[2]

In the December 2003 Request for Site Closure[3], the City's then environmental consultant for the site, RMT, described the history of the site thus:

> *The La Crosse Municipal Airport is located in. the northern portion of French Island in La Crosse, Wisconsin (Figure 1). Two of the City's production wells (23H and 24H), located on the eastern side of French Island, were shut down as of November 1994, except for emergency back-up use, because of the presence of chlorinated volatile organic compounds (VOCs) and xylenes in samples from the wells. The source of the*

[2] Wisconsin Department of Natural Resources (2019). "Reopening of Closed Case", Responsible Party letter to the City of La Crosse. May 10, 2019. Eau Claire, WI.

[3] RMT (2003). Request for Site Closure - WDNR BRRTS# 02-32-000065, City of La Crosse Municipal Airport, La Crosse, Wisconsin, December 11, 2003, Correspondence to WDNR. December 11, 2003. Madison, WI.

contamination was identified as the two former test burn pits that were located approximately 3,000 feet northwest of the municipal wells.

The test burn pits were used by the La Crosse Fire Department for firefighting training, which reportedly took place during the 1970s through about 1988. Waste solvents that were collected from local industries were poured on a sand fill and plastic liner in the test burn pits. The solvents were then ignited and extinguished with a firefighting foam. The firefighting foam consisted primarily of water and 2-(2-butoxyethoxy)-ethanol, with small amounts of detergents, surfactants, and a thickener. The use of the firefighting foam is not believed to be a significant source of environmental impacts from the test burn activities.

The Wisconsin Department of Natural Resources (WDNR) determined that the waste solvents disposed in the test burn pits were listed and/or characteristic hazardous wastes. Although the Fire Department and the airport apparently received approval from the WDNR to conduct the training drills through 1988, the City did not have a hazardous waste license or a permit to treat, store, or dispose of hazardous wastes.

A soil pore gas and groundwater quality study was performed at the site in June 1992 (Layne GeoSciences, 1992), to assess the presence and extent of soil and groundwater contamination near the former burn pits. An additional subsurface investigation was conducted in February and March 1993 (Layne Geosciences, 1993) to assess the presence and extent of groundwater contamination between the former burn pits and City wells 23H and 24H. The WDNR required the City to conduct additional subsurface investigative activities and treatability studies, and to complete closure activities.

In May 1994, RMT, Inc. (RMT), was retained by the City to conduct the activities necessary to obtain the WDNR' s approval of a closure plan for the hazardous waste units. RMT performed additional investigations during the summer of 1994 and presented the Additional Investigation Activities, Treatability Studies, and Remedial Options Analysis (1994). The City of La Crosse and RMT proposed installing a single remediation well to pump and treat the water before discharging the water to the Black River. In a meeting in December 1994, the WDNR approved this remedial action. RMT prepared the Remedial Action Plan (1995), which presented the preliminary engineering concepts for the groundwater recovery and treatment system.

The groundwater recovery well (RW-1) and treatment system (aeration via flow over a rock-filled channel) were installed near monitoring well nest MW-llS/1/D and began operation in October 1995. RW-1 was pumped at a rate of approximately 400 gallons per minute for over 3 years. Over the period of operation, the concentration of VOCs in groundwater and in the recovery well effluent consistently declined. As a result, in a

meeting held in January 1999 and in a follow-up letter (WDNR, 1999), the WDNR approved the shutdown of the recovery well. RW-1 was shut down in February 1999.

Municipal well 23H was returned to limited service in May 1997. In August 1997, the WDNR gave approval for increased operation and a monthly monitoring frequency. As agreed in the January 1999 meeting with the WDNR, municipal supply well 24H was returned to service as needed by the water utility. Both 23H and 24H continue to operate, and sampled on a quarterly basis.

SEH Memo

In 2016, the La Crosse Water Utility (LCWU), retained Short Elliott Hendrickson Inc. (SEH) to design a water sampling and testing plan for Well 23H for the LCWU to implement that would document the presence (and concentration) or lack of PFOS in the Well 23H water supply. In a June 14, 2019 Memorandum[4] to Bernard Lenz, City Utilities Manger, and Leland Anderson, Water Utility Superintendent, SEH provide the following background information:

The La Crosse Water Utility (LCWU) was a participant in US Environmental Protection Agency's third round of its Unregulated Contaminant Monitoring Rule (UCMR3) program. US EPA published in 2012 the list of unregulated contaminants to be sampled by selected water utilities throughout the country. La Crosse was included in this list of utilities. UCMR3 included sampling and testing for 28 chemicals and two viruses, including Perflourinated Alkyl Acids (PFAS). Perfluoro-octanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) were detected above recommended levels in the UCMR3 water samples collected for La Crosse Well 23H during 2014 and 2016.[5]

A copy of the SEH Memorandum is attached as appendix 1.

Knowledge of the source, type and amount of contamination

Polyfluoroalkyl Substances (PFAS), presumably from firefighting foam (also known as Aqueous Film Forming Foam (AFFF)), is the type of contamination currently under investigation. Limited information is available on the amount of foam used or released at the site. As discussed below, there are five potential source areas including:

1. Former test burn pits
2. 2001 crash site, where AFFF was applied;
3. 1997 fuel spill, where AFFF was applied
4. West edge taxiway northwest of airport fire station, where AFFF was discharged while annually collecting FAA-required samples; and

[4] Sandford, R. & Kent, B., SEH (2019), June 14, 2019. Memo to Bernard Lenz-PE, Leland Anderson, RE: Well 23H Perfluorinated Compound Testing. La Crosse, WI

[5] Sanford, K & Kent, B., SEH (2019). La Crosse, WI. P. 1.

5. The former fire station, where AFFF was presumably stored and transferred into firefighting equipment.

Test Burn Pits

As stated above, firefighting training was conducted at test burn pits at the airport from the 1970s through approximately 1988. On August 12, 2019, the City and The OS Group, LLC (OSG) held a project kick off meeting in City Hall. In that meeting Assistant Fire Chief Jeffery Murphy stated that, in recent years, the firefighting foams used at the airport were Aqueous Film Forming Foam (AFFF) (also referred to as "Class B Foam") manufactured by 3M, Tyco Fire Protection Products and others. Currently "Chemguard 3% AFFF (C306-MS_C)" is used. No records of products used historically are readily available. According to Assistant Chief Murphy, no foam has been used during practice drills for about 25 years, and at some point, the pits were re-constructed with concrete containment.

Other Potential Source Areas

It is presumed that the Former Test Burn Pits are a source of the PFAS groundwater contamination detected in wells 23 and 24. At this time, OSG considers the following as potential source areas because it has not been confirmed that there is PFAS contamination present at or emanating from them.

Emergency Events

In a December 10, 2019 email, Assistant Chief Murphy stated that he is unaware of any emergency events where foam was used in the last 20 years. He stated, "[H]owever, Fox 1 may have laid down a blanket of foam after the crash that occurred during air fest years ago."[6] This crash occurred in June 2001. More was learned about this 2001 crash and a 1997 fuel spill when firefighting had been foam used. The events are described in the following paragraphs.

June 2001 Crash

On January 9, 2020, at a meeting in the Airport fire Station, John Storlie of OSG discussed the air fest crash with Airport personnel, John Adank, Airport Operations Coordinator, who has worked at the airport since 1996 in operations at the airport. Also present at the meeting were Ian Turner, Airport Director, since 2019; Anderson Ott, Airport Operations and Maintenance Manager; and Assistant Fire Chief Murphy. According to Mr. Adank, the crash occurred in Jun 2001 in the southwest part of the airport, and AFFF was applied[7]. In a January 11, 2020 email, Mr. Turner provided additional information on the location of the crash site, which was approximately "930 feet +/- southwest of the current threshold [*southwest end*] of Runway 4".[8] Runway 4 was formerly known as Runway 3-21. Mr. Turner explained, "[T]he accident occurred 817 feet from the departure end of Runway 21 (now Runway 22). In 2008/2009, Runway 03/21 was shortened to eliminate a Runway/Runway/Taxiway

[6] Murphy, J., La Crosse Fire Department. December 10, 2019. Email to John Storlie, The OS Group, LLC. La Crosse, WI
[7] Adank, J., La Crosse Regional Airport. January 9, 2020. Meeting at La Crosse Regional Fire Station, La Crosse, WI.
[8] Turner, I., La Crosse Regional Airport. January 11, 2020. Email to John Storlie, The OS Group, LLC. La Crosse, WI.

intersection occurring at the threshold. This is a safety issue. This project shortened Runway 04/22 by about 120 feet." Mr. Turner gather the detailed information from the National Traffic Safety Board (NTSB) report on the accident.[9] See figure 1 and figure 2 Site Layout for the location of the June 2001 crash site.

January 1997 Fuel Spill

In the January 9, 2020 meeting[10], Mr. Adank described a spill that occurred in late January 1997. While fueling a charter plane, near the main terminal a discharge occurred. AFFF was applied to the spill prophylactically. Sand was also applied to the spill as a sorbent and traction material. It was snowing during the incident, and snowplowing would have pushed the material north to the edge of the concrete. See figures 1 and 2 for the location of the 1997 fuel spill incident.

Airport Fire Station / AFFF Test Area

See figures 1 and 2 for the location of the Airport fire station, on Fanta Reed Road near the Air Traffic Control Tower. According to Assistant Chief Murphy and confirmed by OSG during a January 9,2020 site visit, there are two AFFF vehicles at the airport, and each of them carry 210 gallons of AFFF Foam. There is additional foam stored in 5-gallon plastic containers in a storage room off the apparatus floor in the station. The trucks are parked/staged at the airport fire station on Fanta Reed Road.[11,12] After the January 9, 2020 meeting, John Storlie inspected the AFFF storage area and the fire trucks in the apparatus room. Mr. Store observed 24 5-gallon containers of "Chemguard 3% AFFF (C306-MS_C)". According the Safety Data Sheet (SDS), the product contains the following PFAS/PFOAs: Polyfluorinated alkyl polyamide (1-5%) and Polyfluorinated alkyl quaternary amine chloride (0.1 to 1%), and other ingredients.[13] A copy of the SDS is attached. The label stated, "For use at 3% on hydrocarbon fuels. Suitable for use with both fresh and sea water." According to Mr. Adank, in the past the foam was a 6% application formula. The floor was clean and competent in both areas.

According to Mr. Adank[14], since 1998 the FAA has required annual testing of the foam from each nozzle of the truck. He stated that this was conducted across the taxiway northwest of the Fire Station (AFFF Test Area). The foam not collected for the samples was wasted to the grass. After the samples were collected, typically 5 to 10 gallons of foam were needed to be added to the truck. Thus, over the past 21 years, approximately 150 gallons of AFFF solution at 3 to 6% AFFF has been discharged in this area.

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[9] National Traffic Safety Board. 2001. Accident Reports. NTSB Identification: CHI01FA180. https://www.ntsb.gov/_layouts/ntsb.aviation/brief2.aspx?ev_id=20010621X01233&ntsbno=CHI01FA180&akey=19 (Accessed on January 13, 2020). Washington, DC.
[10] Adank, J., La Crosse Regional Airport. January 9, 2020. Meeting at La Crosse Regional Fire Station, La Crosse, WI.
[11] Murphy, J., La Crosse Fire Department. December 10, 2019. Email to John Storlie, The OS Group, LLC. La Crosse, WI.
[12] Storlie, J., The OS Group, LLC. January 9, 2020. Site visit to Airport Fire Station. La Crosse, WI.
[13] Tyco Fire Protection Products. January 11, 2019. Safety Data Sheet CHEMGUARD 3% AFFF C306-MS-C. Marinette, WI.
[14] Adank, J., La Crosse Regional Airport. January 9, 2020. Meeting at La Crosse Regional Fire Station, La Crosse, WI.

Former Airport Fire Station

During the January 9, 2020 meeting, Mr. Adank and Assistant Chief Murphy described the location of the Former Airport Fire Station, which is currently a vacant lot on Fanta Reed Road[15]. See figure 2. Little is known about the Former Airport Fire Station, where AAF was stored, what the conditions were, how AAF may have been tested or released. It is only listed as a potential source area because AFFF was historically stored and presumably transferred into firefighting equipment there.

Environmental Media Affected or Potentially Affected

Affected and potentially affected media include groundwater, soils, surface water and sediments. Groundwater is known to be affected as the contaminant was identified by sampling of wells 23 and 24.

Physiographical & Geological Setting, Significant Hydrologic Features

The 2003 RMT Closure Request summarizes the setting thus:

> *The airport is located on the northern part of French Island, and is constructed on the flat-lying flood plain deposits of the Mississippi and Black Rivers, which surround the island. The Black and Mississippi Rivers are dammed adjacent to the island creating Lake Onalaska, which borders the Island to the north and northwest (Figure 1).*
>
> ### Regional Geology and Hydrogeology
>
> *The unconsolidated sediment in the western part of La Crosse County is composed of alluvial and outwash deposits of the Mississippi River, consisting mainly of well-sorted sand and gravel. The alluvial sand and gravel deposits are approximately 150 feet thick and are underlain by Cambrian Sandstone.*
>
> *The direction of groundwater flow across the study area is generally to the southeast, toward the Black River. The flow direction is controlled by the relative elevations of Lake Onalaska and the Mississippi and Black Rivers. The Mississippi and Black Rivers are dammed to the west and north of the island, creating a strong underflow across the island. The results of a pumping test conducted on the wells on French Island indicate that the aquifer is highly transmissive with good hydraulic connection to the rivers (W.G. Keck & Associates, 1972).*[16]

Adjacent Land Uses

The site is a regional airport; adjacent land uses include “Airport Beach”, a non-official recreational beach; the Upper Mississippi River National Wildlife and Fish Refuge; Lake Onalaska; the Black River; and further from the suspected PFAS plume, residential and commercial neighborhoods in the City of La Crosse and the Town of Campbell. Neighborhoods in the Town of Campbell to the west and south

[15] Ibid.
[16] RMT (2003). P. 2.

of the airport are served by private water supply wells. An industrial park is located immediately west of the north half of the airport.

Topography

The site topography is flat and on the margins of French Island sloping to the Black River[17].

Geology

According to a November 1994 report on the site by RMT[18],

> *The site is underlain by a well sorted medium sand that was deposited as alluvial outwash. A trace of gravel was encountered in some of the borings, along with occasional thin coarse-grained layers. The sand ranges in color from yellowish brown to brown and is loose to medium dense. The alluvial sand is underlain by Cambrian Sandstone, which occurs at a depth of approximately 150 feet below grade.*

Hydrology and Hydrogeology

The site is located on flat-lying flood plain deposits of the Mississippi and Black Rivers, which surround the island. The Black and Mississippi Rivers are dammed adjacent to the island creating Lake Onalaska, which borders the Island to the north and northwest.

According to RMT's 2003 Closure request:

Groundwater Use

> *The principal aquifer in La Crosse County is the alluvial sand and gravel deposits, which are capable of yielding more than 3,000 gallons per minute (gpm) in some areas. The City of La Crosse owns and operates 16 high-capacity municipal wells. The City's wells are screened in the alluvial sand and gravel deposits, at depths ranging from 90 to 160 feet below grade. The wells pump at rates ranging from 1,100 to 3,4OO gpm.*
>
> *In addition to the City's wells, the U.S. National Fisheries Research Center owns and operates three high-capacity wells that are used to provide water supply for the Fish Hatchery on French Island. The Fish Hatchery wells are located on the eastern side of French Island near the Black River, approximately 0.5 mile south of City wells 23H and 24H. The Fish Hatchery wells have a design capacity of 1,800 gpm and produce an average of approximately one million gallons of water per day.*[19]

OSG reviewed the WDNR online drinking & groundwater use information system database for information regarding the Fish Hatchery high-capacity wells. As recently as 2018, all three Fish

[17] USGS (2018). Onalaska Quadrangle, Wisconsin - La Crosse County, 7.5-Minute Series. 2018
[18] RMT (1994). November 1994. Additional Investigative Activities, Treatability Studies and Remedial Options Analysis for The City of La Crosse Municipal Airport Former Test Burn Pits. Madison, Wisconsin
[19] RMT (2003). P. 3.

Hatchery wells were active with a reported withdrawal rate of 9,400,000 gallons/month/well.[20] The newest (Wisconsin Unique Well Number WR972) was constructed in 2011. It was constructed to depth of 250 feet in the sandstone aquifer. Sand and gravel were observed from surface to 155 feet.[21]

According to the 1994 RMT report[22]:

> *The groundwater flow direction is to the south-southeast toward the Black River, with a horizontal hydraulic gradient of approximately 0.001. Based on water levels recorded in the three well nests at the site, the vertical gradient in the alluvial sand is negligible compared to the horizontal gradient. [Based on] Three pumping tests were performed on-site in the 1970s and early 1980s … (t)he water levels responded relatively quickly to river level changes, indicating good hydraulic connection to the river (W.G. Keck & Associates, 1972). Pumping tests… performed for the City of La Crosse in 1976 and 1980 [and] …data from the Fish Hatchery well were used to calculate an aquifer transmissivity of 245,000 gal/day/ft, which indicates a very productive aquifer. On the basis of an aquifer thickness of 150 feet, the hydraulic conductivity of the aquifer is approximately 220ft/day (8 x 10^{-2} cm/s).*
>
> *The hydraulic conductivity values calculated for the monitoring wells are generally consistent between monitoring wells, indicating a homogeneous aquifer. Calculated hydraulic conductivity of the monitoring wells ranged from 8 x 10^{-3} to 3 x 10^{-2} cm/s, with a geometric mean of approximately 1 x 10^{-2} cm/s. …*
>
> *Groundwater flow velocities in the alluvial sand were calculated using the hydraulic conductivity from the pumping test (8 x 10^{-2} cm/s), the average horizontal hydraulic gradient (0.001), and an assumed effective porosity of 20 percent (de Marsily, 1986). Based on these values, the calculated horizontal flow velocity is approximately 400 feet per year.*

Throughout the chlorinated VOC investigation and remediation, the ground water flow direction was consistently to the southeast with some influence from the pumping of wells 23 and 24. OSG anticipates a consistent groundwater flow to the southeast across the airport site.

[20] WDNR. Drinking & Groundwater Use Information System (https://dnr.wi.gov/wateruse/pub_v3_ext/source/). Accessed by OSG on October 24, 2019.
[21] Well Construction Report, Wisconsin Unique Well Number WR972 (Created on 04-10-2012, Updated on 04-19-2013).
[22] RMT (1994). Pp. 11-15.

The June 14, 2019 SEH memo to the City Water Utility describes the pumping rates of Well 23 and its correlation to PFAs sampling results from July 26, 2017 to April 15, 2019, at which time "Well 23H was shut off and remains off"[23].

In an October 18, 2019 email, Leland Anderson, Water Superintendent, La Crosse Water Utility, stated:

> *The wells on the north side of La Crosse are used during high demand times usually during summer months or if other Wells are down for maintenance. These are used for fire protection for the City's north side industrial parks in the event of a major fire. Manufacturers prefer the north side Wells because the Wells provide better water quality for their productions and these are high capacity Wells that pump around 2,000 gallons per minute of water. We only have a 5,000,000 gallon reservoir and the Wells provide the demand of water to maintain and fill the reservoir. We have daily demands of 15 to 20 million gallons during summer months which is 4 times what the reservoir can hold.*[24]

Potential Hazardous Substance Migration Pathways

Dissolved Contaminants in Groundwater

Based on the chlorinated solvents contamination plume as documented in the earlier study and remediation at the site, it is clear that groundwater flow is likely the predominant mechanism of PFAS contaminant transport. The groundwater flow path and rates at the site are well understood, and the plume is likely originating at the test burn pits and migrating toward receptors, Wells 23 & 24 and the Black River. The pumping of municipal well 23 may have served to intercept the PFAS contaminant plume, in whole or in part, but when not pumping, it is likely that the plume has discharged to the Black River adjacent to well 23.

Dissolved Contaminants in Surface Water

It has been documented at other sites that PFAS groundwater plumes discharging into surface waters have migrated and persisted in detectable concentrations. Thus, there is potential for PFAS migration in the Black River.

Receptors

Receptors with known, suspected and potential contaminant impact that have been considered in the development of this SIWP are discussed below. The potential for impacts to each will be iteratively re-evaluated at the completion of each phase of the site investigation, as we gather more information about the extent and degree of PFAS contamination.

[23] Sanford, K & Kent, B., SEH (2019). La Crosse, WI. P. 3.
[24] Anderson, L., La Crosse Water Utility. October 18, 2019. Email to John Storlie, The OS Group, LLC. La Crosse, WI

Water Supply Wells

All water supply wells in the area of the airport will be evaluated as potential receptors with the potential for contaminant impacts. The need for sampling them will be evaluated immediately upon the determination of whether PFAS groundwater contamination is present either upgradient of or within 1,200 feet of any particular well. Several wells known to be present near the airport and neighborhoods served by private water wells are discussed in the following sections. The airport itself is served by the La Crosse Water Utility.

Municipal Water Supply Wells

Documented impacts[25] to municipal water supply Well 23 triggered the re-opening of the BRRTS Case.[26] In 53 samples collected from Well 23 from June 2017 through April 2019, total perfluoroctanoic acid (PFOA) and perfluoroctanesulfonic acid (PFOS) detections ranged from 24 to 210.3 nanograms per liter (parts per trillion (ppt))[27]. In a sample collected from Well 24 on May 15, 2019, Perfluorooctanesulfonic acid (PFOS) was detected at 11.7 ppt[28]. A copy of the lab report for the May 15, 2019 Well 24 sample is attached as appendix 3. UESPA Unregulated Contaminant Monitoring Rule (UCMR) sampling in 2014 did not detect PFAS compounds in Well 24. Municipal water supply Wells 23 and 24 are considered receptors with known contaminant impacts.

Well 26 is located 2,800 to greater than 3,500 feet west-northwest and up gradient of the former test burn bits and other potential sources of PFAS groundwater contamination[29]. Well 26 has been sampled for PFAs compounds under the UCMR in 2014, and none were detected. Given the strong and consistent southeasterly groundwater gradient across the site, OSG does not consider Well 26 as a potential receptor.

USGS Upper Midwest Environmental Sciences Center

As discussed above under the Hydrology and Hydrogeology section, the USGS Upper Midwest Environmental Sciences Center (formerly known as the U.S. National Fisheries Research Center) owns and operates three high-capacity wells that are used to provide water supply for the Fish Hatchery on French Island. The wells are located on the eastern side of French Island near the Black River, approximately 0.5 mile south of City wells 23H and 24H. The Fish Hatchery wells have a design capacity of 1,800 gpm and produce an average of approximately one million gallons of water per day.[30] OSG reviewed the WDNR online drinking & groundwater use information system database for information

[25] Sanford, K & Kent, B., SEH (2019). La Crosse, WI.
[26] Wisconsin Department of Natural Resources. May 10, 2019. Letter to The City of La Crosse, Reopening of Closed Case, La Crosse Municipal Wells 23 & 24, Fisherman Rd, French Island, La Crosse, WI, DNR BRRTS # 02-32-000065. Eau Claire, WI.
[27] Sanford, K & Kent, B., SEH (2019). La Crosse, WI.
[28] Northern Lake Service, Inc. May 15, 2019 sample, printed January 24, 2020. Analytical Report. Crandon, WI.
[29] WDNR. Drinking & Groundwater Use Information System (https://dnr.wi.gov/wateruse/pub_v3_ext/source/). Accessed by OSG on October 24, 2019 and December 6, 2019.
[30] RMT (2003). P. 3.

regarding the Fish Hatchery high-capacity wells. As recently as 2018, all three Fish Hatchery wells were active with a reported withdrawal rate of 9,400,000 gallons/month/well.[31] The southmost well provides potable water. See figure 3 for the location of nearby potable wells including the USGS Fish Hatchery water supply wells.

In a December 20, 2019 email, Randy Hines of the USGS provided information on the four (4) wells serving their campus. Three (3) of the wells provide water for their research and one is potable.[32] OSG mapped the four (4) USGS wells. The well nearest to the PFAS study area is approximately 2,000 feet from Well 23 and approximately 1,800 feet from the extent of the chlorinated solvents plume (from the test pits), which is presumed to be the extent of the PFAS plume until groundwater sampling better defines it. Based on presumed southeast groundwater flow direction, the Fish Hatchery wells are downgradient (albeit greater than 1,200 feet) from the 1997 fuel Spill, the Airport Fire Station and the Former Fire Station, all potential source areas.

Based on the information available, OSG is of the opinion that after Wells 23 and 24, these wells are the next likely water supply wells susceptible to the known PFAS-contaminant impacts to groundwater. Based on our current knowledge of extent of the PFAS plume (inferred from the chlorinated solvents plume), the Fish Hatchery wells are more than 1.200 feet from the presumed extent of PFAS in the groundwater and other potential source areas. This will be re-evaluated as monitoring well sampling confirms and modifies our understanding of the definition of the PFAS plume.

The Fish Hatchery Wells are considered receptors with the potential for contaminant impacts. The need for sampling them will be evaluated immediately upon the determination of whether PFAS groundwater contamination is present upgradient of or within 1,200 feet of the wells.

Private Water Supply Wells

OSG reviewed private well construction reports from the WDNR[33] and the Wisconsin Geological and Natural History Survey (WGNHS)[34] for locations near the chlorinated solvents plume (E ½ of Sec 7, W ½ of Sec 8, NW ¼ of Sec 17, and NE ¼ of Sec 18 and the E ½ of Sec 7, T16N, R07W). Those that could be affirmatively associated with a street address within 1,200 feet of a suspect source area are depicted on figure 3. Some well construction reports reviewed were either mis-mapped in the WDNR and WGNHS web-based mapping applications or well beyond 1,200 feet from the inferred extent of the PFAS plume or other suspect source areas.

[31] WDNR. Drinking & Groundwater Use Information System (https://dnr.wi.gov/wateruse/pub_v3_ext/source/). Accessed by OSG on October 24, 2019 and December 6, 2019.
[32] Hines, R., USGS. December 20, 2019. Email to John Storlie, The OS Group. La Crosse, WI.
[33] WDNR. DNR Drinking Water System, Well Construction Reports (https://prodoasext.dnr.wi.gov/inter1/watr$.startup). Accessed by OSG on October 24, 2019 and December 6, 2019.
[34] Wisconsin Geological and Natural History Survey. Historic Well Construction Reports (1930-1989) (https://data.wgnhs.wisc.edu/well-viewer/). Accessed by OSG on October 24, 2019 and December 6, 2019.

Patti Martell maintains the city private well permits for the La Crosse Water, Sewer & Storm Utilities. In a December 26, 2019, email from Ms. Martell, she stated at she is not sure if they have a comprehensive list of private water supply wells within the City of La Crosse in the airport area. She did provide the list below and note that they would not have information on wells serving properties in the town of Campbell[35]. The wells below are within the City of La Crosse:

- 2929 Airport Road – American Down & Textile
- 2717 Fanta Reed Rd – Colgan Air
- 2733 Fanta Reed Rd – Colgan Air
- 2650 Fanta Reed Rd – Enterprise Holdings
- 2604 Fanta Reed Rd – Richard Von Arx
- 413 Central Rd – Laura Scheppa
- 2754 Del Ray Ave – Paul Stuhr

OSG mapped the above wells. While they are greater than 1,200 feet from the extent of the chlorinated solvents plume (from the test pits), which is presumed to be the extent of the PFAS plume until groundwater sampling better defines it, additional discussion of the wells is provided in the sections below.

Again, given the persistence of PFAS and the documented PFAS groundwater-contaminant-transport distance at other sites, the potential for impacts to nearby private wells will be iteratively reevaluated as the extent of the PFAS plume is defined.

East Airport Complex

The two Colgan Air water supply wells are within 1,200 feet of the known release at the AFFF Test Area west of the Airport Fire Station. The two Colgan Air wells are approximately 950 feet from the AFFF Test Area (side-gradient) and approximately 2,900 feet downgradient from the 1997 Fuel Spill. The Enterprise Holdings water supply well is approximately 1,500 feet from the AFFF Test Area (side-gradient) and approximately 3,300 feet downgradient from the 1997 Fuel Spill.

Private potable wells in the east airport complex of the airport are considered receptors with the potential for contaminant impacts. The need for sampling them will be evaluated immediately upon the determination of whether PFAS groundwater contamination is present upgradient of or within 1,200 feet of the wells.

Neighborhood south of Fanta Reed Road

Private potable water supply wells are the source of water for the homes in the Town of Campbell neighborhood south of the airport, across Fanta Reed Road. Up to 19 homes are within approximately

[35] Martell, P., La Crosse Water, Sewer & Storm Utilities. December 26, 2019. Email to John Storlie, The OS Group. La Crosse, WI.

1,200 feet of the 2001 crash site. Some homes where a well construction report could be matched to an address are depicted on Figure 3. The well are typically 55 to 70 feet deep, screened in the bottom 3 to 5 feet. It is presumed that each house is served by its own well; however, some may be served by a shared well. Given the persistence of PFAS and the documented PFAS groundwater-contaminant-transport distance at other sites, the potential for impacts to other nearby private well will be reevaluated as the presence of groundwater contamination is confirmed or refuted at the crash site and other potential source areas, and as the extent of the PFAS plume is defined.

Private potable wells in the neighborhood south of the airport are considered receptors with the potential for contaminant impacts. The need for sampling them will be evaluated immediately upon the determination of whether PFAS groundwater contamination is present upgradient of or within 1,200 feet of the wells.

Neighborhood west of the Airport

The residential neighborhood west of the airport is in the town of Campbell and is served by private water supply wells, and some are within 1,200 feet of the 2001 Crash Site. Given the consistent southeasterly groundwater flow, however, OSG considers the wells upgradient and not at risk of impact by PFAS contamination.

Private potable wells in the neighborhood west of the airport are not considered receptors with the potential for contaminant impacts. Nevertheless, the need for sampling them will be evaluated immediately upon the determination of whether PFAS groundwater contamination is present upgradient of the wells.

Industrial Park west of the Airport

The industrial park west of the Airport is served by La Crosse municipal water supply system. One private well permit is on record with the La Crosse Water Utility as discussed above: American Down & Textile. 2929 Airport Road. This well is more than 1,200 feet side-gradient from the 1997 Fuel Spill more than 1,200 feet upgradient of the 2001 Crash Site.

Thus, private potable wells in the industrial park west of the airport are not considered receptors with the potential for contaminant impacts. Nevertheless, the need for sampling the identified well and assessing for others will be evaluated immediately upon the determination of whether PFAS groundwater contamination is present within 1,200 feet of the wells.

Black River

Based on the persistence of PFAS and low detection limits utilized in PFAS investigations, as well as the documented contaminants in Well 23 adjacent to the Black River, OSG anticipates that the surface water quality of the Black River has been affected by PFAS contaminants from the airport test burn pits. Similarly, sediments of the Black River may have been affected at the points of discharge from the 2017 pump test east of Well 23 and the 1990's remediation east of well 24.

Pools 3, 4, 6 and 8 of the Mississippi River were sampled by the WDNR Water Quality Program in the summer of 2019[36]. The Mississippi and Black Rivers south of the spillways at French Island are part of Pool 8. The WNDR Water Quality Program sampling of Pool 8 was downstream from the Well 23 & 24 site. Pool 6 is upstream. PFOA and PFOS compounds were detected in all six (6) samples collected from both Pools 6 and 8.

Black River surface water and sediments are considered receptors with suspected contaminant impacts.

Scope of Work

Approach

The objectives of the initial phase of the site investigation will be to:

1. At and downgradient from the Test Burn Pits, define the extent and degree of PFAS contamination in the soils and groundwater and identity whether detectable impacts to the Black River water quality have occurred.
2. Identify more precisely the location of the 2001 Crash Site.
3. Determine if soil or groundwater are impacted by PFAS at and downgradient from the following additional potential source areas:
    a. 2001 crash site, where AFFF was applied;
    b. 1997 fuel spill, where AFFF was applied
    c. West edge taxiway west of airport fire station, where AFFF was discharged while collecting FAA-required samples; and
    d. The former fire station, where AFFF was presumably stored and transferred into firefighting equipment.
4. Determine if PFAS-groundwater contamination is present that has the potential to impact nearby private water supply wells and the Fish Hatchery wells.

The overall objectives to be achieved through multiple phases of investigation are:

1. Identify PFAS-impacted media and all locations affected;
2. Define the extent and degree of PFAS contamination;
3. Identify threats to receptors;
4. Confirm or refute impacts to receptors; and
5. Characterize site conditions sufficiently for the development and analysis of remedial action options.

[36] WDNR Water Quality Program. 2019 PFAS Surface water sampling. https://dnr.wi.gov/topic/Contaminants/WaterQuality.html#sites (accessed on January 24, 2019). Madison, WI.

No soil or groundwater samples were analyzed for PFAS during the previous VOC investigation and remedial action. Nevertheless, at least initially, the operating assumptions guiding the PFAS investigation are that:

1. PFAS contamination identified in Municipal Wells 23 & 24 originated from the same burn pits;
2. PFAS groundwater contamination from the test Burn Pits is likely following the same path as the former VOC contamination;

Soil and / or groundwater may be impacted at four (4) other potential source areas at the airport Monitoring well and piezometer placement and depth at and downgradient from the former Test Burn Pits are based on the VOC plume previously identified. In the first round of soil and groundwater sampling, one (1) permanent monitoring well will be installed at each of the other four (4) potential source areas, together with soil borings and temporary groundwater monitoring points, to determine if soil and or groundwater contamination is present in these areas.

As each phase of data collection is conducted and evaluated, OSG will review the investigation approach and strategy, as well as potential for contaminants to impact potential receptors, including nearby potable wells.

OSG proposes to perform the following scope of work to complete the NR 716 Site Investigation of the PFAS contamination. All sample locations will be located by GPS and/or land surveyor.

Contaminants & Parameters

Based on the known and potential receptors, affected or potentially affected environmental media and contaminant migration pathways outlined above, over the course of the investigation, OSG proposes to collect samples from the following environmental media:

- Groundwater
- Soil
- Surface water
- Sediments

As discussed in the Receptor section above, drinking water samples have been analyzed from Wells 23 and 24. Thus, no potable water samples are anticipated to be collected and analyzed by OSG as part of this portion of the investigation. Rather, OSG intends to rely on well sample results previously provided by the Water Utility and the PFAS sample to be collected from Well 24 during its triennial VOC and inorganics sampling planned for the summer of 2020, as required by Safe Drinking Water Act (SWDA) regulations. In the Department's November 25, 2019 response to the first version of the SIWP, the Department required "sampling of municipal wells 23 and 24 as part of the groundwater monitoring

schedule"[37]. OSG recommends against additional PFAS sampling as part of this site investigation of Wells 23 and 24, and none is proposed for the following reasons:

1. Sampling has already demonstrated that the wells are impacted. Additional samples from the wells add no additional information on the investigation or enhancements to the conceptual site model.
2. The two high-pressure, high-capacity well pump at a rate of 1,800 to 2,500 gallons per minute. Sample collection typically requires 30 minutes of operation. That purge water would have to be either discharged into the water distribution system or discharged to the ground or the Black River. Each of those discharge options pose an environmental cost that should be avoided or minimized.
3. Well 23 is currently offline.
4. Well 24, while technically online, it is not pumping, rather it is on standby. It meets the current standards for a public water system, but that is a last option only in response to a large demand, such as a large fire response on the City's north side.
5. Well 24 will be sampled for PFAS compounds in the summer of 2020 in compliance with SWDA regulations.

Analytical Method and Analytes

All soil, groundwater and surface water analyses denoted as lab or laboratory will be performed following modified EPA method 537, per an October 21, 2019 email from David Rozeboom, West Central Region Team Supervisor, Remediation and Redevelopment Program, Wisconsin Department of Natural Resources[38]. In that email, Mr. Rozeboom stated:

> *The DNR recommends the following lab methods for sample analysis:*
>
> 1. *Method 537.1 for drinking water.*
> 2. *Modified 537 for soil, groundwater and surface water. We are allowing laboratories to use their own in-house developed method as long as the criteria specified in the WI guidance document (described above) for PFAS are met.*

As laboratory capability exists, all media will be analyzed for all 36 compounds per the WDNR's *PROPOSED - Wisconsin PFAS Aqueous (Non-Potable Water) and Non-Aqueous Matrices Method Criteria - Version 9.11.2019 - Per- and Polyfluorinated Alkyl Substances (PFAS) Analysis Using Isotope Dilution*

[37] Rozeboom, D. Remediation and Redevelopment Program, Wisconsin Department of Natural Resources. November 25, 2019. Review of Site Investigation Work Plan letter to City of La Crosse. Eau Claire, WI.
[38] Rozeboom, D., Remediation and Redevelopment Program, Wisconsin Department of Natural Resources. October 21, 2019. Email to John Storlie, The OS Group, LLC. Eau Claire, WI

by LC/MS/MS,[39]. Should WDNR guidance or lab certifications change during the conduct of this investigations, OSG's methods will be modified accordingly. At the date of this plan, OSG is evaluating two laboratories for subcontracted analytical services – Pace Analytical Services Inc. and the Wisconsin State lab of Hygiene.

Sampling Procedures

Except where WDNR guidance exists, PFAS sampling procedures will follow the latest version of Michigan Department of Environmental Quality (MDEQ) technical guidance (https://www.michigan.gov/pfasresponse/0,9038,7-365-86510_87154-469832--,00.html). The guidance published as of the date of this document are:

- *General PFAS Sampling Guidance*, October 2018
- *Soil PFAS Sampling Guidance*, November 2018
- *Groundwater PFAS Sampling Guidance*, October 2018
- *Surface Water PFAS Sampling Guidance,* November 2018
- *MDEQ PFAS Sampling Quick Reference Field Guide*, October 17, 2018

In addition, the surface water field investigation will follow WDNR's *Surface Water PFAS Sampling, V1.0, Draft,* June 24, 2019, or its latest version in effect at the time of the surface water field investigation. Where differences exist between the WDNR and MDEQ guidance documents, OSG will rely on WDNR guidance, even if only draft or proposed.

Surface Water Investigation

To evaluate the impact to the Black River from the PFAS plume, three (3) surface water samples will be collected from the Black River:

1. One (1) background surface water sample will be collected upstream from Wells 23 & 24
2. One (1) downstream surface water sample
3. One (1) surface water sample in the location of suspected entry of the plume into the Black River as requested by the WNDR[40]. This will be conducted after the monitoring well network between the test burn pits and Wells 34 and 24 has been constructed, surveyed and sampled, so that the centerline of the plume and be defined and the suspected entry point can best be estimated. This sample will be collected from a single point near the shore.

Exact locations of the upstream and downstream sampling will be determined prior to the surface water sampling event based on input and concurrence from WDNR. The upstream background sample

[39] Wisconsin Department of Natural Resources. September 11, 2019. *PROPOSED - Wisconsin PFAS Aqueous (Non-Potable Water) and Non-Aqueous Matrices Method Criteria - Version 9.11.2019 - Per- and Polyfluorinated Alkyl Substances (PFAS) Analysis Using Isotope Dilution by LC/MS/MS*. Madison, WI.
[40] Rozeboom, D. WDNR. (November 2019) Review of Site Investigation Work Plan letter. Eau Claire, WI.

will likely be collected just below the spillway. The downstream sample will be downstream of the Airport Beach, likely upstream from or at the I-90 bridge.

Surface water sample collection procedures should match those used by the WDNR for its sampling of the Mississippi River during its water chemistry monitoring events on June 27, July 25 and August 14, 2019. OSG will coordinate sample collection techniques with the Monitoring Section of the WNDR's Water Quality Program.

Sediment Investigation

As required by the WDNR in its November 25, 2019 review[41], sampling of sediments of the Black River will be conducted. The WNDR stated in that letter: "Include sampling of the sediment below each location proposed for surface water sampling. One (1) sediment sample should also be collected from the point of discharge location applicable to the pump test of municipal well 23 and WPDES Permit # 0057671-04." OSG proposes sediment sampling at the following five (5) locations:

1. One (1) sediment sample will be collected upstream from Wells 23 & 24, corresponding to the surface water sampling above
2. One (1) downstream sediment sample, corresponding to the surface water sampling above
3. One (1) sediment sample in the location of suspected entry of the plume into the Black River, corresponding to the surface water sampling above. This will be conducted after the monitoring well network between the test burn pits and Wells 34 and 24 has been constructed, surveyed and sampled, so that the centerline of the plume and be defined and the suspected entry point can best be estimated.
4. One (1) sediment sample will be collected from the point of discharge of the pump test of municipal Well 23 and WPDES Permit # 0057671-04 (east of Well 23)
5. One (1) sediment sample will be collected from the point of discharge for the 1990s to early 2000s remediation (east of Well 24)

Soil Investigation

Former Test Burn Pits

OSG will drill ten (10) borings, by hollow-stem auger. Seven (7) of the borings will be converted to four (4) monitoring wells and three (3) piezometers. Six (6) borings will be drilled in "location 1," the assumed source area (i.e., near the former burn pits and former monitoring wells MW-1S, MW-1D and MW-8), and four (4) borings will be drilled in "location 2," downgradient near former monitoring wells MW-4, MW-6, and MW-11S. See figure 4, Test Burn Pits - Proposed Boring and Well/Piezometer Locations. During drilling, soil samples will be collected continuously by split-spoon sampler (except at the second boring at the piezometer nest). Soils will be classified according the Unified Soil Classification System (USCS).

[41] Ibid.

Three (3) soil samples from each of the six (6) "location 1" borings and two (2) soil samples from three (3) of the four (4) "location 2" borings will be submitted to an analytical environmental laboratory for PFAS analysis via modified EPA method 537 (i.e., samples will not be collected from one of the borings installed at the piezometer nest at former MW-11S/MW-11I). Twenty-four (24) soil samples in total will be lab analyzed. No field screening techniques exist for PFAS compounds.

"Location 1" soil samples will be collected from depths of 1 to 2 feet, 5 to 6 feet, and 11 to 12 feet below ground surface (bgs). "Location 2" soil samples will be collected from depths of 9 to 10 and 19 to 20 feet bgs.

1997 Fuel Spill

OSG will install five (5) boreholes or Geoprobe borings in the grass located immediately north of the airport apron. Four (4) of the boreholes/Geoprobes will be installed to a depth of four (4) feet below ground surface (bgs) and one (1) to five (5) feet below the water table, at an estimated depth of twenty-five (25) bgs. Soil samples will be collected continuously during borehole advancement and classified according to the USCS. One (1) soil sample from each of the shallow boreholes/Geoprobes and two (2) samples from the deep borehole/Geoprobe will be submitted for PFAS analysis. The deep borehole will be finished as a water table monitoring well. Figure 5 depicts proposed boring and well locations near the former fuel spill.

AFFF Test Area

OSG will install six (6) boreholes or Geoprobe borings in the grass located immediately northwest of the airport taxiway located northwest of the Airport Fire Station. Four (4) of the borings will be installed to a depth of four (4) feet bgs and two (2) to the water table anticipated at approximately twenty-five (25) feet bgs. Soil samples will be collected continuously and classified according to the USCS. One (1) soil sample from each of the four (4) "shallow" borings and three (3) samples (2 to 3 feet, 9 to 10 feet, and water table interface) from the two "deeper" borings will be submitted for PFAS analysis. The deep boreholes will be finished as a water table monitoring well. Proposed boring and monitoring well locations at the AFFF Test Area are provided in Figure 6.

Former Airport Fire Station

OSG will install one (1) borehole or Geoprobe boring in the southern quarter of the Former Fire Station parcel of the airport. The boring will be advanced to the water table anticipated to be located approximately twenty-five (25) feet bgs. Soil samples will be collected continuously, classified according to the USCS, and three soil samples (2 to 3 feet, 9 to 10 feet, and water table interface) will be submitted for PFAS analysis. The borehole will be finished as a water table monitoring well as depicted in Figure 7.

2001 Crash Site

OSG will install nine (9) boreholes or Geoprobe borings in the vicinity of the 2001 crash site. Prior to the installation, a land surveyor will be used to identify the approximate location of the crash based on the NTSB report and subsequent modifications to the runways. Following completion of the survey, a metal detector will be used to attempt to further identify the location and range of the crash site is best pinpointed, nine (9) boreholes/Georpobe borings will be installed. Six (6) of the borings will be advanced to a depth of four (4) feet bgs and five (5) to the water table anticipated at approximately 25 feet below ground surface. Soil samples will be collected continuously from each boring and classified according to the USCS. One (1) soil sample from the six (6) shallow borings and three (3) soil samples from the three (3) deeper borings will be submitted for PFAS analysis. One (1) deep borehole will be finished as a water table monitoring well. The proposed boring (shallow and deep) and monitoring well locations at the 2001 crash site are depicted in Figure 8.

Former Remediation Discharge Rip Rap

The pump-and-treat component of the 1990s – 2000s chlorinated VOCs remediation utilized a rip-rap-lined swale for conveyance and aeration/volatilization of water pumped by Well 24. The rip rap is still present and runs east from the Well 24 pumphouse to the Black River. OSG proposes to collect one shallow soil sample beneath the rip rap, at depth of approximately one (1) foot bgs. The sample location will be selected at a low point or low-slope point in the swale, where infiltration would have been greatest. The sample will be collected by hand auger and submitted for PFAS analysis.

Groundwater Investigation

Former Test Burn Pits

Based on the VOC-contaminant plume previously defined during the VOC investigation conducted at the site, OSG will install four (4) water table monitoring wells and three (3) piezometers at and down-gradient from the Former Test Burn Pits as described below:

Location 1

Three (3) water table monitoring wells will be installed in “location 1”, the suspected source area (i.e., former burn pits):

- One (1) monitoring well at former monitoring well MW-1S.
- One (1) monitoring well up-gradient at former monitoring well MW-8.
- One (1) monitoring well at former MW-7.
- Groundwater elevations at these locations previously ranged from approximately 12 to 17 feet bgs, and therefore, OSG will install these three wells to a depth of twenty (20) feet bgs with fifteen (15) foot screens.

Location 2

OSG proposes to install three piezometers, at an intermediate depth, and one (1) water table monitoring well in "location2". One (1) piezometer will be installed at former MW-11I, which had the highest VOC concentrations in the prior years of monitoring. One (1) piezometer will be installed NNE of former MW-4 former monitoring well, and one SSW of former MW-6. Depth and screen length will match that of former MW-11I, as described in Table 1, below.

In addition, during a site walkover, OSG discovered a monitoring well approximately 80 feet east of Well 24. After researching the City Engineering files related to the planning and construction of Wells 23 & 24, OSG believes this monitoring well was constructed as a pre-construction test well for Wells 23 & 24. We believe it is so-called "Test Well No. 2" drilled to 156 feet bgs, at which depth sandstone bedrock was encountered. Going forward this will be referred to as MW-24H. Depth to the bottom of MW-24H will be measured, and its location, top of casing and adjacent ground surface will be surveyed to an on-site datum and mean sea level. Two pages from historical pre-construction documents related to Well 23 and 24 are included as appendix 4. MW-24H will be sampled as part of the site investigation.

The monitoring wells and piezometers will be constructed per Chapter NR 141, Wisconsin Administrative Code, with flush-threaded, 2-inch ID, schedule 40 PVC pipe. Wells within the airport will be flush-mounted. Depth and screen lengths are described below:

Table1: Test Burn Pit Monitoring Well Depths and Screen Lengths

Proposed Well #	Nearest Former Well #	Location	Location Description	Previous Depth to Water (feet)	Proposed Well Depth (feet)	Screen Length (feet)
MW-101	MW-1S	1	Source Area	13 – 17	20	15
MW-102	MW-8	1	Up-gradient of Source Area	13 – 15	20	15
MW-103	MW-7	1	Side- / down-gradient of Source Area	10 - 13	20	15
MW-104S	MW-11S	2	Down-gradient	22 – 27	33	15
PZ-104I	MW-11I	2	Down-gradient	22 – 27	60	5
PZ-105I	MW-4	2	Side- / down-gradient	17 – 21	55	5
PZ-106I	MW-6	2	Side- / down-gradient	17 - 21	55	5

Other Potential Source Areas

In addition to the monitoring wells and piezometers installed at and down-gradient of the former test burn pits, groundwater samples will also be collected from the four (4) other potential source areas identified at the airport including the 1) 1997 Fuel Spill, 2) Former Airport Fire Station, 3) AFFF Test Area, and 4) 2001 Crash Site. Ground water samples will be collected from all "deep" boreholes (i.e., those that extend to the water table), and select deep boreholes will be finished as water table

monitoring wells. More specifically, one (1) to two (2) "deep" boreholes will be finished as water table monitoring wells at the aforementioned four (4) potential source areas. This would include installing one (1) monitoring well at the 1997 Fuel Spill, one (1) monitoring well at the Former Airport Fire Station, two (2) monitoring wells at the AFFF Test Area and one (1) monitoring well at the 2001 plane crash site. The locations of the proposed monitoring wells are provided in Figures 4 - 8.

After construction of the monitoring wells and piezometers throughout the airport, monitoring well and piezometer locations, tops of casings and adjacent ground surface will be surveyed to mean sea level (MSL) and groundwater elevations measured prior to each sampling event.

After development per NR 141, groundwater samples will be collected from the monitoring wells and piezometers and field analyzed for pH, specific conductivity, dissolved oxygen and oxidation-reduction potential using a flow-through cell. Groundwater samples will be submitted to a laboratory for PFAS analyses as described above. After one (1) sampling event, the potential need for additional monitoring points will be revaluated.

Reporting of Results

Because multiple mobilizations and phases of field investigation are anticipated, OSG will provide status updates to the City and the WDNR after each phase of the field investigation. A comprehensive NR 716 Site Investigation Report (SIR) will after the completion of all phases of investigations. Status updates will include a letter summarizing work completed, observations, findings, conclusions and recommendations, with updated tables of results, figures and attachments, as needed and appropriate.

Investigative Waste Management

Soil cuttings from HSA drilling and excess soil samples will be drummed and stored in a secure area on site. Monitoring well development and purge water will be drummed and secured on site, and disposal will be based on analytical results. Disposal of groundwater soil and sediment investigative waste (IW) will be determined at later phase of the investigation. The Department's guidance in IW disposal options is requested.

Schedule

OSG anticipates completing the scope for work described herein, including final status update with recommendations for additional investigation, not later than the end of the calendar year as outlined in the table below, assuming SWIP approval is received within two months. Factors affecting the schedule include availability of PFAS experienced drilling subcontractors, laboratory backlogs and turn-around times, and critical-path investigative phases. Comprehensive status update report will be completed within 3 months of completion of field activities.

Table 2: Fieldwork Schedule

SIWP Approval	30 days	45 days	60 days	75 days	90 days	105 days	120 days	135 days	150 days
Surveying Crash Site									
Metal Detection of Crash Site									
Installation of Boring and Wells									
Monitoring Well Survey and Development									
Monitoring Well Sampling									
Surface Water Sampling									
Sediment Sampling									

Certification

I, John C. Storlie, hereby certify that I am a hydrogeologist as that term is defined in s. NR 712.03(1), Wis. Adm. Code, am registered in accordance with the requirements of ch. GHSS 2, Wis. Adm. Code, or licensed in accordance with the requirements of ch. GHSS, Wis. Adm. Code, and that, to the best of my knowledge, all of the information contained in this document is correct and the document was prepared in compliance with all applicable requirements in chs. NR 700 to 726, Wis. Adm. Code.

Signature

January 25, 2020

Printed name and title **John C. Storlie, PG, Principal Hydrogeologist** Date

Figure 1: Site Location Map
BRRTS # 02-32-000065 - LA CROSSE MUNICIPAL WELLS 23 & 24

WISCONSIN DEPT. OF NATURAL RESOURCES

Legend

- Open Site
- Open Site Boundary
- Closed Site
- Continuing Obligations Apply
- Facility-wide Site

La Crosse Municipal Wells 23 & 24 Site

1997 Fuel Spill, Approx

Airport Fire Station

2001 Crash Site, Approx.

KWIK TRIP #822
ZIEGLER INC PROPERTY
MATHY CONST CO
NELSONS SPUR STATION
FLOWERS BY GUENTHERS
EXCALIBUR LAUNDRIES
RAU OIL ONALASKA
A-SPEC AUTO & ACS PROPERTIES
KWIK TRIP #767
NATIONAL AUTO WRECKING CO
DOMKE CONTRACTORS
TORRANCE CASTING INC
SWANSON CONST CO
ORC INDUSTRIES
MARTIN TRUCKING FMR
DESMONDS MENS WEAR
KWIK TRIP #762
STAVLO RENTAL
BOB JOHNSON OIL AVIS CAR RENTAL
HEILEMAN AIR SERVICES
ISLAND PARK BAPTIST CHURCH
RUAN LEASING CO
BONSAC TRUCKING

Coulee Environmental Solutions™ a division of The OS Group LLC

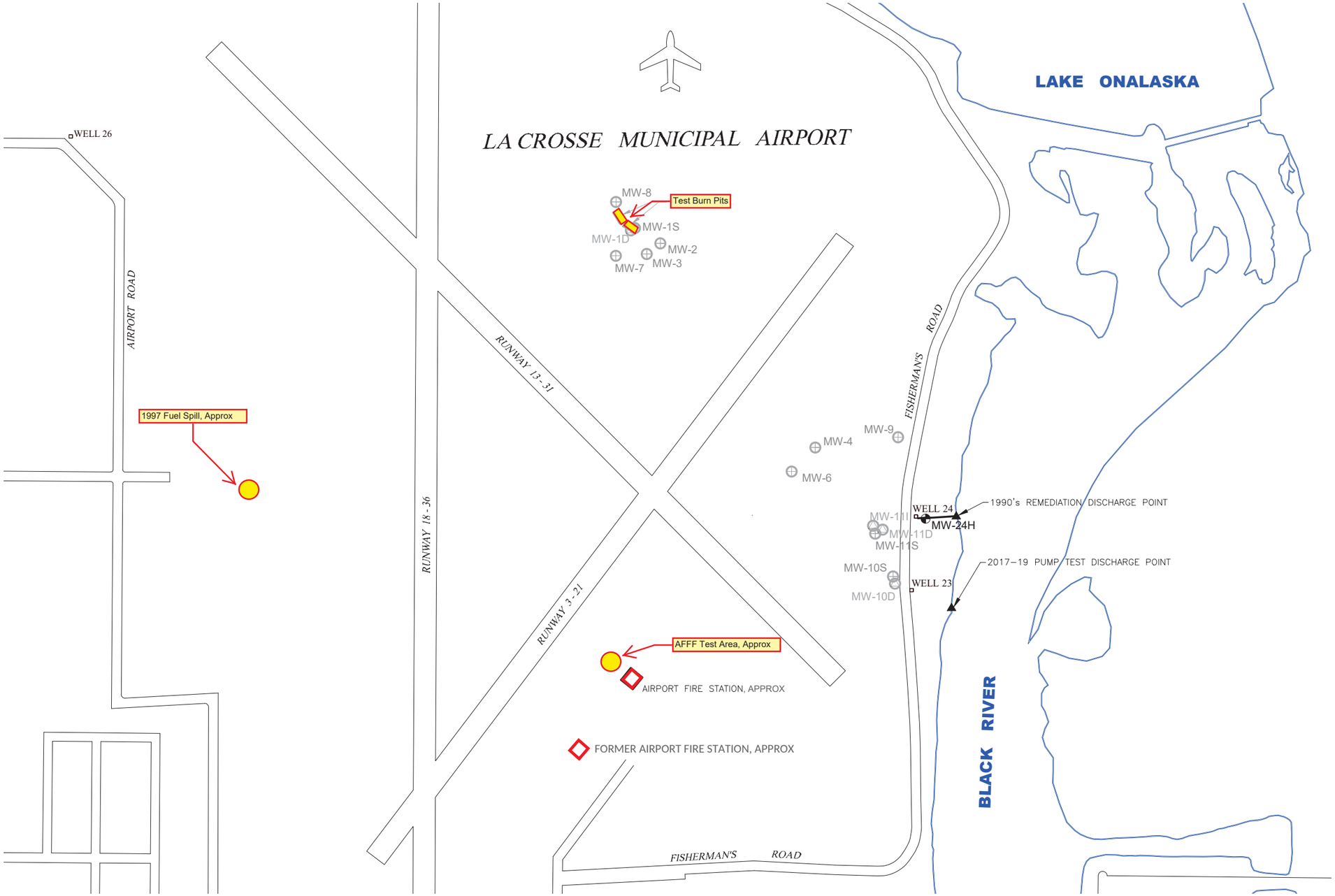
0.8 0 0.38 0.8 Miles

NAD_1983_HARN_Wisconsin_TM

Note: Not all sites are mapped.

Notes

Source:
Wisconsin DNR RR Sites map, https://dnrmaps.wi.gov/H5/?viewer=rrsites&run=RR2&DSN=32998, accessed 09/03/2019



NOTE:
Base map from City of La Crosse, former features adapted from RMT figure dated November, 1994.

The OS Group LLC

SITE LAYOUT

City of La Crosse Municipal Airport
La Crosse, Wisconsin

FIGURE NO.
2

DATE
JCS 1/25/20
REVISED
DATE 1/25/20
JCS
REVIEWED
1/7/20
Drawn By: BEB
FILE: Base Map 2.tcw
PROJECT NO. 1901155

Figure 3: Water Supply Wells

Identified to date in vicinity of Wells 23 & 24 PFAS Contamination Site

Well 26
Burn Pits (Former)
Breezy Point Rd
1997 Fuel Spill
Well 24
Well 23
PW
AFFF Test Area
Airport Fire Station
Former Fire Station
PW - Colgan
PW - Colgan
USGS Research Well
PW - Enterprise
USGS Research Well
USGS Research Well
Plainview Rd
2001 Crash Site
USGS Potable Well
Lakeshore Dr
Hibbard Ct
Grand Ave
Airport Dr
Fanta Reed Rd
Dawson Ave

Legend

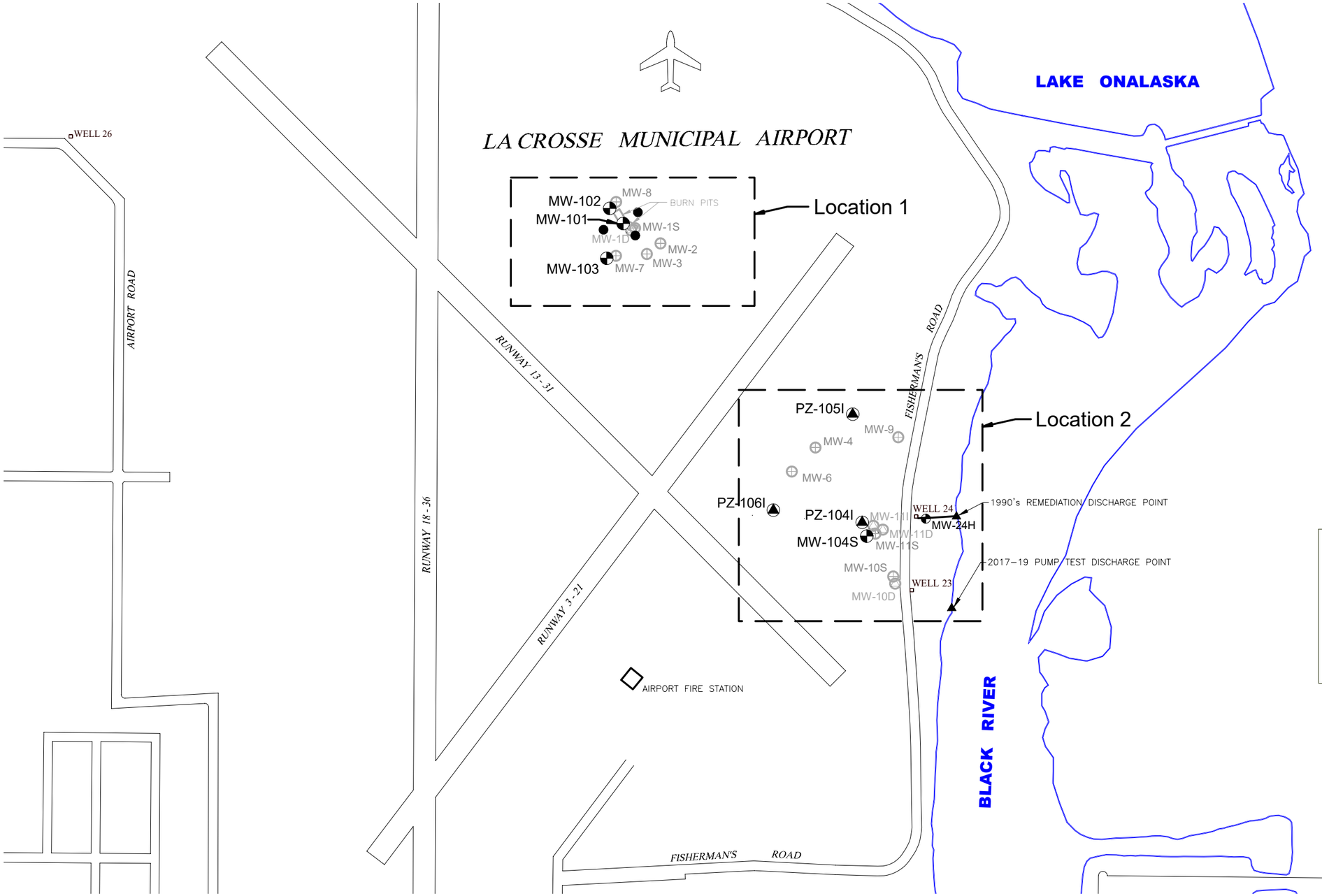
- Fire Station
- Municipal Well
- Potential PFAS Source
- PW

Google Earth

N

90

2000 ft



NOTE:
Base map from City of La Crosse, former features adapted from RMT figure dated November, 1994.

APPROXIMATE SCALE

0' 1000' 2000'

The OS Group LLC

TEST BURN PITS - PROPOSED BORING AND WELL / PIEZOMETER LOCATIONS

City of La Crosse Municipal Airport
La Crosse, Wisconsin

FIGURE NO.

4

DATE
REVISED
DATE
REVIEWED 1/17/20
Drawn By: BEB
FILE: Base Map 2.tcw
PROJECT NO.


Figure 5
1997 Fuel Spill - Proposed Boring and Monitoring Well Locations
Legend
Boring
Monitoring Well
1997 Fuel Spill
Google Earth
© 2019 Google
200 ft
N

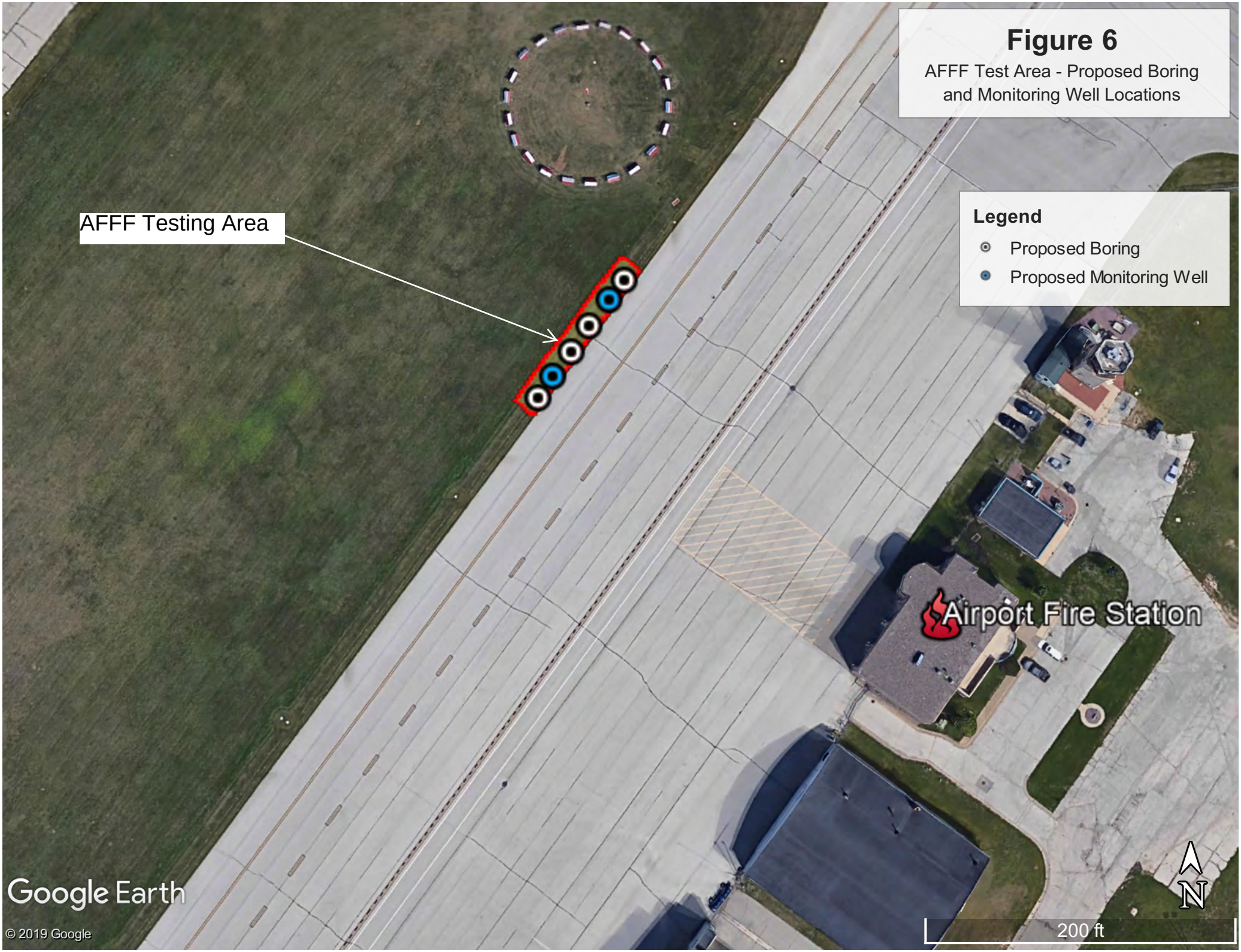


Figure 6
AFFF Test Area - Proposed Boring and Monitoring Well Locations
AFFF Testing Area
Legend
Proposed Boring
Proposed Monitoring Well
Airport Fire Station
Google Earth
© 2019 Google
N
200 ft


Figure 7
Former Fire Station - Proposed Monitoring Well Location
Legend
Monitoring Well
Former Fire Station
Google Earth
© 2019 Google
N
200 ft

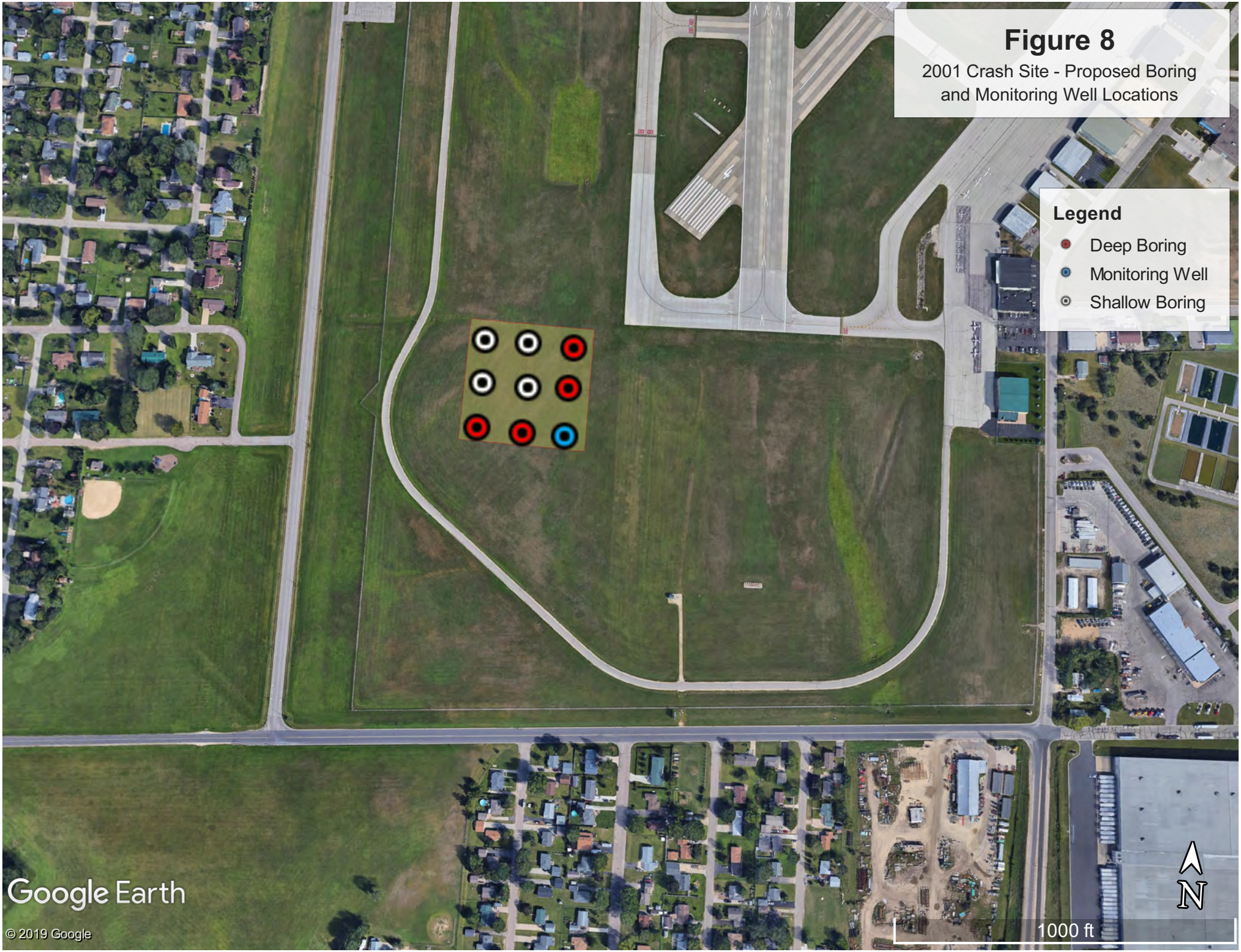


Figure 8
2001 Crash Site - Proposed Boring and Monitoring Well Locations
Legend
Deep Boring
Monitoring Well
Shallow Boring
Google Earth
© 2019 Google
1000 ft
N

APPENDIX 1

SEH Memorandum, June 14, 2019

Building a Better World for All of Us®

MEMORANDUM

TO: Bernard Lenz-PE, Leland Anderson

FROM: Randy Sandford-PE, Brian Kent, CHMM

DATE: June 14, 2019

RE: Well 23H Perflourinated Compound Testing
SEH No. LACRS139514 14.00

The La Crosse Water Utility (LCWU) was a participant in US Environmental Protection Agency's third round of its Unregulated Contaminant Monitoring Rule (UCMR3) program. US EPA published in 2012 the list of unregulated contaminants to be sampled by selected water utilities throughout the country. La Crosse was included in this list of utilities. UCMR3 included sampling and testing for 28 chemicals and two viruses, including Perflourinated Alkyl Acids (PFAS). Perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) were detected above recommended levels in the UCMR3 water samples collected for La Crosse Well 23H during 2014 and 2016.

PFOS and PFOA are unregulated fluorinated organic chemicals which should be monitored by public water systems under UCMR3. The chemicals PFOA and PFOS were widely used to make carpets, clothing, fabrics for furniture, paper packaging for food and other materials that are resistant to water, grease or stains. They were also used for firefighting at airfields and in a number of industrial processes. Most people have been exposed to these chemicals through consumer products, but drinking water can be an additional source of exposure in communities where these chemicals have been identified within the water supplies.

During 2016 the LCWU retained SEH to design a water sampling and testing plan for Well 23H for the LCWU to implement that would document the presence (and concentration) or lack of PFOS in the Well 23H water supply. The first step in the water and testing plan development involved a comprehensive review of available testing information for Well 23H, and other vicinity production wells, a review of potential contaminant sources, and review of existing aquifer modeling.

The EPA health advisory for PFOS is 70 parts per trillion (0.070 µg/L) and the EPA asks water utilities to make some actions if the individual or combined concentration of these two compounds are greater than 70 ppt. Since 2016, the EPA and the Wisconsin Department of Natural Resources (WDNR), have recognized the growing concerns with the presences of PFAS in groundwater and the limited information relating to health risks, treatability and industry practices related to sample collection and integrity. During February 2019 the EPA published a PFAS Action Plan (EPA823R18004, February 2019) to lead the national effort to understand PFAS and reduce PFAS risks to the public through active engagement and partnership with other federal agencies, states, tribes, industry groups, associations, local communities, and the public. Five key elements of the plan are summarized below:

- EPA has initiated actions to develop a Maximum Contaminant Level, or MCL, for PFAS, and specifically for two PFAS compounds, PFOS and PFOA. EPA indicated it will begin the MCL creation process by the end of 2019. The EPA Administrator stated that this would be the first substance to have an MCL established since the Safe Drinking Water Act was amended in 1996. The EPA maintains that the 70

parts per trillion (ppt) standard is a federally enforceable groundwater standard, despite misconceptions to the contrary.

- EPA will continue to pursue enforcement actions utilizing the existing Health Advisory Level for PFAS of 70 ppt.
- The EPA will expand monitoring and data gathering related to PFAS, including adding PFAS to the toxics release inventory, which should generate additional information on the extent of PFAS in industry and in the environment. The EPA is using enhanced mapping tools to identify where and in what communities PFAS is in the groundwater and in the environment.
- The EPA will expand research into the impacts of PFAS on human health and the environment, studying fate and transport issues associated with PFAS. The EPA wants to "close the gap" on the science related to PFAS, including the more recently manufactured perfluourinated compound known as "GenX",
- The EPA will develop a "risk communication toolbox" that will provide information to the public and the regulated community more clearly.

Meanwhile, the WDNR's Remediation and Redevelopment (RR) Program has convened a PFAS Technical Advisory Group to discuss PFAS-related concerns that are specific to the assessment and cleanup of environmental contamination. The goal of the group is to examine the "what, where, when and how" of PFAS investigation and remediation by sharing concerns, identifying current and proposed practices and strategizing on issues requiring solutions.

SEH was provided with PFOS sampling results by the City of La Crosse for 13 wells sampled for PFOS and other PFAS (EPA Method 537). Detections of PFOS and PFHxS were detected in Well 23H. No other wells sampled showed detections of PFOS, including nearby Well 24H and Well 26H. Since water sampling results showed that Well 23H contains PFOA and PFOS greater than 70 parts per trillion, EPA recommended that the utility undertake additional sampling on a voluntary basis.

A review of potential contaminant sources identified a historic environmental repair site located hydraulically upgradient of Well 23H. A report prepared by RMT detailed groundwater impacts originating from burn pits on the La Crosse Municipal Airport property. These burn pits are located approximately 3200 feet hydraulically upgradient from Well 23H. Historical records indicate volatile organic compounds (VOCs) were the primary contaminant of concern relating to the burn pits, and VOCs had impacted production wells 23H and 24. Records further indicate that remediation was implemented at the burn pits, consisting of soil vapor extraction and air sparging. During 2010, the WDNR issued closure permits for the project indicating contaminants in the production wells were at or below regulatory limits. PFAS analysis was not conducted, or was not available, from investigation and remediation efforts relating to the burn pits and impacts to production wells 23H and 24. WDNR did conclude that airfield fire suppression materials used on the up-gradient burn pits are the likely source of PFOS/PFOA impacts at Well 23H.

A review of the City of La Crosse wellhead protection plan suggests that the former test burn pits are a likely source of contaminants to Well 23. The groundwater flow field for the calibrated groundwater flow model shows groundwater flow generally from north to south, turning towards the southeast in the vicinity of the municipal wells. Particle traces show that the source of a portion of the groundwater for Well 23 is from the vicinity of the former burn pits. The aquifer geology is considered homogenous and well connected. It has transmissivity properties that lend itself well to high capacity wells. It also means that any contamination plumes would flow as easily towards high capacity wells making this geology highly susceptible. Conversely this geology has greater opportunities to reduce contamination plumes through mechanical pumping.

During February 2017 SEH and the City met to discuss the above findings and initial recommendations relating to the sampling plan. Due to the aquifer characteristics in the vicinity of the burn pits and Well 23H, and the City's desire to remediate the source of contaminants as well as understand the degree and extent of PFOS and PFOAs, the sampling plan involved actively pumping water from Well 23H, using several different operation scenarios, while routinely collecting analytical data to assess contaminant response to each scenario. Water

pumped from Well 23H was planned to be discharged to the Black River, assuming approval from the WDNR. The LCWU obtained approval from the WDNR to discharge water pumped from Well 23H during early 2017, and implemented pumping and testing of Well 23H during late June 2017. However, shortly after the pumping program was started, the well field was struck by lightning the pump starter for Well 23H was damaged. Pumping was re-initiated following repair on July 26, 2018. Pumping and testing activities were concluded on April 15, 2019.

The following is a summary of the pumping and testing program:

- From July 26, 2017 to approximately August 27, 2017 Well 23H was operated 12 hours/day, 5 days/week at a pumping rate of 2300 gallons per minute (gpm). The 5 day sequence started on Wednesday evenings and ended Monday morning, then sat idle until the next Wednesday. Samples were collected at start up (Sunday evening) and shut down (Monday morning) of the last day of the 5-day cycle.
- From August 30, 2017 to approximately October 1, 2017 Well 23H was operated 12 hours/day, 3 days/week (Wed-Friday) and 24 hours/day for 2 days (weekend) at a pumping rate of 2300 gpm. Samples were collected Monday morning on the last day of the 5-day cycle.
- From October 1, 2017 to November 18, 2017 Well 23H operated 12 hours/day, 5 days/week and 24 hours/day on the weekend at a pumping rate of 2300 gpm. Samples were collected Monday mornings following the 24 hour/day cycle.
- From November 18, 2017 until March 14, 2018 Well 23H operated 24 hours/day, 7 days/week at a pumping rate of 2300 gpm. Samples were collected Monday mornings.
- From March 14, 2018 until April 25, 2018 Well 23H operated 24 hours/day, 7 days/week at a pumping rate of 1800 gpm. Samples were collected Monday mornings.
- April 25, 2018 until April 30, 2018 2018 Well 23H was off
- On April 30, 2018 Well 23H was started at a pump rate of 1800 gpm, immediately sampled (approximately 6:52 am) and sampled 2 hours later (approximately 8:52 am), then shutdown.
- Between April 30, 2018 and May 13, 2018 Well 23H was off.
- On May 13, 2018 Well 23H was started at a pump rate of 1800 gpm, immediately sampled (approximately 9:35 pm), operated for 11 hours, resampled (May 14, 2018; 8:35 am), and shut down.
- Between May 14, 2018 and July 31, 2018 Well 23H was off.
- On July 31, 2018 Well 23H was started at a pump rate of 1800 gpm, immediately sampled (approximately 9:40 pm), operated for 11 hours, resampled (August 1, 2018; 8:30 am), and shut down.
- Between August 1, 2018 and August 27, 2018 Well 23H was off.
- From August 27, 2018 to November 4, 2018 Well 23H operated 12 hours/day, 5 days/week and 24 hours/day on the weekend at a pumping rate of 1800 gpm. Samples were collected on September 4, September 24 and October 1 following the 24 hour/day cycle.
- From November 5, 2018 until March 31, 2019 Well 23H operated 24 hours/day, 7 days/week at a pumping rate of 2150 gpm. Samples were collected the first Monday of each month.
- From April 1, 2019 until April 15, 2019 Well 23H operated 24 hours/day, 7 days/week at a pumping rate of 1800 gpm. Samples were collected on April 1 and April 15, just prior to shutdown.
- On April 15, 2019 Well 23H was shut off and remains off.

Test Results Summary

- The PFOA/PFOS resulted in a small decline with results well below 70ppt during the City's pumping period of 5 days per week with 12 hour run times at 2300gpm from July 26th – August 27, 2017
- The PFOA/PFOS resulted in an increase and above 70ppt during the City's pumping period of 3 days per week with 12 hour run times at 2300gpm from August 30 – October 1 2017.
- Between December 2017 and April 2018; PFOA/PFOS is below 70ppt, with consistent decline- however, the system was operating 24/7 with little opportunity for rebound. SEH suggested shutdowns in April/May 2018 to assess rebound. Not much of a rebound during this time frame, but it was only off 5 days
- During the month of May 2018 the pumping rate was 1800gpm run for 24 hours for two days which yielded elevated levels but still below 70ppt
- Well 23H was shut down on May 14 until July 31 (@2.5 months). The startup sample on July 31 was low (@24ppt PFOA/PFOS combined), but the sample collected after approximately 11 hours on August 1 was

high (91ppt PFOA/PFOS combined. This rebound was not identified by the City until late August when the sample analysis was complete.

- This alarmed the City and they responded with a much more aggressive sampling protocol during the summer/fall of 2018, and ran it continuously over the winter to avoid freeze up. PFOA/PFOS results during this time were below 70ppt and consistent while pumping at 2150gpm 24hr/day 7 days per week.
- The City contacted the WDNR to see if they could extend their discharge permit, but was rejected. The WDNR stipulated that the discharge to the Black River would need to be terminated by April 15. The City shut down Well 23H on April 15 2019.

Conclusions

The homogenous properties of the aquifer that the City of La Crosse receives it potable water from, yields high transmissivity properties and is considered an excellent source of safe reliable drinking water. The above tests conducted were done voluntarily by the City of La Crosse. The testing procedures took 2 years to complete. Water from well 23H was approved by WDNR to discharge to the Black River during this time period.

The results above indicate that the PFOA/PFOS can be reduced over of time using high capacity pumps. Pumping results from well 23H indicate that during longer periods of shut down the PFOA/PFAS can rebound. The testing procedures deliberately varied the pumping times and rates in order to identify trends. One trend that seemed consistent, indicated that with greater pumping for more than 5 days of run time, a decline of PFOA/PFOS were observed. However there was a limit to the lowest levels measured. Lowest levels ranged between 24-30ppt. Conversely the higher ranges of PFOA/PFOS were reported during pumping rates of less than 5 days of run time. The highest levels ranged from 175-210ppt.

PFOAS and PFAS are now on the EPA's most recent action plan (EPA823R18004) and has next steps planned to implement a Maximum Contaminant Level (MCL). Whether to add well 23H back into its normal supply rotation should be discussed between the City of La Crosse Utility and City of La Crosse City Council. As part of the decision making process discussion should include public safety, maximum daily customer demands and observation and trend review as it pertains to the needs of the Utility during the summer months.

These test results indicated that with maximum pumping capacity, paired with long runtimes without interruption will yield PFOA/PFOS results that are under the EPA's health advisory levels of 70ppt. If the decision is to reinstate this well we recommend that the Utility staff monitor the PFOA/PFOS on a monthly basis during its use.

BLK & RJS
Attachments
p:\ko\l\lacrs\139514\3-env-stdy-regs\city sampling 2017\seh final memo_well 23h perflourinated compound testing_june 2019.docx

Well 23 Operation Schedule

June 28th / June 29th - 12 Hour runs 2300 GPM

June 30th Well starter blows… Replaced starter, operations resume July 26th.

July 26th, 27th, 28th, 29th, 30th -5 days /12 Hour runs @2300 gpm

August 2nd, 3rd, 4th, 5th, 6th - 5 days /12 Hour runs@ 2300 gpm

August 9th, 10th, 11th, 12th, 13th -5 days /12 Hour runs @2300 gpm

August 16th, 17th, 18th, 19th, 20th -5 days /12 Hour runs @2300 gpm

August 23rd, 24th, 25th, 26th, 27th -5 days /12 Hour runs @2300 gpm

August 30th, 31st, Sept. 1st, 2nd, 3rd 4th -3 days /12 Hour runs -3 days /24 Hour runs @2300 gpm

September 6th, 7th, 8th, 9th, 10th -3 days / 12 Hour runs -2 days /24 Hour runs @2300 gpm

September 13th, 14th, 15th, 16th, 17th -3 days /12 Hour runs -2 days /24 Hour runs @2300 gpm

September 20th, 21st, 22nd, 23rd, 24th -3 days /12 Hour runs -2 days /24 Hour runs @2300 gpm

September 27th, 28th, 29th, 30th Oct. 1st -3 days / 12 Hour runs -2 days /24 Hour runs @2300 gpm

Beginning October 1st Runs 12 Hours a day on weekdays/ 24 Hours a day on Weekends @2300 gpm

Beginning November 18th Runs 24/7 @2300 gpm

Beginning March 14th 2018 Runs 24/7 @ 1800 gpm

April 25th 2018 shutdown

April 30th started at 6:52 am @ 1800 gpm and sample collected. Shutdown on April 30th at 8:52 am- sample just prior to shutdown

May 13th 2018 started at 935 pm @ 1800 gpm and sample collected. Shut down May 14th at 835 am- sample just prior to shutdown

July 31st 2018 started at 940 pm @ 1800 gpm and sample collected. Shut down August 1st at 830 am- sample just prior to shutdown

Beginning August 27th Runs 12 Hours a day on weekdays/ 24 Hours a day on Weekends @1800 gpm

Beginning November 5th Runs 24/7 @2150 gpm

April 1st 2019 to April 15th 2019 Runs 24/7 @1800 gpm

Shutdown on April 15th 2019 (WDNR will not extend discharge approval)

SUMMARY OF RESULTS FROM SAMPLING PROGRAM AT WELL 23

SAMPLE DATE	Well 23H pumping capacity (gpm)	PFOA* RESULT ppt	CHANGE FROM PREVIOUS SAMPLE ppt	PFOS** RESULT ppt	% OF HEALTH ADVISORY LEVEL	CHANGE FROM PREVIOUS SAMPLE ppt	Sample number	PFOA/PFOS
JUNE 28, 2017		7.09		43.4	62.0%		1	50.49
JUNE 29, 2017		12.7	5.61	16.3	23.3%	-27.1	2	29
JULY 30, 2017		17.7	5	14	20.0%	-2.3	3	31.7
JULY 31, 2017		18.1	0.4	14.7	21.0%	0.7	4	32.8
AUGUST 6, 2017		21.5	3.4	15.3	21.9%	0.6	5	36.8
AUGUST 7, 2017		15.6	-5.9	19.7	28.1%	4.4	6	35.3
AUGUST 13, 2017		14.1	-4	26.5	37.9%	11.8	7	40.6
AUGUST 14, 2017		18.2	4.1	15.9	22.7%	-10.6	8	34.1
AUGUST 20, 2017		20.7	5.1	16.6	23.7%	-3.1	9	37.3
AUGUST 21, 2017		13.8	-6.9	35.1	50.1%	18.5	10	48.9
AUGUST 27, 2017		20.8	0.1	22.2	31.7%	-12.9	11	43
AUGUST 28, 2017		16.9	-3.9	56.4	80.6%	34.2	12	73.3
SEPT. 5, 2017		19.5	2.6	123	175.7%	66.6	13	142.5
SEPT. 11, 2017		19.9	0.4	155	221.4%	32	14	174.9
SEPT. 18, 2017		22.3	2.4	188	268.6%	33	15	210.3
SEPT. 25, 2017		20.5	-1.8	165	235.7%	-23	16	185.5
								0
OCTOBER 2, 2017		20.5	0	154	220.0%	-11	17	174.5
October 9, 2017		18.4	-2.1	111	158.6%	-43	18	129.4
October 16, 2017		18.6	0.2	83.7	119.6%	-27.3	19	102.3
October 23, 2017		18.6	0.0	75	107.1%	-8.7	20	93.6
October 30, 2017		18.7	0.1	89.5	127.9%	14.5	21	108.2
November 6, 2017		15.5	-3.2	87.7	125.3%	-1.8	22	103.2
November 13, 2017		16.4	0.9	81	115.7%	-6.7	23	97.4
November 20, 2017		15.9	-0.5	71.9	102.7%	-9.1	24	87.8
November 27, 2017		15.6	-0.3	60.8	86.9%	-11.1	25	76.4
December 4, 2017		14.7	-0.9	53.2	76.0%	-7.6	26	67.9
December 11, 2017		13.7	-1.0	51	72.9%	-2.2	27	64.7
December 18, 2017		12.5	-1.2	48.9	69.9%	-2.1	28	61.4
December 26, 2017		13.8	1.3	47	67.1%	-1.9	29	60.8
January 2, 2018		12.9	-0.9	44.9	64.1%	-2.1	30	57.8
January 16, 2018		11.8	-1.1	38.8	55.4%	-6.1	31	50.6
January 29, 2018		10.9	-0.9	39	55.7%	0.2	32	49.9
February 12, 2018		9.87	-1.0	36.7	52.4%	-2.3	33	46.57
February 26, 2018		8.22	-1.7	31.9	45.6%	-4.8	34	40.12
March 12, 2018		9.42	1.2	33.6	48.0%	1.7	35	43.02
March 26, 2018		9.51	0.1	34.8	49.7%	1.2	36	44.31
April 9, 2018	2300	8.97	-0.5	33.4	47.7%	-1.4	37	42.37
April 30, 2018		13.6	4.6	23.4	33.4%	-10	38	37
April 30, 2018		10.8	-2.8	29.4	42.0%	6	39	40.2
May 13, 2018		11.7	0.9	38.9	55.6%	9.5	40	50.6
May 14, 2018		11.5	-0.2	29.7	42.4%	-9.2	41	41.2
July 31, 2018		7.7	-3.8	16.3	23.3%	-13.4	42	24
August 1, 2018		11.7	4.0	79.3	113.3%	63	43	91
September 4, 2018		11.5	-0.2	47.0	67.1%	-32.3	44	58.5
September 24, 2018		9.3	-2.2	33.9	48.4%	-13.1	45	43.2
October 1, 2018	1800	7.9	-1.4	32.8	46.9%	-1.1	46	40.7
November 5, 2018		8.4	0.5	33.7	48.1%	0.9	47	42.1
December 3, 2018		9.2	0.8	40.2	57.4%	6.5	48	49.4
January 2, 2019		9.2	0.0	33.6	48.0%	-6.6	49	42.8
February 4, 2019		7.45	-1.8	28.2	40.3%	-5.4	50	35.65
March 4, 2019		8.73	1.3	30.6	43.7%	2.4	51	39.33
	2150							
April 1, 2019		11.9	3.2	30.8	44.0%	0.2	52	42.7
April 15, 2019	1800	10.2	-1.7	22.5	32.1%	-8.3		32.7

* PFOA = perfluoroctanoic acid

** PFOS = perfluoroctanesulfonic acid

Current Health Advisory level for PFOS is 70 ppt.

S:/Data/MSEXCEL/Mark Johnson/Projects/Water Projects/WELL DATA/Well 23 PFO & PFA Sampling-2017

APPENDIX 2

Safety Data Sheet - CHEMGUARD 3% AFFF C306-MS-C

Safety Data Sheet

This safety data sheet complies with the requirements of: 2012 OSHA Hazard Communication Standard (29CFR 1910.1200)

Product name CHEMGUARD 3% AFFF C306-MS-C

1. Identification

1.1. Product Identifier

Product name CHEMGUARD 3% AFFF C306-MS-C

1.2. Other means of identification

Product code 770811
Synonyms None
Chemical Family No information available

1.3. Recommended use of the chemical and restrictions on use

Recommended use Fire extinguishing agent.
Uses advised against Consumer use.

1.4. Details of the Supplier of the Safety Data Sheet

Company Name Tyco Fire Protection Products
One Stanton Street
Marinette, WI 54143-2542
Telephone: 715-735-7411
Contact point Product Stewardship at 1-715-735-7411
E-mail address psra@tycofp.com

1.5. Emergency Telephone Number

Emergency telephone CHEMTREC 001-800-424-9300 or 001-703-527-3887

2. Hazards Identification

Classification

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Serious eye damage/eye irritation - Category 1
Skin Sensitization - Category 1B

2.2. Label Elements

Signal Word
DANGER

Hazard Statements
Causes serious eye damage
May cause an allergic skin reaction

Precautionary Statements

Prevention
Wear protective gloves/protective clothing/eye protection/face protection. Avoid breathing dust/fume/gas/mist/vapors/spray. Contaminated work clothing should not be allowed out of the workplace.

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or doctor/physician.
IF ON SKIN: Wash with plenty of soap and water. If skin irritation or rash occurs: Get medical advice/attention. Wash contaminated clothing before reuse.

Disposal
Dispose of contents/container to an approved waste disposal plant.

2.3. Hazards Not Otherwise Classified (HNOC)
Not Applicable.

2.4. Other Information

3. Composition/information on Ingredients

3.1. Mixture
The following component(s) in this product are considered hazardous under applicable OSHA(USA)

Chemical name	CAS No.	weight-%
2-(2-Butoxyethoxy)ethanol	112-34-5	10 - 30
Laurylamidopropyl betaine	4292-10-8	1 - 5
Caprylcaprilyl glucoside	68515-73-1	1 - 5
Polyfluorinated alkyl polyamide	Proprietary	1 - 5
Octylphenoxypolyethoxyethanol	9036-19-5	1 - 5
Polyfluorinated alkyl quaternary amine chloride	Proprietary	0.1 - 1

4. First aid measures

4.1. Description of first aid measures
Eye Contact Rinse thoroughly with plenty of water for at least 15 minutes, lifting lower and upper eyelids. Consult a physician.

Skin contact Wash skin with soap and water. Get medical attention if irritation develops and persists.

Inhalation Remove to fresh air. If breathing is difficult, give oxygen. (Get medical attention immediately if symptoms occur.).

Ingestion Rinse mouth. Do not induce vomiting without medical advice. If swallowed, call a poison control center or physician immediately.

4.2. Most Important Symptoms and Effects, Both Acute and Delayed
Symptoms No information available.

4.3. Indication of Any Immediate Medical Attention and Special Treatment Needed
Note to physicians Treat symptomatically.

5. Fire-fighting measures

5.1. Suitable Extinguishing Media
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

5.2. Unsuitable Extinguishing Media
None.

5.3. Specific Hazards Arising from the Chemical
None known.

Hazardous Combustion Products	Carbon oxides, Fluorinated oxides, Nitrogen oxides (NOx), Oxides of sulfur

5.4. Explosion Data

Sensitivity to Mechanical Impact	None.
Sensitivity to Static Discharge	None.

5.5. Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

6. Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Personal Precautions	Ensure adequate ventilation, especially in confined areas.
For emergency responders	Use personal protection recommended in Section 8.

6.2. Environmental Precautions

Environmental Precautions	Prevent further leakage or spillage if safe to do so. Prevent entry into waterways, sewers, basements or confined areas. See Section 12 for additional Ecological Information.

6.3. Methods and material for containment and cleaning up

Methods for Containment	Prevent further leakage or spillage if safe to do so.
Methods for Cleaning Up	Pick up and transfer to properly labeled containers.

7. Handling and Storage

7.1. Precautions for Safe Handling

Advice on safe handling	Avoid contact with skin and eyes. Handle in accordance with good industrial hygiene and safety practice.

7.2. Conditions for safe storage, including any incompatibilities

Storage Conditions	Keep containers tightly closed in a dry, cool and well-ventilated place.
Incompatible Materials	Strong oxidizing agents. Strong acids. Strong bases.

8. Exposure Controls/Personal Protection

8.1. Control Parameters

Exposure guidelines

Chemical name	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL
2-(2-Butoxyethoxy)ethanol 112-34-5	TWA: 10 ppm inhalable fraction and vapor	-	-	-

ACGIH (American Conference of Governmental Industrial Hygienists) OSHA (Occupational Safety and Health Administration of the US Department of Labor) NIOSH IDLH Immediately Dangerous to Life or Health

8.2. Appropriate Engineering Controls

Engineering controls Ensure adequate ventilation, especially in confined areas.

8.3. Individual protection measures, such as personal protective equipment

Eye/Face Protection Avoid contact with eyes. Tight sealing safety goggles.

Skin and Body Protection Wear protective gloves and protective clothing.

Respiratory Protection If exposure limits are exceeded or irritation is experienced, NIOSH/MSHA approved respiratory protection should be worn. Positive-pressure supplied air respirators may be required for high airborne contaminant concentrations. Respiratory protection must be provided in accordance with current local regulations.

Ventilation Use local exhaust or general dilution ventilation to control exposure with applicable limits

8.4. General hygiene considerations

Do not eat, drink or smoke when using this product. Handle in accordance with good industrial hygiene and safety practice.

9. Physical and Chemical Properties

9.1. Information on basic physical and chemical properties

Physical State Liquid
Odor Characteristic
Color Light yellow
Odor Threshold No data available

Property	Values	Remarks • Method
pH	7 - 8.5	
Melting point/freezing point	No data available	
Boiling point / boiling range	No data available	
Flash Point	No data available	
Evaporation Rate	No data available	
Flammability (solid, gas)	No data available	
Flammability limit in air		
Upper flammability limit:	No data available	
Lower flammability limit:	No data available	
Vapor Pressure	No data available	
Vapor Density	No data available	
Specific gravity	No data available	
Water Solubility	No data available	
Solubility in Other Solvents	No data available	
Partition coefficient	No data available	
Autoignition Temperature	No data available	
Decomposition Temperature	No data available	
Kinematic viscosity	No data available	
VOC content (%)	18.7575	
Density	1.02	

10. Stability and Reactivity

10.1. Chemical Stability

Stable under recommended storage conditions.

10.2. Reactivity

No data available

10.3. Possibility of hazardous reactions

None under normal processing.

Hazardous Polymerization Hazardous polymerization does not occur.

10.4. Conditions to Avoid

Extremes of temperature and direct sunlight.

10.5. Incompatible Materials

Strong oxidizing agents. Strong acids. Strong bases.

10.6. Hazardous decomposition products

Carbon oxides. Nitrogen oxides (NOx). Oxides of sulfur. Fluorinated oxides.

11. Toxicological Information

11.1. Information on Likely Routes of Exposure

Product information

Inhalation No data available.

Eye Contact Corrosive to the eyes and may cause severe damage including blindness.

Skin contact May cause allergic skin reaction.

Ingestion No data available.

Component Information

Acute Toxicity

Chemical name	Oral LD50	Dermal LD50	Inhalation LC50
2-(2-Butoxyethoxy)ethanol 112-34-5	= 5660 mg/kg (Rat)	= 2700 mg/kg (Rabbit)	-
Laurylamidopropyl betaine 4292-10-8	> 2000 mg/kg (Rat)	-	-
Polyfluorinated alkyl polyamide	>2000 mg/kg	>2000 mg/kg	>5.11 mg/l
Octylphenoxypolyethoxyethanol 9036-19-5	= 4190 mg/kg (Rat) = 1700 mg/kg (Rat)	-	-
Polyfluorinated alkyl quaternary amine chloride	>300 - <2000 mg/kg	-	-

11.2. Information on Toxicological Effects

Symptoms No information available.

11.3. Delayed and immediate effects as well as chronic effects from short and long-term exposure

Component Information					
Polyfluorinated alkyl quaternary amine chloride					
Method	species	Exposure Route	Effective dose	Exposure time	Results
OECD Test No. 439: In Vitro Skin Irritation: Reconstructed Human Epidermis Test Method	EPISKIN™	in vitro			Non-irritant

Serious eye damage/eye irritation Risk of serious damage to eyes.

Component Information					
Polyfluorinated alkyl polyamide					
Method	species	Exposure Route	Effective dose	Exposure time	Results
OECD Test No. 405: Acute Eye Irritation/Corrosion	Rabbit	eye			Class 4 on a 1 to 8 scale according to a modified Kay and Calandra classification system. Mild eye irritation

Sensitization May cause sensitization by skin contact.

Component Information			
Polyfluorinated alkyl polyamide			
Method	species	Exposure Route	Results
OECD Test No. 429: Skin Sensitisation: Local Lymph Node Assay	mouse	dermal	sensitizing

Polyfluorinated alkyl quaternary amine chloride			
Method	species	Exposure Route	Results
OECD Test No. 429: Skin Sensitisation: Local Lymph Node Assay	mouse	dermal	sensitizing

Component Information		
Polyfluorinated alkyl polyamide		
Method	species	Results
OECD Test No. 473: In vitro Mammalian Chromosome Aberration Test	in vitro	Non-clastogenic to human lymphocytes in vitro.

Carcinogenicity No information available.
Reproductive Toxicity No information available.
STOT - Single Exposure No information available.
STOT - Repeated Exposure No information available.
Aspiration Hazard No information available.

11.4. Numerical Measures of Toxicity - Product information

The following values are calculated based on chapter 3.1 of the GHS document

ATEmix (oral) 5101 mg/kg
ATEmix (dermal) 12061 mg/kg
ATEmix (inhalation-dust/mist) 129.5 mg/l

12. Ecological Information

12.1. Ecotoxicity

Chemical name	Algae/aquatic plants	Fish	Crustacea

2-(2-Butoxyethoxy)ethanol 112-34-5	EC50 (96h) > 100 mg/L Desmodesmus subspicatus	LC50 (96h) static = 1300 mg/L Lepomis macrochirus	EC50 (48h) > 100 mg/L Daphnia magna EC50 (24h) = 2850 mg/L Daphnia magna
2-Methyl-2,4-pentanediol 107-41-5	-	LC50 (96h) static = 10700 mg/L Pimephales promelas LC50 (96h) static = 10000 mg/L Lepomis macrochirus LC50 (96h) flow-through = 8690 mg/L Pimephales promelas LC50 (96h) flow-through 10500 - 11000 mg/L Pimephales promelas	EC50 (48h) 2700 - 3700 mg/L Daphnia magna
t-Butanol 75-65-0	EC50 (72h) > 1000 mg/L Desmodesmus subspicatus	LC50 (96h) flow-through 6130 - 6700 mg/L Pimephales promelas	EC50 (48h) = 933 mg/L Daphnia magna EC50 (48h) Static 4607 - 6577 mg/L Daphnia magna
Polyethylene Glycol 25322-68-3	-	LC50 (24h) > 5000 mg/L Carassius auratus	-
Sodium chloride 7647-14-5	-	LC50 (96h) flow-through 4747 - 7824 mg/L Oncorhynchus mykiss LC50 (96h) semi-static = 7050 mg/L Pimephales promelas LC50 (96h) static = 12946 mg/L Lepomis macrochirus LC50 (96h) static 6020 - 7070 mg/L Pimephales promelas LC50 (96h) flow-through 5560 - 6080 mg/L Lepomis macrochirus LC50 (96h) static 6420 - 6700 mg/L Pimephales promelas	EC50 (48h) Static 340.7 - 469.2 mg/L Daphnia magna EC50 (48h) = 1000 mg/L Daphnia magna
4,4'-bis-(sulfostyryl)-biphenyl disodium salt 27344-41-8	EC50 (72h) = 10 mg/L Desmodesmus subspicatus EC50 (96h) 10.0 - 11.0 mg/L Desmodesmus subspicatus	LC50 (96h) static = 76 mg/L Brachydanio rerio	EC50 (48h) = 1000 mg/L Daphnia magna

Polyfluorinated alkyl polyamide					
Method	Species	Endpoint type	Effective dose	Exposure time	Results
OECD Test No. 203: Fish, Acute Toxicity Test	Oncorhynchus mykiss (rainbow trout)	LC50	>14 mg/l	96h	NOEC: 14 mg/L No toxic effects at saturation.
OECD Test No. 201: Freshwater Alga and Cyanobacteria, Growth Inhibition Test	Algae	ErC50	>15 mg/l	72h	Growth rate >15, Yield 13. NOEC: 4.0 mg/L, LOEC: 8.5 mg/L
OECD Test No. 202: Daphnia sp., Acute Immobilization Test	Daphnia magna	EC50	>20 mg/l	48h	NOEC: 20 mg/L No toxic effects at saturation.

Polyfluorinated alkyl quaternary amine chloride					
Method	Species	Endpoint type	Effective dose	Exposure time	Results
OECD Test No. 211: Daphnia magna Reproduction Test	Daphnia magna	NOEC	5.38 mg/L	21 days	
OECD Test No. 202: Daphnia sp., Acute Immobilization Test	Daphnia magna	EC50	2.6 mg/L	48h	
OECD Test No. 210: Fish, Early-Life Stage Toxicity Test	Pimephales promelas	NOEC	11.8 mg/L	33 days	
OECD Test No. 203: Fish, Acute Toxicity Test	Cyprinus carpio	LC50	98 mg/L	96h	
OECD Test No. 201: Freshwater Alga and Cyanobacteria, Growth Inhibition Test	Pseudokirchneriella subcapitata	EC50	788 mg/L	96h	

12.2. Persistence and Degradability

No information available.

12.3. Bioaccumulation
No information available.

12.4. Other Adverse Effects
No information available

13. Disposal Considerations

13.1. Waste Treatment Methods

Disposal of wastes	Disposal should be in accordance with applicable regional, national and local laws and regulations.
Contaminated Packaging	Do not reuse container.

14. Transport Information

DOT	NOT REGULATED
TDG	NOT REGULATED
MEX	NOT REGULATED
ICAO (air)	NOT REGULATED
IATA	NOT REGULATED
IMDG	NOT REGULATED

15. Regulatory Information

15.1. International Inventories

TSCA	Complies
DSL/NDSL	Does not comply
ENCS	Does not comply
IECSC	Does not comply
KECL	Does not comply
PICCS	Does not comply
AICS	Does not comply

Legend:
TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List
ENCS - Japan Existing and New Chemical Substances
IECSC - China Inventory of Existing Chemical Substances
KECL - Korean Existing and Evaluated Chemical Substances
PICCS - Philippines Inventory of Chemicals and Chemical Substances
AICS - Australian Inventory of Chemical Substances

15.2. US Federal Regulations

SARA 313
Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product contains a chemical or chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

Chemical name	SARA 313 - Threshold Values %
2-(2-Butoxyethoxy)ethanol - 112-34-5	1.0

SARA 311/312 Hazard Categories

Acute Health Hazard	Yes
Chronic health hazard	No
Fire Hazard	No
Sudden Release of Pressure Hazard	No
Reactive Hazard	No

CWA (Clean Water Act)

This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42)

CERCLA

This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material

15.3. US State Regulations

California Proposition 65

This product contains the following Proposition 65 chemicals

Chemical name	California Proposition 65
Perfluorooctanoic acid - 335-67-1	Developmental Toxicity

U.S. State Right-to-Know Regulations

Chemical name	New Jersey	Massachusetts	Pennsylvania
2-(2-Butoxyethoxy)ethanol 112-34-5	X	-	X

16. Other information, including date of preparation of the last revision

NFPA	**Health Hazards** 2	**Flammability** 0	**Instability** 0	**Physical and chemical properties** -
HMIS	**Health Hazards** 2	**Flammability** 0	**Physical Hazards** 0	**Personal Protection** X

Revision date 11-Jan-2019
Revision note SDS sections updated, 2, 11, 12.

Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

End of Safety Data Sheet

APPENDIX 3

May 15, 2019 Well 24 Lab Report

NORTHERN LAKE SERVICE, INC.
Analytical Laboratory and Environmental Services
400 North Lake Avenue - Crandon, WI 54520
Ph: (715)-478-2777 Fax: (715)-478-3060

ANALYTICAL REPORT

WDNR Laboratory ID No. 721026460
WDATCP Laboratory Certification No. 105-330
EPA Laboratory ID No. WI00034

NLS Project: 321368
NLS Customer: 17323

Fax: 608 789 7396 Phone: 608 789 7385

Client: **La Crosse Water Utility**
Attn: Lee Anderson
400 La Crosse Street
La Crosse, WI 54601 3374

Project: **Well 24 Informational**

Well 24 NLS ID: 1121425
COC: 210096:1 Matrix: DW
Collected: 05/15/19 08:30 Received: 05/16/19

Parameter	Result	Units	Dilution	LOD	LOQ/MCL	Analyzed	Method	Lab
Perfluorinated Chemicals by EPA Method 537.1	see attached					05/30/19	EPA 537 Rev 1.1	721026460
Solid Phase Extraction by EPA Method 537.1	yes					05/27/19	EPA 537	721026460

Values in brackets represent results greater than or equal to the LOD but less than the LOQ and are within a region of "Less-Certain Quantitation". Results greater than or equal to the LOQ are considered to be in the region of "Certain Quantitation". LOD and/or LOQ tagged with an asterisk(*) are considered Reporting Limits. All LOD/LOQs adjusted to reflect dilution and/or solids content.

ND = Not Detected (< LOD) LOD = Limit of Detection LOQ = Limit of Quantitation NA = Not Applicable
DWB = Dry Weight Basis %DWB = (mg/kg DWB) / 10000 1000 ug/L = 1 mg/L
MCL = Maximum Contaminant Levels for Drinking Water Samples. Shaded results indicate >MCL.

Reviewed by: [redacted]

Authorized by:
R. T. Krueger
President

ANALYTICAL RESULTS: Perfluorinated Chemicals by EPA 537 Rev 1.1 Safe Drinking Water Analysis

Customer: La Crosse Water Utility NLS Project: 321368

Project Description: Well 24 Informational

Project Title: Template: 537PPT Printed: 01/24/2020 09:21

Sample: 1121425 Well 24 Collected: 05/15/19 Analyzed: 05/30/19 - Analytes: 12

ANALYTE NAME	RESULT	UNITS	WWB	DIL	LOD	LOQ	MCL	Note
perfluorobutanesulfonic acid (PFBS)	ND	ppt		1	6.6	21		
perfluorohexanoic acid (PFHxA)	ND	ppt		1	1.3	4.0		
perfluoroheptanoic acid (PFHpA)	ND	ppt		1	0.80	2.6		
perfluorohexanesulfonic acid (PFHxS)	ND	ppt		1	2.8	8.8		
perfluorooctanoic acid (PFOA)	ND	ppt		1	1.2	3.9		
perfluorononanoic acid (PFNA)	ND	ppt		1	1.5	4.9		
perfluorooctanesulfonic acid (PFOS)	11.7	ppt		1	1.7	5.3		
perfluorodecanoic acid (PFDA)	ND	ppt		1	0.90	2.7		
perfluoroundecanoic acid (PFUnA)	ND	ppt		1	1.0	3.0		
perfluorododecanoic acid (PFDoA)	ND	ppt		1	1.9	6.1		
perfluorotridecanoic acid (PFTrDA)	ND	ppt		1	3.2	10		
perfluorotetradecanoic acid (PFTA)	ND	ppt		1	2.8	8.9		
C13-PFHxA (SURR)	53.004%			1				SR S
C13-PFDA (SURR)	81.364%			1				S

NOTES APPLICABLE TO THIS ANALYSIS:

S = This compound is a surrogate used to evaluate the quality control of a method.

SR = Surrogate recovery was outside QC limits.
C13-PFHxA recovered below QC limits.

The PFOA branch isotope peak is included in the PFOA calculation per EPA directive.

SAMPLE COLLECTION AND CHAIN OF CUSTODY RECORD

NORTHERN LAKE SERVICE, INC.

Analytical Laboratory and Environmental Services

400 North Lake Avenue • Crandon, WI 54520-1298

Tel: (715) 478-2777 • Fax: (715) 478-3060

Wisconsin DNR cert ID
721026460 (Cran) / 268533760 (Wauk)
Wisconsin DATCP ID
105-000330 (Cran) / 105-000479 (Wauk)

CLIENT	La Crosse Water Utility
ADDRESS	400 La Crosse St.
CITY / STATE / ZIP	La Crosse / WI / 54601
PROJECT DESCRIPTION / NO.	Well 24 Informational
QUOTATION NO.	
DNR FID #	
DNR LICENSE #	
CONTACT	Lee Anderson
PHONE	608-789-7388
PURCHASE ORDER NO.	
FAX	608-789-7396

MATRIX:
SW = surface water
WW = waste water
GW = groundwater
DW = drinking water
TIS = tissue
AIR = air
SOIL = soil
SED = sediment
PROD = product
SL = sludge
OTHER

NO. 210096

ITEM NO.	NLS LAB. NO.	SAMPLE ID	COLLECTION DATE	COLLECTION TIME	MATRIX (See above)	ANALYZE PER ORDER OF ANALYSIS: PFO	USE BOXES BELOW: Indicate Y or N if GW Sample is field filtered. Indicate G or C if WW Sample is Grab or Composite. PARAMETER	COLLECTION REMARKS (i.e. DNR Well ID #)
1.	112425	Well 24 (x4)	5-15-19	8:30	DW	G		
2.								
3.								
4.								
5.								
6.								
7.								
8.								
9.								
10.								

ONE SAMPLE PER LINE

COLLECTED BY (signature)	CUSTODY SEAL NO. (IF ANY)	DATE/TIME 5-15-19 / 8:30
RELINQUISHED BY (signature)	RECEIVED BY (signature)	DATE/TIME
DISPATCHED BY (signature)	METHOD OF TRANSPORT: UPS Ground	DATE/TIME 5-15-19 / 14:00

RECEIVED AT NLS BY (signature)	DATE/TIME 5-16-19 10:00	CONDITION on ice	TEMP. 2.2c MB #2
COOLER #	REMARKS & OTHER INFORMATION: Request Result ASAP		
	WDNR FACILITY NUMBER	E-MAIL ADDRESS	

REPORT TO

INVOICE TO

PRESERVATIVE:
NP = no preservative
S = sulfuric acid
N = nitric acid
Z = zinc acetate
M = methanol
OH = sodium hydroxide
HA = hydrochloric & ascorbic acid
H = hydrochloric acid

IMPORTANT

1. TO MEET REGULATORY REQUIREMENTS, THIS FORM **MUST** BE COMPLETED IN DETAIL AND INCLUDED IN THE COOLER CONTAINING THE SAMPLES DESCRIBED.
2. PLEASE USE ONE LINE PER SAMPLE, **NOT** PER BOTTLE.
3. RETURN THIS FORM WITH SAMPLES - CLIENT MAY KEEP YELLOW COPY.
4. PARTIES COLLECTING SAMPLE, LISTED AS **REPORT TO** AND LISTED AS **INVOICE TO** AGREE TO STANDARD TERMS & CONDITIONS ON REVERSE.

Rev. 7/20/15

Printed: Monday May 13 2019 1:58 PM

CLIENT: La Crosse Water Utility
400 La Crosse Street
La Crosse, WI 54601 3374
608-789-7385
PFC at Well #24 - Needs Results by 05/31/2019

SHIP TO: Lee Anderson
800 East Avenue North
La Crosse, WI 54601
608-789-7385

Cust #: 17323
Order #: 72790
Ship Date: 05/13/2019
Type: DW
CHLORINATED SYSTEM
UPS Ground

Sample ID: Well #24 + Qkit
1 SET

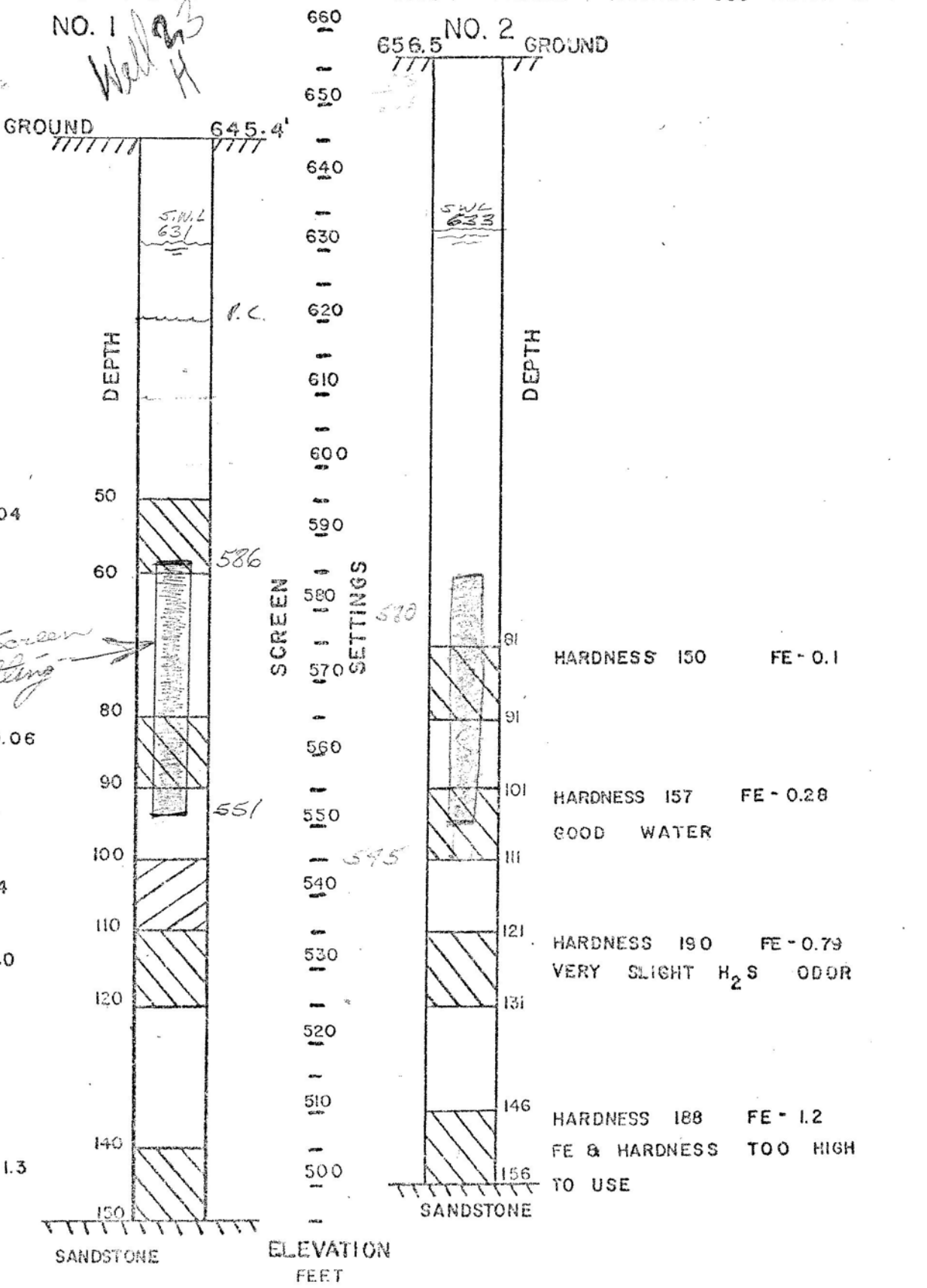
Perfluorinated Compounds Method 537 -- 2 x 250mL 1.25g Trizma

Shipped and Completed by:_____

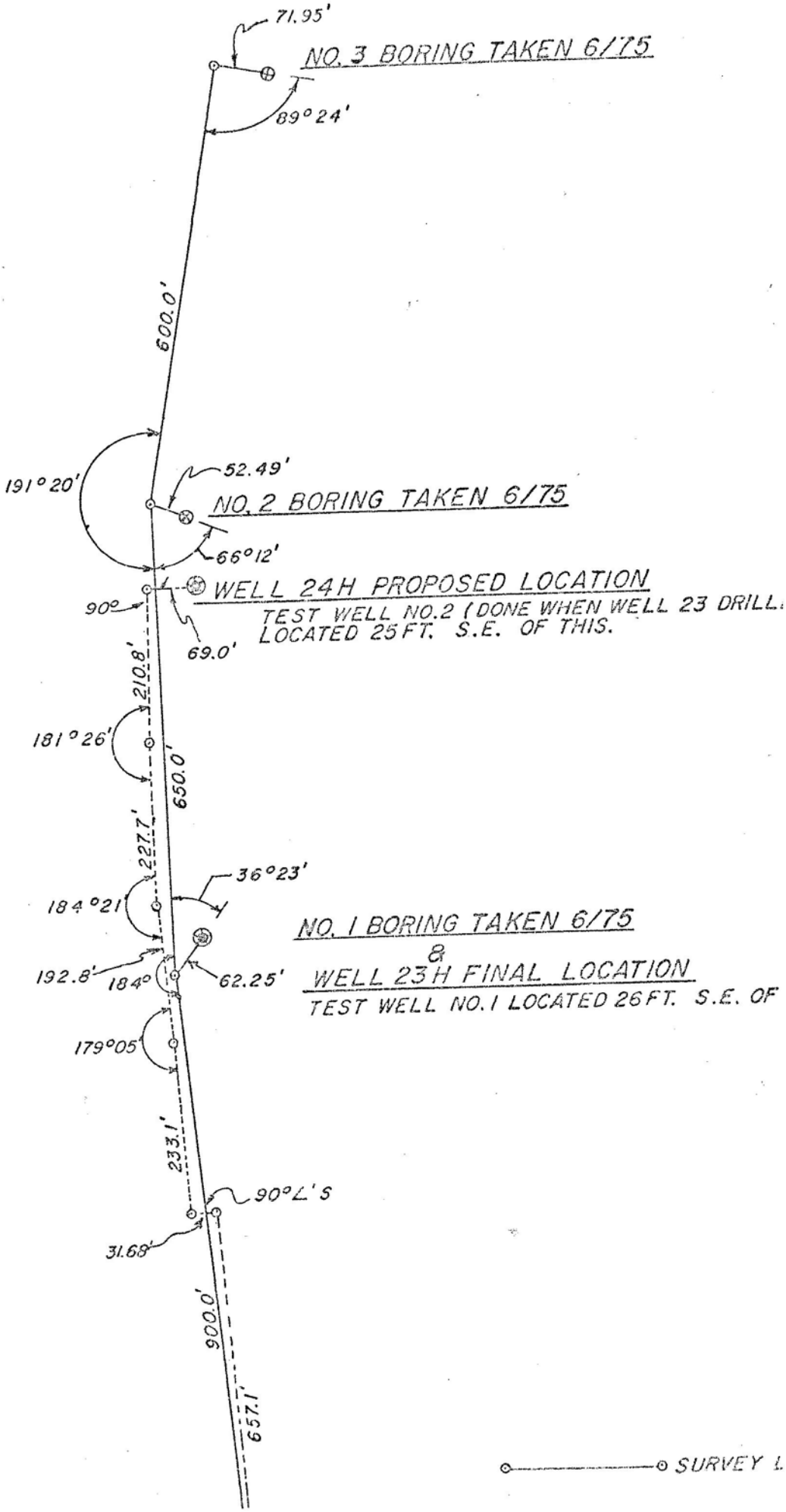
APPENDIX 4

"Test Well No. 2" Documents

PUMPING OF FRENCH ISLAND TEST WELLS FOR WELL 23H.



1" = 20'


71.95'
NO. 3 BORING TAKEN 6/75
89°24'
600.0'
191°20'
52.49'
NO. 2 BORING TAKEN 6/75
66°12'
WELL 24H PROPOSED LOCATION
TEST WELL NO.2 (DONE WHEN WELL 23 DRILL
LOCATED 25FT. S.E. OF THIS.
90°
69.0'
210.8'
181°26'
650.0'
227.7'
36°23'
184°21'
NO. 1 BORING TAKEN 6/75
&
WELL 23H FINAL LOCATION
TEST WELL NO.1 LOCATED 26FT. S.E. OF
192.8'
184°
62.25'
179°05'
233.1'
90°L'S
31.68'
900.0'
657.1'
SURVEY L