

March 13, 2018

Project Number: 05-017-015

Mr. Ron Shear  
Enumclaw Recycling Facility  
PO BOX 1373  
ENUMCLAW, WA 98022

RE: Addendum to the ERC Critical Aquifer Recharge Areas Hydrogeologic Report 38XXX Enumclaw Franklin Road SE, Enumclaw, WA 98022 King County Parcel Numbers: 3621069014, 3621069013, and 3621069004 prepared for: ERC, Inc., by SNR Company, dated March 2018; Well Head Protection Areas letter report addendum

Dear Ron:

Per your request, SNR Company has prepared this addendum letter report, to SNR's March 2018, "Critical Aquifer Recharge Areas", hydrogeologic report, to address "wellhead protection" areas in the vicinity of the ERC proposed mulch processing area. The location of the only Group "A" water district water supply wells in the vicinity of the ERC site is shown on Figure 1.



*Figure 1 – Location of "Group A" water district, water supply wells in the vicinity of the ERC site, Google Earth Professional, 2018*

The geologic and hydrogeologic studies and data for the subject property and vicinity are included in the SNR "Critical Aquifer Recharge Areas", hydrogeologic report, dated March 2018. This letter report only addresses potential well head protection areas for Group "A" water system, water supply wells in the vicinity of the ERC proposed mulch processing area.

Based on SNR's research, there is only one well log in an area of approximately 3-square miles from the ERC exempt water well that suggests the well, installed in 2004, is a water supply well for a Group "A" water system ("purveyor"), the Remolif Water System well log. The entire Remolif water system consists of the two water wells shown on Figure 1, per the DOH database on Group "A" water systems (Figure 2).

Compliance Actions		Operating Permits		Operators		Reports		Water Use Efficiency	
General Information		Source Information		Samples		Exceedances		Water Quality Monitoring Schedule	
<b>Source 01 - WELL #1 ABS603</b>									
Source Status	Active	Usage	Permanent	WRIA	Duwamish-Green	Intertie Supplying System	NA		
Type	Groundwater Well	Capacity (gpm)	40	Township	21	Intertie Supplying Number	NA		
Effective Date	1/1/1970	Treated	No	Range	08E				
Inactive Date		Metered	Yes	Section	36				
DOE Well Tag Number	ABS603	Well Depth (ft)	83	Qtr/Qtr Section	SWSE				
<b>Source 02 - Unapproved WELL #2 AKR828</b>									
Source Status	Active	Usage	Seasonal	WRIA	Duwamish-Green	Intertie Supplying System	NA		
Type	Groundwater Well	Capacity (gpm)	40	Township	21	Intertie Supplying Number	NA		
Effective Date	12/15/2004	Treated	No	Range	08E				
Inactive Date		Metered	Yes	Section	36				
DOE Well Tag Number	AKR528	Well Depth (ft)	114	Qtr/Qtr Section	SWSE				

Figure 2 - Water wells in the Remolif Water System from the Washington State Department of Health, 2018

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However, there is an older (1976) Remolif water well log that indicates that the well's proposed use is "municipal" water, in the "Propose Use" checkboxes on the well log, but the driller does not use the terms "Group "A" water system well" in the description of this well, because this well could be for a Group "B" water system and there is no way to know what type of system the Remolif water system was in 1976.

Well drillers are required to indicate on the well logs the purpose and type of water well that will be installed, especially for Group "A" water system supply wells, because these **ARE NOT**, exempt, domestic water supply wells. Group "A" water systems must obtain water rights from the Department of Water Resources (DWR), which then allows the installation of as many water supply wells to meet the demands of the water district's customers, as necessary, up to the maximum allowed withdrawals pursuant to the water rights that were granted to the water district/purveyor.

However, the well head protection program only applies to Group "A" water system supply wells, which are the largest water supply systems a water purveyor can have. Although Group "B" water systems, with three to fourteen users are very common in rural areas. These water systems are not regulated by the wellhead protection program (these Group "B" systems can have as few as one water well and depending on the size of the system, it may be necessary to obtain water rights from the DWR for these systems to install more water supply wells).

In reality, areas with a critical recharging effect on aquifers used for potable water, wellhead protection and even sole source aquifers are addressed in federal law as the Safe Drinking Water Act (42 U.S.C. §300f et seq.). However, almost all state health departments have been authorized to administer provisions of this Act and the State Health Department can authorize municipal health departments to administer provisions of this Act also.

The intent of the Act is to insure that the largest suppliers (surface or ground water) of potable water for public use are providing truly potable water to the consumers of this water. The largest suppliers are Group "A" water systems, which is why the wellhead protection program only pertains to Group "A" water systems.

This became a critical areas issue under the Growth Management Act of 1990 (GMA), as revised, per RCW 36.70A.030 (5) (b), "areas with a critical recharging effect on aquifers used for potable water" (most of the critical areas in the GMA have federal law counterparts, such as wetland areas regulated under the GMA RCW 36.70A.030 (5) (a) and under federal law 33 U.S.C. §1251 et seq. – the Water Quality Act of 1987).

Because, RCW 36.70A.030 (5) critical areas must be incorporated into the municipal code of all municipalities that were required to or chose to “Plan” under the GMA. The following is from the King County “critical areas ordinance”:

21A.06.253C Critical aquifer recharge area. Critical aquifer recharge area: an area designated on the critical aquifer recharge area map adopted by K.C.C. 21A.24.311 that has a high susceptibility to ground water contamination or an area of medium susceptibility to ground water contamination that is located within a sole source aquifer or within an area approved in accordance with chapter 246-290 WAC as a wellhead protection area for a municipal or district drinking water system, or an area over a sole source aquifer and located on an island surrounded by saltwater. Susceptibility to ground water contamination occurs where there is a combination of permeable soils, permeable subsurface geology and ground water close to the ground surface. (Ord. 15051 § 23, 2004; Ord. 11481 § 1, 1994. Formerly K.C.C. 21A.06.253C).

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The WAC listed in this King County Code is: Chapter 246-290 WAC - GROUP A PUBLIC WATER SUPPLIES. This WAC states:

WAC 246-290-135

Source water protection.

(1) The department may require monitoring and controls in addition to those specified in this section if the department determines a potential risk exists to the water quality of a source.

(2) SCA. [Sanitary Control Area]

(a) The purveyor shall maintain an SCA around all sources for the purpose of protecting them from existing and potential sources of contamination.

(b) For wells and springs, the minimum SCA shall have a radius of one hundred feet (thirty meters) and two hundred feet (sixty meters) respectively, unless engineering justification demonstrates that a smaller area can provide an adequate level of source water protection. The justification shall address geological and hydrological data, well construction details, mitigation measures, and other relevant factors necessary to assure adequate sanitary control.

There are no Group “A” water supply wells located within 200-feet of the ERC property. The Remolif Group “A” water well (installed in 2004) is in a confined aquifer with 81-feet of hydraulic head (2.45 atmospheres in pressure).

This Remolif well installed in 2004, is located approximately 200-feet east of the ERC exempt water well and 560-feet south of the ERC southern property line. Additionally the ground water aquifer the ERC well is screened in (in a confined aquifer); is very different from the confined ground water aquifer the Remolif 2004 water well is producing from.

There is another older (1976) Remolif water well, but this is not designated as a Group A water system well on the well log. The ground water aquifer this well is producing from is confined by 40-feet of glacial lodgment till and produces < 40 gpm, which could potentially provide an adequate water supply for approximately 100-residences. This well is located 550-feet southwest of the southwest corner of the ERC property. This 1976 well has 33-feet of hydraulic head (1 atmosphere of pressure).

Neither of the two Group "A" water system, water supply well's, SCA can be impacted by the ERC, because these wells are located much further from the ERC southern property line, than the largest SCA required by WAC 246-290-135 (200-foot radius of the Group "A" water supply wells).

Regardless, based on the studies and research for the ERC Critical Aquifer Recharge Areas Hydrogeologic Report 38XXX Enumclaw Franklin Road SE, Enumclaw, WA 98022 King County Parcel Numbers: 3621069014, 3621069013, and 3621069004 prepared for: ERC, Inc., by SNR Company, dated March 2018; all water wells located within 3-square miles of the ERC exempt water well, that produce from a ground water aquifer (2-dug wells produce unsaturated zone ground water), produce from confined ground water aquifers, which do not allow infiltrating ground water recharge these wells anywhere where they are confined, including "polluted" unsaturated zone ground water infiltration.

The Remolif water system is a very small Group "A" system, which has 25-approved connections by the Washington State Department of Health (DOH), but per Figure 3, actually has 28-connections.

General Information		Source Information		Samples		Exceedances		Water Quality Monitoring Schedule	
Group	A	Status	Active	Ownership Type	Private				
Type	Community	Residential Population	76	Jurisdiction	WA DOH ODW				
County	KING	NonResidential Population	0	System Effective Date	1/1/1970				
Owner Name	REMOLIF ADDITION	Total Calculated Connections	28	System Inactive Date					
Primary Contact	Rob Ogbum	Total Approved Connections	25	SMA Name					
Primary Contact Phone	(360) 802-6351	Distribution Capacity (gallons)	0	SMA Number					
Water System Mailing Address	38124 274th Ave. SE Enumclaw 98022, WA								

Figure 3 - Washington State Department of Health information on the Remolif Group "A" Water System, DOH, 2018

It should be noted that this Group "A" water system has had a significant number of exceedances for secondary drinking water standards and not, unexpectedly, for total fecal coliform (Figure 4).

Type	Source	DOC	Source	Analyte	Result	Quantity	Units	Test Panel	Analyte Group	Sample Number	Lab Number
MCL2	01	09G048	12/10/2003	IRON	0.890		mg/L	IOC	IOC	65452	089
MCL2	01	09G048	1/13/1995	IRON	1.25		mg/L	IOC	IOC	90318	010
MCL2	01	09G048	1/13/1995	MANGANESE	0.086		mg/L	IOC	IOC	90318	010
MCL2	01	09G048	3/28/1993	IRON	3.02		mg/L	ICHEM	IOC	14424	051
MCL2	01	09G048	3/28/1993	MANGANESE	0.139		mg/L	ICHEM	IOC	14424	051
MCL2	01	09G048	5/9/1989	COLOR	30.0		CU	ICHEM	IOC	11651	051
MCL2	01	09G048	5/9/1989	IRON	1.77		mg/L	ICHEM	IOC	11651	051
MCL2	01	09G048	5/9/1989	MANGANESE	0.117		mg/L	ICHEM	IOC	11651	051
MCL2	01	09G048	9/18/1985	COLOR	45.0		CU	ICHEM	IOC	08486	051
MCL2	01	09G048	9/18/1985	IRON	3.10		mg/L	ICHEM	IOC	08486	051
MCL2	01	09G048	9/18/1985	MANGANESE	0.228		mg/L	ICHEM	IOC	08486	051
MCL2	01	09G048	11/15/1982	COLOR	49.0		CU	ICHEM	IOC	96171	051
MCL2	01	09G048	11/15/1982	IRON	5.00		mg/L	ICHEM	IOC	96171	051
MCL2	01	09G048	11/15/1982	MANGANESE	0.320		mg/L	ICHEM	IOC	96171	051
MCL2	01	09G048	10/22/1975	IRON	4.05		mg/L	ICHEM	IOC	01969	051
MCL2	01	09G048	10/22/1975	MANGANESE	0.180		mg/L	ICHEM	IOC	01969	051
P	Distribution		08/2017	TOTAL COLIFORM	Present		/100ml	COLL_AP	MICRO	27936	089
P	Distribution		12/12/2014	TOTAL COLIFORM	Present		/100ml	COLL_AP	MICRO	01579	089
P	Distribution		6/23/2014	TOTAL COLIFORM	Present		/100ml	COLL_AP	MICRO	84779	089
P	Distribution		4/30/2005	TOTAL COLIFORM	Present		/100ml	COLL_AP	MICRO	60853	089
P	Distribution		8/3/2004	TOTAL COLIFORM	Present		/100ml	COLL_AP	MICRO	35967	089
P	Distribution		8/3/2004	TOTAL COLIFORM	Present		/100ml	COLL_AP	MICRO	35568	089
P	Distribution		8/3/2004	TOTAL COLIFORM	Present		/100ml	COLL_AP	MICRO	35559	089
P	Distribution		7/28/2004	TOTAL COLIFORM	Present		/100ml	COLL_AP	MICRO	35466	089
P	Distribution		4/28/2004	TOTAL COLIFORM	Present		/100ml	COLL_AP	MICRO	28334	089

Figure 4 - DOH partial listing of exceedances for the Remolif Group "A" Water System, DOH, 2018

The test for total fecal coliform can be artificially high if other non-pathogen bacteria are present in the ground water at high enough levels, to create a false positive for fecal coliform bacteria, which are NOT necessarily pathogenic, which is why these wells are also checked for *Escherichia coli* (*E.coli*) bacteria, which can be pathogenic (but not all *E.coli* is pathogenic). There is no indication that *E. coli* bacteria were ever detected in this water system.

Regardless, the two water supply wells in the Remolif water system may already have a 100 to 200-foot Sanitary Control Area (SCA), but even if these SCA's are 200-feet, the SCA is located at least 300-feet from the ERC southern property line and ERC's mulch processing area is located even further away from these water supply wells for the Group "A" Remolif water system (Figure 5).

Wellhead protection requires a Sanitary Control Area up to 200-feet in diameter from the water supply well for a Group "A" water system. The SCA for the water supply wells, for the Remolif water system, are located over 300-feet from the southern property line of the ERC property, presuming the 200-foot SCA was required.

The ERC exempt water well is located over 200-feet from ERC facilities and the onsite septic system, and except for a small storm water infiltration pond that manages storm water runoff from the paved "parking and access area", which is located approximately 50-feet north of the southern property line, all other ERC facilities are located approximately 150-feet or much further north of the southern property line.

Additionally, as discussed in SNR's March 2018 *Critical Aquifer Recharge Areas Hydrogeologic Report 38XXX Enumclaw Franklin Road SE, Enumclaw, WA 98022 King County Parcel Numbers: 3621069014, 3621069013, and 3621069004 prepared for: ERC, Inc.*, there are no chemicals used in any portion of the of the ERC mulching process. Most processing prior to curing the mulch are mechanical, used to "chip" the feedstock materials into a uniform, "mulch size". The only other step taken after the mulch has cured is the use of screening equipment to sort the sizes of the mulch, with the smaller sized mulch typically being blended with clean, pre-washed sand to create a planting soil.

However, the wellhead protection SCA is most likely created to prevent any potentially impacted surface water to accumulate around the well casing, especially for older wells such as the 1976 Remolif water supply well, because these water supply wells (including the one installed in 2004) are NOT designed to prevent potential surface water from becoming unsaturated zone bypass flows below the "sanitary seal" at the ground surface. This can result in a direct discharge of this surface water into the well.

Additionally, the mix that is used to make the sanitary surface seal is very important, because the drill bit is obviously larger than the casing and can affect the permeability of the sediments and bedrock in the vicinity of the advancing drill bit (sort of like fault gouge creating a more permeable conduit for surface water and ground water).

Although the driller of the 2004 Remolif Group "A" water supply well installed a slightly larger casing than is used in an exempt domestic water well (8-inch diameter instead of 6-inch diameter) and a 30-foot surface seal was installed rather than a 20-foot seal; this well was built exactly like an exempt, domestic water well with NO sand pack filling the well from the bottom of the well screens to 2-feet higher than the well screen and installing a 10-foot seal of neat cement mixed with 4-bage of bentonite for each cubic yard of neat cement. Additionally, the well was not tremmie grouted with neat cement to within 30-feet of the ground surface; where the surface sanitary seal is installed in the upper 30-feet of the well. The Bentonite clay swells when it comes in contact with water and the mixture of neat cement and Bentonite will expand in the well hole.



This expanding mixture of neat cement and Bentonite expands sufficiently to compact the materials exposed in the well hole greatly reducing the potential for bypass flows and for surface water infiltrating through the sediments and bedrock "disturbed" by the advancing drill bit. This is necessary because the only way to potentially impact the ground water quality of a confined aquifer is for the pollutants to infiltrate downwards where the well hole penetrated the confined aquifer. In other words, the well hole can create a conduit to the ground water in the confined aquifer.

This is most likely why an SCA is required for a water supply well for a Group "A" water system, including water supply wells that produce from confined aquifers. Because the "weak point" is the actual well bore-hole, which MUST be thoroughly and completely sealed from the sand pack to the top of the ground surface, with materials that are strong and very expansive, to insure that surface water cannot find its way into the ground water aquifer.

Regardless, the BRC facility does not generate any byproducts in the mulching process that do not occur in any forest where forest debris is reduced to forest litter, which is reduced to forest duff. The actual processing areas are located at least 700-feet from the two Remolif water system water supply wells. The maximum SCA for these wells is 200-feet per WAC 246-290-135, and even with a 200-foot SCA, the SCA boundary would still be more than 300-feet south of the southern property line of the ERC site and much further from the actual processing area.

Based on the scientific studies and research conducted for SNR's March 2018 *Critical Aquifer Recharge Areas Hydrogeologic Report 38XXX Enumclaw Franklin Road SE, Enumclaw, WA 98022 King County Parcel Numbers: 3621069014, 3621069013, and 3621069004 prepared for: ERC, Inc.* and the locations of the two Remolif water supply wells for this Group "A" water system, the BRC site cannot have wellhead protection areas present on or within over 500-feet from the southern property line of the ERC site.

If you have any questions, please contact me at your convenience (206-291-5556)

Sincerely,  
SNR COMPANY

Steven F. Neugebauer  
Principal Hydrogeologist/Engineering Geologist  
LG, LHG, LEG, PG  
License Number: 000347  
March 13, 2018

