

TABLE I-1
ERCO Historical Data Master Table

VOA																
Area	StationId	CollectDate	Methylene Chloride	Naphthalene	Styrene	Tetrachloroethene	Tetrahydrofuran	Toluene	trans-1,2-Dichloroethene	trans-1,3-Dichloropropene	Trichloroethene	Trichlorofluoromethane	Vinyl Chloride	Xylenes,		
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	Total µg/L	Total µg/L	
SPP	V-31A	6/20/2001				0.41 U					74		1.8 U			
SPP	V-31A	7/29/2002	0.85 U	0.59 U	0.43 U&	0.57 U	2 U	0.47 U	8.2		0.51 U	71	0.52 U	2	1.5 U	
SPP	V-31A	6/26/2003	0.48 J	0.74 U	0.86 U	0.45 U	1.7 U	0.67 U	8.2		0.19 U	62	0.79 U	2.2	2.6 U	
SPP	V-31A	6/15/2004	0.33 U	0.33 U	0.19 U	0.33 U	0.82 U	0.17 U	7.2		0.16 U	73	0.28 U	1.9	0.59 U	
SPP	V-31A	6/21/2005	0.43 U	0.74 U	0.86 U	0.45 U	1.7 U	0.67 U	6.5		0.19 U	56	0.79 U	1.9	2.6 U	
SPP	V-31A	6/20/2006	0.43 U	0.74 U	0.86 U	0.45 U	1.7 U	0.67 U	9		0.19 U	71	0.79 U	2.2	2.6 U	
SPP	V-31A	6/26/2007	0.43 U	0.74 U	0.86 U	0.45 U	1.7 U	0.67 U	8.1		0.19 U	56	0.79 U	1.9	2.6 U	
SPP	V-31A	6/24/2008	0.43 U	0.74 U	0.86 U	0.45 U	1.7 U	0.67 U	9.5		0.19 U	56.8	0.79 U	3.3	2.6 U	
SPP	V-31A	6/18/2009	0.43 U	0.89 U	0.86 U	0.45 U	1.7 U	0.67 U	9.8		0.19 U	58.5	0.79 U	3	2.6 U	
SPP	V-31A	6/15/2010	0.43 U	0.89 U	0.86 U	0.45 U	1.7 U	0.67 U	10.5		0.19 U	60.7	0.79 U	4.1	2.6 U	
SPP	V-31A	6/6/2011	1.4 U	5.0 U	1.0 U	1.0 U	5.0 U	1.0 U	9.1		0.63 U	53	1.0 U	3.3	3.0 U	
SPP	V-31A	6/18/2012	2.5 U	2.5 U	2.5 U	2.5 U	13 U	2.5 U	9.9		2.5 U	53	2.5 U	3.3	5.0 U	
SPP	V-31A	6/17/2013	2.5 U	2.5 U	2.5 U	2.5 U	13 U	2.5 U	8.8		2.5 U	44	2.5 U	3.2	5.0 U	
SPP	V-31A	6/5/2014	2.5 U	2.5 U	2.5 U	2.5 U	13 U	2.5 U	8.8		2.5 U	44	2.5 U	2.4 J	5.0 U	
SPP	V-31A	6/10/2015	2.5 U	2.5 U	2.5 U	2.5 U	13 U	2.5 U	7.9		2.5 U	35	2.5 U	1.2 J	5.0 U	
SPP	V-31A (Dup)	6/10/2015	2.0 U	2.0 U	2.0 U	2.0 U	10 U	2.0 U	8.2		2.0 U	35	2.0 U	1.6 J	4.0 U	
SPP	V-31A	6/8/2016	3.57 U	0.580 U	0.390 U	0.663 U	6.07 U	0.340 U	7.67		0.740 U	31.8	0.433 U	1.82	1.50 U	
SPP	V-31A	6/14/2017	3.57 U	0.580 U	0.390 U	0.663 U	6.07 U	1.37 U	10.5		0.740 U	36.0	0.433 U	1.93	1.50 U	
SPP	V-31A	6/5/2018	3.57 U	0.580 U	0.390 U	0.663 U	6.07 U	1.37 U	11.1		0.740 U	30.8	0.433 U	2.45	1.05 U	
SPP	V-31A (dup)	6/5/2018	3.57 U	0.580 U	0.390 U	0.663 U	6.07 U	1.37 U	10.7		0.740 U	29.1	0.433 U	2.24	1.05 U	
SPP	V-31A	6/19/2019	3.57 U	0.580 U	0.390 U	0.663 U	6.07 U	1.37 U	10.4		0.740 U	31.0	0.433 U	1.60	1.05 U	
SPP	V-31A	6/3/2020	1.43 U	0.580 U	0.393 U	1.00 U	3.10 U	0.927 U	10.8		0.393 U	23.0	0.533 U	1.51	1.50 U	
SPP	V-31A	6/30/2021	1.43 U	0.580 U	0.393 U	1.00 U	3.10 U	0.927 U	11.0		0.393 U	22.3	0.533 U	1.97	0.580 U	
SPP	V-31A	6/22/2022	1.43 U	0.580 U	0.393 U	1.00 U	3.10 U	0.927 U	8.90		0.393 UJ	14.7	0.533 U	1.47	0.580 U	
SPP	V-31A (dup)	6/22/2022	1.43 U	0.580 U	0.393 U	1.00 U	3.10 U	0.927 U	9.14		0.393 UJ	15.3	0.533 U	1.49	0.580 U	
SPP	V-31A	6/14/2023	5.0 U	1.0 U	1.0 U	1.0 U	10 U	0.50 U	10		1.0 U	14	1.0 U	1.3	1.0 U	
SPP	V-31A	6/10/2024	5.1	1.0 U	1.0 U	1.0 U	10 U	0.50 U	8.9		1.0 U	8.7	1.0 U	1.2	1.0 U	
SPP	V-32	12/10/1996	5 U		5 U	5 U		5 U	1.4		5 U	3.3	5 U	2	5 U	
SPP	V-32	4/15/1999				0.41 U						3		1		
SPP	V-32	6/9/1999				0.41 U						2.4		1.5 J		
SPP	V-32	9/14/1999				1 U						1		1		
SPP	V-32	12/6/1999				0.41 U						2.3		0.98		
SPP	V-32	9/26/2000				0.41 U						1.7		0.17 U		
SPP	V-32	12/7/2000														
SPP	V-32	6/21/2001				0.41 U						2.3		1.2 U		
SPP	V-32	7/29/2002	0.85 U	0.59 U	0.43 U&	0.57 U	2 U	0.47 U	0.81 Q		0.51 U	2.5 Q	0.52 U	1.1	1.5 U	
SPP	V-32	6/26/2003	0.43 U	0.74 U	0.86 U	0.45 U	1.7 U	0.67 U	1.4 J		0.19 U	2.3	0.79 U	1.5	2.6 U	
SPP	V-32	6/15/2004	0.33 U	0.84 J	0.19 U	0.33 U	0.82 U	0.17 U	0.21 U		0.16 U	1.7	0.28 U	0.18 U	0.59 U	
SPP	V-32	6/22/2005	0.43 U	0.74 U	0.86 U	0.45 U	1.7 U	0.67 U	0.89 U		0.19 U	1.7	0.79 U	0.86	2.6 U	
SPP	V-32	6/20/2006	0.43 U	3.3	0.86 U	0.45 U	1.7 U	0.67 U	0.89 U		0.19 U	1.4	0.79 U	0.59	2.6 U	
SPP	V-32	6/26/2007	0.43 U	0.74 U	0.86 U	0.45 U	1.7 U	0.67 U	0.89 U		0.19 U	1.6	0.79 U	0.42 J	2.6 U	
SPP	V-32	6/24/2008	0.43 U	0.74 U	0.86 U	0.45 U	1.7 U	0.67 U	1.1		0.19 U	1.7	0.79 U	0.76	2.6 U	
SPP	V-32	3/25/2009														
SPP	V-32	6/16/2009														
SPP	V-32	9/29/2009														
SPP	V-32	12/14/2009														
SPP	V-32	3/15/2010														
SPP	V-32	6/15/2010	0.43 U	0.89 U	0.86 U	0.45 U	1.7 U	0.67 U	2.9		0.19 U	0.48 U	0.79 U	0.51 J	2.6 U	
SPP	V-32	12/16/2010														
SPP	V-32	3/28/2011														
SPP	V-32	6/6/2011	1.4 U	5.0 U	1.0 U	1.0 U	5.0 U	1.0 U	2.2		0.63 U	1.0 U	1.0 U	0.30 J	3.0 U	
SPP	V-32	9/27/2011														
SPP	V-32	12/5/2011														
SPP	V-32	3/13/2012														
SPP	V-32	6/19/2012	1.0 U	1.0 U	1.0 U	1.0 U	5.0 U	1.0 U	1.9		1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	
SPP	V-32	9/24/2012														
SPP	V-32	12/3/2012														
SPP	V-32	3/19/2013	1.0 U	1.0 U	1.0 U	1.0 U	5.0 U	1.0 U	2.1		1.0 U	1.0 U	1.0 U	0.22 J	2.0 U	
SPP	V-32	9/16/2013														
SPP	V-32 (dup)	9/16/2013														
SPP	V-32	12/3/2013														
SPP	V-32 (dup)	12/3/2013														
SPP	V-32	6/5/2014	1.0 U	1.0 U	1.0 U	1.0 U	5.0 U	1.0 U	2.0		1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	
SPP	V-32	9/11/2014														
SPP	V-32	12/4/2014														
SPP	V-32 (dup)	12/4/2014														
SPP	V-32	3/16/2015														
SPP	V-32	6/16/2015	1.0 U	1.0 U	1.0 U	1.0 U	5.0 U	1.0 U	1.8		1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	
SPP	V-32	9/9/2015														
SPP	V-32	12/8/2015														
SPP	V-32	3/14/2016														
SPP	V-32 (dup)	3/14/2016														
SPP	V-32	6/8/2016	3.57 U	0.580 U	0.390 U	0.663 U	6.07 U	0.340 U	1.20		0.740 U	0.510 U	0.433 U	0.393 U	1.50 U	
SPP	V-32 (dup)	6/8/2016	3.57 U	0.580 U	0.390 U	0.663 U	6.07 U	0.340 U	1.28		0.740 U	0.510 U	0.433 U	0.393 U	1.50 U	
SPP	V-32	9/20/2016														
SPP	V-32 (dup)	9/20/2016														
SPP	V-32	12/1/2016														
SPP	V-32	3/29/2017														
SPP	V-32	6/15/2017	3.57 U	0.580 U	0.390 U	0.663 U	6.07 U	1.37 U	1.39		0.740 U	0.154 J	0.433 U	0.213 J	1.50 U	
SPP	V-32 (dup)	6/15/2017	3.57 U	0.580 U	0.390 U	0.663 U	6.07 U	1.37 U	1.43		0.740 U	0.510 U	0.433 U	0.208 J	1.50 U	
SPP	V-32	9/7/2017														
SPP	V-32	12/5/2017														
SPP	V-32	3/28/2018	3.57 U	0.580 U	0.390 U	0.663 U	6.07 U	1.37 U	1.09		0.740 U	0.510 U	0.433 U	0.214 J	1.05 U	
SPP	V-32	9/5/2018														
SPP	V-32	12/14/2018														
SPP	V-32	3/27/2019														
SPP	V-32	6/20/2019	3.57 U	0.580 U	0.390 U	0.663 U	6.07 U	1.37 U	1.03		0.740 U	0.510 U	0.433 U	0.166 J	1.05 U	
SPP	V-32	9/18/2019														
SPP	V-32	12/19/2019														
SPP	V-32	3/17/2020														
SPP	V-32	6/3/2020	1.43 U	0.580 U	0.393 U	1.00 U	3.10 U	0.927 U	1.02		0.393 U	0.633 U	0.533 U	0.780 U	1.50 U	
SPP	V-32	9/10/2020														
SPP	V-32	12/16/2020														
SPP	V-32	3/17/2021														
SPP	V-32	6/30/2021	1.43 U	0.580 U	0.393 U	1.00 U	3.10 U	0.927 U	0.966		0.393 U	0.633 U	0.533 U	0.780 U	0.580 U	
SPP	V-32	9/16/2021														
SPP	V-32	12/14/2021														
SPP	V-32 (dup)	12/14/2021														
SPP	V-32	3/25/2022														
SPP	V-32	6/24/2022	1.43 U	0.892 U	0.393 U	1.00 U	3.10 U	0.927 U	0.832		0.393 U	0.633 U	0.533 U	0.780 U	0.580 U	
SPP	V-32 (dup)	6/24/2022	1.43 U													

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ERCO Historical Data Master Table

VOA																	
Area	StationId	CollectDate	Methylene Chloride	Naphthalene	Styrene	Tetrachloroethene	Tetrahydrofuran	Toluene	trans-1,2-Dichloroethene	trans-1,3-Dichloropropene	Trichloroethene	Trichlorofluoromethane	Vinyl Chloride	Xylenes, Total			
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L		
SPP	V-32A	12/10/1996	5 U		5 U	5 U		1	3.2	5 U	3.9		5 U	3.5	5 U		
SPP	V-32A	4/15/1999				0.41 U					0.49 J			0.52 U			
SPP	V-32A	6/9/1999				0.41 U					1.7			2.8			
SPP	V-32A	9/13/1999				1 U					1 U			1 U			
SPP	V-32A	12/6/1999				0.41 U					1.2 J			0.17 U			
SPP	V-32A	9/26/2000				0.41 U					1.4 J			0.17 U			
SPP	V-32A	6/20/2001				0.41 U					2.2			1.7 U			
SPP	V-32A	7/29/2002	0.85 U	0.59 U	0.43 U&	0.57 U	2 U	0.47 U	0.79 U	0.51 U	1.3 Q		0.52 U	0.47 Q	1.5 U		
SPP	V-32A	6/26/2003	0.43 U	0.74 U	0.86 U	0.45 U	1.7 U	0.67 U	1.7 J	0.19 U	1.5 J		0.79 U	1.4	2.6 U		
SPP	V-32A	6/15/2004	0.33 U	0.33 U	0.19 U	0.33 U	0.82 U	0.17 U	1.1	0.16 U	1.6		0.28 U	1.1	0.59 U		
SPP	V-32A	6/22/2005	0.43 U	0.74 U	0.86 U	0.45 U	1.7 U	0.67 U	0.96 J	0.19 U	1.6		0.79 U	0.68	2.6 U		
SPP	V-32A	6/20/2006	0.43 U	0.74 U	0.86 U	0.45 U	1.7 U	0.67 U	1.5 J	0.19 U	1.8		0.79 U	0.73	2.6 U		
SPP	V-32A	6/27/2007	0.43 U	0.74 U	0.86 U	0.45 U	1.7 U	0.67 U	0.89 U	0.19 U	1.5 J		0.79 U	0.38 J	2.6 U		
SPP	V-32A	6/24/2008	0.43 U	0.74 U	0.86 U	0.45 U	1.7 U	0.67 U	1.3	0.19 U	1.8		0.79 U	0.67	2.6 U		
SPP	V-32A	3/25/2009															
SPP	V-32A	6/16/2009															
SPP	V-32A	9/28/2009															
SPP	V-32A	12/14/2009															
SPP	V-32A	3/15/2010															
SPP	V-32A	6/16/2010	0.43 U	0.89 U	0.86 U	0.45 U	1.7 U	0.67 U	3	0.19 U	0.48 U		0.79 U	0.31 J	2.6 U		
SPP	V-32A	12/16/2010															
SPP	V-32A	3/28/2011															
SPP	V-32A	6/6/2011	1.4 U	5.0 U	1.0 U	1.0 U	5.0 U	1.0 U	2.2	0.63 U	0.25 J		1.0 U	0.60 U	3.0 U		
SPP	V-32A	9/27/2011															
SPP	V-32A	12/5/2011															
SPP	V-32A	3/13/2012															
SPP	V-32A	6/19/2012	1.0 U	1.0 U	1.0 U	1.0 U	5.0 U	1.0 U	2.2	1.0 U	0.38 J		1.0 U	1.0 U	2.0 U		
SPP	V-32A (dup)	6/19/2012	1.0 U	1.0 U	1.0 U	1.0 U	5.0 U	1.0 U	2.2	1.0 U	0.34 J		1.0 U	1.0 U	2.0 U		
SPP	V-32A	9/24/2012															
SPP	V-32A	12/3/2012															
SPP	V-32A (dup)	12/3/2012															
SPP	V-32A	3/20/2013															
SPP	V-32A	6/18/2013	1.0 U	1.0 U	1.0 U	1.0 U	5.0 U	1.0 U	2.4	1.0 U	1.0 U		1.0 U	1.0 U	2.0 U		
SPP	V-32A (dup)	6/18/2013	1.0 U	1.0 U	1.0 U	1.0 U	5.0 U	1.0 U	2.4	1.0 U	0.20 J		1.0 U	1.0 U	2.0 U		
SPP	V-32A	9/16/2013															
SPP	V-32A	12/3/2013															
SPP	V-32A	6/5/2014	1.0 U	1.0 U	1.0 U	1.0 U	5.0 U	1.0 U	2.2	1.0 U	0.25 J		1.0 U	1.0 U	2.0 U		
SPP	V-32A	9/11/2014															
SPP	V-32A	12/4/2014															
SPP	V-32A	3/16/2015															
SPP	V-32A	6/16/2015	1.0 U	1.0 U	1.0 U	1.0 U	5.0 U	1.0 U	2.3	1.0 U	1.0 U		1.0 U	1.0 U	2.0 U		
SPP	V-32A	9/9/2015															
SPP	V-32A	12/8/2015															
SPP	V-32A	3/14/2016															
SPP	V-32A	6/8/2016	3.57 U	0.580 U	0.390 U	0.663 U	6.07 U	0.340 U	1.61	0.740 U	0.510 U		0.433 U	0.393 U	1.50 U		
SPP	V-32A	9/20/2016															
SPP	V-32A	12/1/2016															
SPP	V-32A	3/29/2017															
SPP	V-32A	6/15/2017	3.57 U	0.580 U	0.390 U	0.663 U	6.07 U	1.37 U	2.04	0.740 U	0.254 J		0.433 U	0.167 J	1.50 U		
SPP	V-32A	9/7/2017															
SPP	V-32A	12/5/2017															
SPP	V-32A	3/28/2018															
SPP	V-32A	6/6/2018	3.57 U	0.580 U	0.390 U	0.663 U	6.07 U	1.37 U	1.73	0.740 U	0.510 U		0.433 U	0.393 U	1.05 U		
SPP	V-32A	9/5/2018															
SPP	V-32A	12/14/2018															
SPP	V-32A	3/27/2019															
SPP	V-32A	6/20/2019	3.57 U	0.580 U	0.390 U	0.663 U	6.07 U	1.37 U	1.79	0.740 U	0.189 J		0.433 U	0.393 U	1.05 U		
SPP	V-32A	9/18/2019															
SPP	V-32A	12/19/2019															
SPP	V-32A	3/17/2020															
SPP	V-32A	6/3/2020	1.43 U	0.580 U	0.393 U	1.00 U	3.10 U	0.927 U	1.39	0.393 U	0.633 U		0.533 U	0.780 U	1.50 U		
SPP	V-32A	9/10/2020															
SPP	V-32A	12/16/2020															
SPP	V-32A	3/17/2021															
SPP	V-32A	6/30/2021	1.43 U	0.580 U	0.393 U	1.00 U	3.10 U	0.927 U	1.06	0.393 U	0.633 U		0.533 U	0.780 U	0.580 U		
SPP	V-32A	9/16/2021															
SPP	V-32A	12/14/2021															
SPP	V-32A	3/25/2022															
SPP	V-32A	6/24/2022	1.43 U	0.557 J	0.393 U	1.00 U	3.10 U	0.927 U	1.22	0.393 U	0.211 J		0.533 U	0.780 U	0.580 U		
SPP	V-32A	9/19/2022															
SPP	V-32A	12/15/2022															
SPP	V-32A (dup)	12/15/2022															
SPP	V-32A	3/20/2023															
SPP	V-32A (dup)	3/20/2023															
SPP	V-32A	6/15/2023	5.0 U	1.0 U	1.0 U	1.0 U	10 U	0.50 U	0.90 J	1.0 U	0.50 U		1.0 U	1.0 U	1.0 U		
SPP	V-32A	9/5/2023															
SPP	V-32A	6/10/2024	5.0 U	1.0 U	1.0 U	1.0 U	10 U	0.50 U	1.0 U	1.0 U	0.50 U		1.0 U	1.0 U	1.0 U		
SPP	V-32B	12/10/1996	10 U		10 U	9.4		10 U	27	10 U	180		10 U	51	10 U		
SPP	V-32B	4/15/1999				17					210			25			
SPP	V-32B	6/9/1999				23					200			35			
SPP	V-32B	9/13/1999				27					200			46			
SPP	V-32B	12/6/1999				19					160			1 J			
SPP	V-32B	9/26/2000				25					190			13			
SPP	V-32B	12/6/2000				22					190			4.2			
SPP	V-32B	6/20/2001				24					200			27			
SPP	V-32B	7/29/2002	0.85 U	0.59 U	0.43 U&	11	2 U	0.47 U	13	0.51 U	110		0.52 U	27	1.5 U		
SPP	V-32B	6/26/2003	0.86 U	1.5 U	1.7 U	5.6	3.4 U	1.3 U	12	0.38 U	76		1.6 U	21	5.2 U		
SPP	V-32B	6/16/2004	0.33 U	0.33 U	0.19 U	5.5	0.82 U	0.17 U	7.5	0.16 U	68		0.28 U	9.3	0.59 U		
SPP	V-32B	6/22/2005	0.43 U	0.74 U	0.86 U	1.9	1.7 U	0.67 U	7.1	0.19 U	45		0.79 U	8.1	2.6 U		
SPP	V-32B	6/20/2006	0.43 U	3.1	0.86 U	0.64 J	1.7 U	0.67 U	9.6	0.19 U	31		0.79 U	6.7	2.6 U		
SPP	V-32B	6/27/2007	0.43 U	0.74 U	0.86 U	0.87 J	1.7 U	0.67 U	6.1	0.19 U	35		0.79 U	2.7	2.6 U		
SPP	V-32B	6/24/2008	0.43 U	0.74 U	0.86 U	0.45 U	1.7 U	0.67 U	10.1	0.19 U	51.5		0.79 U	5.8	2.6 U		
SPP	V-32B	3/25/2009															
SPP	V-32B	6/16/2009	0.43 U	0.89 U	0.86 U	0.45 U	1.7 U	0.67 U	11.1	0.19 U	43.4		0.79 U	5.8	2.6 U		
SPP	V-32B	9/28/2009															
SPP	V-32B	12/14/2009															
SPP	V-32B	3/15/2010															
SPP	V-32B	6/16/2010	0.43 U	0.89 U	0.86 U	0.45 U	1.7 U	0.67 U	10	0.19 U	7.6		0.79 U	5.9	2.6 U		
SPP	V-32B	12/16/2010															
SPP	V-32B	3/28/2011															
SPP	V-32B	6/6/2011	1.4 U	0.77 J	1.0 U	1.0 U	5.0 U	1.0 U	7.0	0.63 U	11		1.0 U	4.8	3.0 U		
SPP	V-32B	9/27/2011															
SPP	V-32B	12/5/2011															
SPP	V-32B	3/13/2012															
SPP	V-32B	6/19/2012	1.0 U	1.0 U	1.0 UJ	1.0 U	5.0 U	0.17 J	4.9	1.0 U	6.4		1.0 U	2.4	2.0 UJ		
SPP	V-32B	9/24/2012															
SPP	V-32B	12/3/2012															
SPP	V-32B	3/20/2013															
SPP	V-32B	6/18/2013	1.0 U	1.8	1.0 U	1.0 U	0.54 J	0.20 J	5.6	1.0 U	6						

TABLE I-1
ERCO Historical Data Master Table

VOA															
Area	StationId	CollectDate	Methylene Chloride µg/L	Naphthalene µg/L	Styrene µg/L	Tetrachloroethene µg/L	Tetrahydrofuran µg/L	Toluene µg/L	trans-1,2-Dichloroethene µg/L	trans-1,3-Dichloropropene µg/L	Trichloroethene µg/L	Trichlorofluoromethane µg/L	Vinyl Chloride µg/L	Xylenes, Total µg/L	
SPP	V-32B	9/16/2013													
SPP	V-32B	12/3/2013													
SPP	V-32B	3/25/2014													
SPP	V-32B	6/5/2014	1.0 U	1.3	1.0 U	1.0 U	0.46 J	0.18 J	5.7	1.0 U	7.1	1.0 U	2.8	2.0 U	
SPP	V-32B	9/11/2014													
SPP	V-32B	12/4/2014													
SPP	V-32B	3/16/2015													
SPP	V-32B	6/16/2015	1.0 U	1.6	1.0 U	1.0 U	5.0 U	1.0 U	4.2	1.0 U	4.6	1.0 U	1.5	2.0 U	
SPP	V-32B	9/9/2015													
SPP	V-32B	12/8/2015													
SPP	V-32B	3/14/2016													
SPP	V-32B	6/8/2016	3.57 U	1.91	0.390 U	0.663 U	6.07 U	0.198 J	2.88	0.740 U	3.24	0.433 U	1.10	1.50 U	
SPP	V-32B	9/20/2016													
SPP	V-32B 0.1 MICRON	9/20/2016													
SPP	V-32B	12/1/2016													
SPP	V-32B 0.1 MICRON	12/1/2016													
SPP	V-32B	3/29/2017													
SPP	V-32B 0.1 MICRON	3/29/2017													
SPP	V-32B	6/15/2017	3.57 U	2.01	0.390 U	0.269 J	6.07 U	1.37 U	2.84	0.740 U	3.50	0.433 U	1.05	1.50 U	
SPP	V-32B 0.1 MICRON	6/15/2017													
SPP	V-32B	9/7/2017													
SPP	V-32B 0.1 MICRON	9/7/2017													
SPP	V-32B	12/5/2017													
SPP	V-32B 0.1 MICRON	12/5/2017													
SPP	V-32B	3/28/2018													
SPP	V-32B	6/6/2018	3.57 U	1.20	0.390 U	0.663 U	6.07 U	1.37 U	2.47	0.740 U	3.19	0.433 U	0.902	1.05 U	
SPP	V-32B	9/5/2018													
SPP	V-32B	12/14/2018													
SPP	V-32B	3/27/2019													
SPP	V-32B	6/20/2019	3.57 U	0.580 U	0.390 U	0.663 U	6.07 U	1.37 U	2.00	0.740 U	2.05	0.433 U	0.565	1.05 U	
SPP	V-32B (dup)	6/20/2019	3.57 U	0.580 U	0.390 U	0.663 U	6.07 U	1.37 U	2.20	0.740 U	1.99	0.433 U	0.707	1.05 U	
SPP	V-32B	9/17/2019													
SPP	V-32B (dup)	9/17/2019													
SPP	V-32B	3/17/2020													
SPP	V-32B (dup)	3/17/2020													
SPP	V-32B	6/3/2020	1.43 U	0.580 U	0.393 U	1.00 U	3.10 U	0.927 U	1.81	0.393 U	2.01	0.533 U	0.729 J	1.50 U	
SPP	V-32B	9/10/2020													
SPP	V-32B (dup)	9/10/2020													
SPP	V-32B	12/16/2020													
SPP	V-32B	3/17/2021													
SPP	V-32B (dup)	3/17/2021													
SPP	V-32B	6/30/2021	1.43 U	0.580 U	0.393 U	1.00 U	3.10 U	0.927 U	1.17	0.393 U	1.72	0.533 U	0.519 J	0.580 U	
SPP	V-32B	9/16/2021													
SPP	V-32B	12/14/2021													
SPP	V-32B	3/25/2022													
SPP	V-32B	6/24/2022	1.43 U	0.957	0.393 U	1.00 U	3.10 U	0.927 U	1.91	0.393 U	2.34	0.533 U	0.775 J	0.580 U	
SPP	V-32B	9/19/2022													
SPP	V-32B	12/15/2022													
SPP	V-32B	3/20/2023	5.0 U	1.0 U	1.0 U	1.0 U	10 U	0.50 U	1.1	1.0 U	1.9	1.0 U	0.38 J	1.0 U	
SPP	V-32B	9/5/2023													
SPP	V-32B	12/19/2023													
SPP	V-32B	3/18/2024	--	--	--	--	--	--	--	--	--	--	--	--	
SPP	V-32B	6/10/2024	5.3	1.4	1.0 U	1.0 U	10 U	0.50 U	1.7	1.0 U	2.3	1.0 U	0.60 J	1.0 U	
SPP	V-32B	9/3/2024	--	--	--	--	--	--	--	--	--	--	--	--	
SPP	V-32B	12/9/2024	--	--	--	--	--	--	--	--	--	--	--	--	
	V-34	9/20/2021													
	V-34	12/15/2021													
	V-34	3/25/2022													
	V-34	6/28/2022													
	V-34 (dup)	6/28/2022													
	V-34	9/19/2022													
	V-34 (dup)	9/19/2022													
	V-34	12/16/2022													
	V-34	3/20/2023													
	V-34	6/19/2023													
	V-34	9/5/2023													
	V-34	6/11/2024	--	--	--	--	--	--	--	--	--	--	--	--	
	V-35	9/20/2021													
	V-35 (dup)	9/20/2021													
	V-35	12/15/2021													
	V-35	3/25/2022													
	V-35	3/28/2022													
	V-35	6/29/2022													
	V-35	9/19/2022													
	V-35	12/16/2022													

Appendix

I

WDNR Letters, Approval of
*Modifications to the RCRA
Ground Water Monitoring Program
at ERCO Worldwide*, dated
November 1, 2016 and November
17, 2023; and follow-up WDNR
email, dated May 16, 2017

State of Wisconsin
DEPARTMENT OF NATURAL RESOURCES
1300 W. Clairemont Ave.
Eau Claire WI 54701

Scott Walker, Governor
Cathy Stepp, Secretary
Telephone 608-266-2621
Toll Free 1-888-936-7463
TTY Access via relay - 711



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NOV 03 2016

November 1, 2016

Mr. Daniel Cummins
ERCO Worldwide (USA) Inc.
Port Edwards Plant
101 Highway 73 South
Nekoosa, WI 54457-8235

Subject: Approval of Modifications to the RCRA Ground Water
Monitoring Program at ERCO Worldwide
101 STH 73 S, Port Edwards, Wisconsin
WDNR BRRTS #02-72-000012

Dear Mr. Cummins:

The Wisconsin Department of Natural Resources (DNR) is in receipt of a report entitled, "Annual Report, Groundwater Monitoring Program, January 1 to December 31, 2015." This report was prepared on your behalf by AECOM, and was received by DNR on April 20, 2016, together with a cover letter dated April 18, 2016. The submittal was followed on June 8, 2016, by Check No. 3458 in the amount of \$425, representing payment of the applicable fee for review of long-term monitoring reports.

The above-referenced report included recommendations for a number of modifications to the current groundwater monitoring program at your ERCO Worldwide Port Edwards Plant. In addition, the cover letter proposed discontinuation of operation and monitoring at the Cell Room Ground Water Collection & Treatment System on a trial basis.

A review of historical information shows that the original purpose of the Cell Room Area Groundwater Collection Trench was to intercept contaminated groundwater before it entered a Department of Transportation (DOT) storm sewer which discharges into wetlands across State Highway 73. During a 1995 Remedial Investigation, it was observed that water appeared to discharge from the storm sewer in question, even during periods of little precipitation. Therefore, it was suspected that groundwater from the vicinity of the cell room building was entering the storm sewer. Sediment samples were taken from below the storm sewer outfall, and mercury contamination in sediments was confirmed. Consequently, a substantial sediment removal was conducted from the affected wetlands in 1998, and the Groundwater Collection Trench was constructed to prevent mercury-contaminated groundwater from entering the DOT storm sewer and re-contaminating sediments.

Mercury concentrations measured from groundwater monitoring wells adjacent to the Cell Room Area Groundwater Collection Trench have been variable, and sample collection methods have been mixed with respect to "total" vs. "dissolved" samples. Data available from the DOT storm sewer outfall represent conditions with the trench in operation, and therefore cannot be relied upon to demonstrate that re-contamination of sediments will not occur if the Cell Room Ground Water Collection & Treatment System is discontinued and potential discharge to the DOT storm sewer is allowed to resume. In addition, groundwater geochemistry in parts of the ERCO site differs from the natural groundwater conditions typically encountered at most sites.

For reasons discussed above, discontinuation of operation and monitoring at the Cell Room Ground Water Collection & Treatment System cannot be approved at this time. However, DNR is currently in the process of requesting assistance from others with specialized expertise in mercury contamination, to assist with interpretation of site data and clarification of site remedy objectives. DNR remains committed to working with ERCO toward achieving those objectives.

Other modifications to ERCO's groundwater monitoring program are approved as submitted, with the following exceptions and qualifications:

- Please be aware that if and when operation of the Cell Room Groundwater Collection Trench is eventually discontinued, analysis for mercury, chloride, and sulfate may need to be resumed at down-gradient wells V-27 and V-27A.
- Likewise, there is the possibility that quarterly (rather than annual) sampling for mercury, chloride, and sulfate may eventually need to resume in wells V-32 and V-32A, if and when more intensive monitoring is deemed necessary down-gradient of the saturator purge pit (SPP) area.
- Natural attenuation appears to be continuing to reduce concentrations of chlorinated volatile organic compounds (VOCs) in many site wells. As stated in the 2015 Annual Report, data from wells V-04R and V-19 show that no VOCs have been detected since VOC sampling began at these two wells in 2009. However, the detection level of 1 ppb for vinyl chloride (VC) exceeds the Wisconsin ES of 0.02 ppb in these and numerous other site wells. According to Table 1 of a July 15, 2015, GHD Memorandum contained in Appendix B of the 2015 Annual Report, samples are currently analyzed for VOCs using analytical Method 8260B. It is likely that lower detection limits for VC could now be achieved by using Method 8021. Therefore, future analysis should be conducted via Method 8021 in order to document that VC concentrations are below the WI ES.

As you know, your facility conducts groundwater monitoring under several different regulatory programs. First, under Wisconsin's hazardous waste Corrective Action (CA) program, groundwater monitoring is conducted down-gradient of the cell room and SPP areas for the purpose of studying the effectiveness of groundwater containment in preventing mercury contamination from spreading. CA monitoring is also required in many areas to study the effectiveness of natural attenuation in remediating chlorinated VOC contamination.

Second, monitoring is required at the SPP, clarifier purge pit, and muds bin under a combined long-term care license. Long-term care requirements include 30 years of groundwater monitoring and are found primarily in ss. NR 664, Subchapter G, Wis. Adm. Code; the unit's long-term care plans; and subsequent Department plan approvals and modifications. Those approvals and modifications include the abandonment and replacement of monitoring well V-5R (formerly designated V-5B) with V-5RR, and the abandonment of well V-6R (formerly designated V-6B). In addition, this approval includes the reduction of monitoring frequency at well V-3AR from quarterly to annually. Other long-term care requirements remain unchanged.

Lastly, monitoring is required at the perimeter of the facility, referred to as "Facilitywide NR 140 Monitoring" in a November 1995 groundwater monitoring plan.

The requirements of these monitoring programs were consolidated into one document in the plan approval dated April 10, 2000 and were subsequently modified by a July 10, 2009 approval. Charts 1 through 3 of the April 10, 2000 plan approval listed wells according to the regulatory authority under which they were required, and those charts were appropriately modified according to the requirements of the July 10, 2009 approval. I have once again updated Charts 1 through 3 to reflect the current modifications and have attached the updated charts to this letter.

Note that certain wells are listed on multiple charts because those wells are required under multiple regulatory authorities. It is important to the Department that clarity be retained regarding which regulatory authorities pertain to which requirements. This will be important to future reviewers, especially if and when monitoring under one program is discontinued, while other program(s) continue to be required. Note, too, that well designations and DNR point ID numbers are assigned as they appear in the WDNR's GEMS database; please use these designations in all future documentation.

Mr. Daniel Cummins
ERCO Worldwide (USA) Inc.
Page 3
November 1, 2016

Thank you for your efforts to restore the environment at this site. If you have any questions or concerns, please feel free to contact me at (715) 839-3748 or reach me via e-mail at mae.willkom@wisconsin.gov.

Sincerely,



Mae E. Willkom, Hydrogeologist
West Central Region - Bureau for Remediation and Redevelopment

Cc Kyle Wagoner, AECOM, 200 Indiana Avenue, Stevens Point, WI 54481
Brenda Halminiak, WDNR WMM

CHART 1: CORRECTIVE ACTION MONITORING

Sampling Point	DNR ID	Required Sampling
<i>Trench Dischg</i>	801	Cell Room Area - pH, field conductivity, groundwater elevation, mercury (dissolved), chloride - Annually
V-2R	062	
V-2BR	064	
V-26	046	
<i>Storm Sewer</i>	802	
V-4A	007	SPP Area - pH, field conductivity, groundwater elevation, mercury (dissolved), chloride - Annually
V-4R*	026	
V-7R	030	
V-19	033	
V-19A	066	
V-23	041	
V-24	043	
V-25	044	
V-32***	058	
V-32A***	059	
V-18R	065	- pH, field conductivity, groundwater elevation, mercury (dissolved), chloride - Quarterly
V-32B	060	
V-2BR	064	VOC NA Monitoring - Field parameters (conductivity, dissolved oxygen, oxidation-reduction potential, pH, temperature), alkalinity, chloride, nitrate, sulfate, total organic carbon, soluble iron, volatile gases (methane, ethane, ethane), volatile organic compounds (by Method 8021), groundwater elevation - Annually
V-3R	035	
V-3AR	036	
V-4A	007	
V-4R*	026	
V-5RR**	069	
V-9	015	
V-16R	061	
V-19	033	
V-19A	066	
V-31	056	
V-31A	057	
V-32	058	
V-32A	059	
V-32B	060	

*formerly designated V-4B

**formerly designated V-5B, V-5R

***groundwater elevations and field parameters required quarterly

CHART 2: LONG-TERM CARE GROUNDWATER MONITORING
Former Saturator Purge Pit, Clarifier Purge Pit, and Muds Bin Units

Well Name	DNR ID	Sampling Parameters and Field Measurements
V-5RR*	069	- Groundwater elevation, temperature, pH, conductivity, chloride, sulfate quarterly - Dissolved mercury annually
V-3AR	036	
V-3R	035	- Groundwater elevation, temperature, pH, conductivity, chloride, sulfate, dissolved mercury - Quarterly
V-23	041	
V-24	043	
V-25	044	

*formerly designated V-5B, V-5R

CHART 3: NR 140 PERIMETER GROUNDWATER MONITORING

Well Name	DNR ID	Annual Sampling Parameters and Field Measurements
V-9	015	Groundwater elevation, temperature, pH, conductivity, chloride, sulfate, dissolved mercury
V-16R**	061	
V-13	020	All of the above plus volatile organic compound sampling
V-27	047	Field parameters (conductivity, dissolved oxygen, oxidation-reduction potential, pH, temperature), alkalinity, chloride, nitrate, sulfate, total organic carbon, soluble iron, volatile gases (methane, ethane, ethane), volatile organic compounds, groundwater elevation
V-27A	049	
V-30	054	
V-30A	055	

** groundwater elevation and field parameters required quarterly

From: [Willkom, Mae - DNR](#)
To: [Schmidt, Eric](#)
Subject: RE: 02-72-000012 ERCO VOC Analytical Method
Date: Tuesday, May 16, 2017 9:41:28 AM

Yes, it is acceptable to continue using Method 8260 (and not 8021) for VOCs going forward. You may also discontinue VOC and natural attenuation laboratory analysis at well nests V19 and V04R. However, those well nests must continue to be sampled for mercury and other parameters required as part of the SPP sampling. Thanks.

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Mae E. Willkom

Phone: 715-839-3748

mae.willkom@wi.gov

From: Schmidt, Eric [mailto:Eric.Schmidt@aecom.com]
Sent: Thursday, May 11, 2017 2:35 PM
To: Willkom, Mae - DNR
Cc: Rebecca Sommers (rsommers@ercoworldwide.com)
Subject: 02-72-000012 ERCO VOC Analytical Method

Mae,

Thank you for taking the time to review the ERCO project with Rebecca and me this afternoon. As discussed, AECOM plans to collect VOC samples in June and submit them for analysis using Method 8260. In your letter dated November 1, 2016, you requested that future VOC analysis be conducted using Method 8021. After talking with the laboratory currently being used (ESC Labs) and Pace Analytical, I understand that Method 8021 is only used for BETX and that Method 8260 is used for VOCs. Please let me know if it is acceptable to continue using Method 8260 (and not 8021) for VOCs going forward.

In 2016, we requested that the requirement for VOC and natural attenuation laboratory analysis at wells V19 and V04R be eliminated. Vinyl chloride was not detected at these two locations in 2016. The method detection limit for vinyl chloride in 2016 for wells V19 and V04R using Method 8260 was below the NR 140 Enforcement Standard. Can we discontinue VOC and natural attenuation laboratory analysis at wells V19 and V04R?

Regards,

Eric

Eric Schmidt, P.E.
Project Engineer, Environment
D +1-715-342-3034
M +1-920-621-3878

From: [Fenske, Dean](#)
To: Sheri.Finn@ghd.com
Subject: RE: ERCO - September 2019 SSOW - T155208
Date: Thursday, October 31, 2019 10:39:00 AM
Attachments: [image001.png](#)

Hi Sheri,

The new WDNR project manager for the ERCO – Port Edwards site, Candace Sykora (Mae Willkom has transitioned to a different role in WDNR), finally responded to the request regarding analytical methods. After discussing internally at WDNR she is ok with the approach proposed by Mark: We can use method 245.1 for analysis, but non-detects will be re-analyzed by 1631E. As expected, a complete switch to method 245.1 only is not approved.

Thanks.

Dean Fenske

Project Manager, Environment, Midwest
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From: Sheri.Finn@ghd.com <Sheri.Finn@ghd.com>
Sent: Monday, October 21, 2019 10:01 AM
To: Fenske, Dean <Dean.Fenske@aecom.com>
Subject: RE: ERCO - September 2019 SSOW - T155208

Sounds good thank you for the update 😊

From: Fenske, Dean <Dean.Fenske@aecom.com>
Sent: Monday, October 21, 2019 11:00 AM
To: Sheri Finn <Sheri.Finn@ghd.com>
Subject: RE: ERCO - September 2019 SSOW - T155208



November 17, 2023

ERCO Worldwide
Attn: Lauren Lueneburg
101 HWY 73 S
PO Box 161
Nekoosa, WI 54469

RE: Recommended Modifications to the Groundwater Monitoring Program Approval
ERCO, 101 Highway 73 South,
Nekoosa BRRTS# 02-72-000012

Ms. Lueneberg,

On behalf of ERCO Worldwide (USA) Inc. (ERCO) and Glenn Springs Holdings (GSH), GHD prepared and submitted recommended modifications to the groundwater monitoring program at the ERCO site in Nekoosa, WI on August 10, 2023.

The Wisconsin Department of Natural Resources (DNR) has reviewed the submitted modifications to the groundwater monitoring program and approves the following modifications to the groundwater sampling:

- Reduce quarterly sampling to annual with the exceptions of:
 - The SPP area where groundwater is actively being remediated in situ, and quarterly data is necessary and appropriate to monitor mercury concentrations.
 - V-32B, a sentinel well near the Wisconsin River where mercury concentrations appear to be increasing over time.
 - V-02R, the Cell Room Building collection trench, that has had mercury concentrations with recent fluctuations requiring quarterly sampling.
- Eliminate MNA parameters. MNA parameters have been sampled since 1999. Discontinuing natural attenuation parameters including dissolved gases, dissolved iron, TOC, nitrate, alkalinity, and sulfate is appropriate as they no longer have an added benefit for continued evaluation of groundwater impacts.
- Add V-34 and V-35 to the annual monitoring program. These wells were installed in 2021 between SPP area and downgradient sentry monitoring well cluster to fill the data gap.
- Removal of V-16R and 19A from the annual monitoring program for mercury and VOCs. These wells are below enforcement standards (ES) and protective action limits (PAL), not located in the SPP area, and other wells provide sufficient sampling for perimeter and downgradient monitoring.
- Remove molar concentration graphs for VOCs as molar concentration data is not used to evaluate the progress at the Site.
- Review the groundwater monitoring program every 2 years to determine if changes are required.

If you have any questions or concerns, please contact me.

Sincerely,

A handwritten signature in black ink that reads "Candace Sykora". The signature is fluid and cursive, with the first name "Candace" and last name "Sykora" clearly legible.

Candace Sykora
Hydrogeologist
Remediation & Redevelopment
Wisconsin Department of Natural Resources
890 Spruce St, Baldwin, WI 54002
Phone: 715-928-0452
Candace.sykora@wisconsin.gov

Cc: Denise Quigley, GHD
Clint Babcock, Glenn Springs Holdings
Doug Coenen, DNR

Appendix

J

2024 Annual Report, Groundwater
Remedial Action by Chemical
Stabilization, ERCO, 101 Highway
73 South, Nekoosa, Wisconsin,
WDNR BRRTS #02-72-000012.
April 18, 2025

Technical Memorandum

April 18, 2025

To	Clint Babcock (GSH)	Tel	+1 519-340-4196
Copy to	Lauren Lueneburg (ERCO) Richard Chatfield (GHD)	E-mail	denise.quigley@ghd.com
From	Denise Quigley/we	Ref. No.	11192391-MEM-5
Subject	2024 Annual Report - Groundwater Remedial Action by Chemical Stabilization ERCO, 101 Highway 73 South, Nekoosa, Wisconsin (Site)		

In accordance with the Remedial Action Design Report (RADR) (GHD Services Inc. [GHD], June 2020), GHD has prepared this Annual Report on behalf of ERCO Worldwide (USA) Inc. (ERCO) to summarize progress of the groundwater remedial action (RA) at the Site. Consistent with Section 3.4 of the Wisconsin Department of Natural Resources- (DNR-) approved RADR (GHD, June 2020), the purpose of the Annual Report is to summarize 2024 activities, including injections completed, monitoring program results, recommendations, and also provide an update to the project schedule. This report summarizes data presented in Quarterly Report #12 (GHD, June 18, 2024), Quarterly Report #13 (GHD, September 10, 2024) and Quarterly Report #14 (GHD, November 19, 2024) plus data for samples collected in December 2024.

1. Background

The purpose of the groundwater RA is to address mercury contamination in groundwater in the area of the former Saturator Purge Pit (SPP) at the Site. The RADR was prepared pursuant to DNR's December 3, 2019, approval of a chemical stabilization groundwater remedy for the mercury source area, as described in the Remedial Action Options Report (RAOR) (GHD, April 2019) and subsequent correspondence with DNR.

As summarized in the RADR, laboratory treatability study results indicated that the injection of sodium dithionite would be the most effective treatment for mercury in the groundwater. Because the treatment was not 100 percent effective in the lab, and based on previous experience with injection technology, GHD anticipated that more than one injection event will be required to effectively treat the mercury in the groundwater at the Site.

A Site plan is provided on Figure 1. The injection program is focused on the SPP and the area immediately downgradient, where concentrations of mercury in the groundwater are highest. By targeting the high-concentration areas, the goal is to maximize the amount of mercury mass treated during the injection program. Based on recent years' groundwater data, the decreases in mercury concentrations in groundwater along the flow path away from the SPP are significant, meaning that any treatment in the source area will result in lower mercury concentrations in the downgradient wells. The treatability study indicates that the treatment efficiency was lower than GHD has observed in applications of the reagents at other sites, meaning that the chemistry at the Site is complex, and may impede treatment. Therefore, a more focused injection program over a relatively small area will provide greater control over the injections and chemistry in the subsurface, which will provide the most effective treatment under these conditions. The injection well locations were selected to avoid existing infrastructure while maximizing the treatment coverage in the SPP area. Based on recent concentrations of mercury in samples from on-Site monitoring wells, the RADR included nine injection wells in the SPP area, plus two injection wells in the area south of the SPP area, near monitoring well V-23. The

two injection wells south of the SPP will be used to help reduce concentrations of mercury in groundwater along the groundwater flowpath between the SPP area and the Wisconsin River.

2. Injections Completed

Between August 25 and August 31, 2021, sodium dithionite injections were completed at the eleven injection wells. As reported in Quarterly Report #5, based on the monitoring results, additional injections were completed by GHD between October 10 and 12, 2022, as summarized in the 2022 Annual Report (GHD, March 31, 2023). No injections were completed in 2023 or 2024; however, a third injection is schedule to occur in spring 2025 (see Section 4).

3. Monitoring Program Results

In 2024, ERCO completed four quarterly groundwater sampling events at the Site, as part of ERCO's routine groundwater monitoring program. Consistent with the RADR and subsequently amended in discussion with DNR¹ groundwater samples were collected from monitoring wells V-23, V-24, V-25, and V-32B. The monitoring well locations are shown on Figure 1. Groundwater samples were analyzed for total and dissolved mercury, sodium, potassium, chloride, and sulfide, plus field parameters [conductivity, dissolved oxygen (DO) and oxygen-reduction potential (ORP)]. The groundwater analytical results from 2024 are presented in Table 1. These results and results from the previous 8 years are summarized in concentration plots presented on Figures 2, 3, and 4 for monitoring well locations V-23, V-24, and V-25, respectively.

The fourteenth round of post-injection groundwater sampling was completed at the Site on December 9, 2024. This sampling was completed as part of ERCO's routine groundwater monitoring program. Consistent with the RADR as updated with approval from DNR on November 17, 2023, groundwater samples were collected from monitoring wells V-23, V-24, V-25, and V-32B. The monitoring well locations are shown on Figure 1. Samples were analyzed for total and dissolved mercury, sodium, potassium, chloride, and sulfide, plus field parameters (conductivity, DO, pH, and ORP). The analytical results from the December 2024 quarterly sampling event are presented in Table 1 along with the results from the other three quarterly events in 2024.

Concentrations of the parameters of interest in groundwater samples from monitoring wells V-23, V-24, and V-25 for 2017 through 2024 are presented graphically on Figures 2, 3, and 4, respectively. These data are presented using a logarithmic scale so that order of magnitude trends can be more easily seen and compared across multiple parameters. The data over the last 8 years are presented to provide a more complete understanding of the scale of the changes resulting from the injections. Potassium and sodium data are only available starting in 2021, as part of this program. The following summarizes the observed changes in groundwater concentrations through December 2024.

As shown on Figures 2, 3, and 4, concentrations of mercury, chloride, sulfate, DO, and ORP have fluctuated over time, at times by as much as an order of magnitude. For example, between June 2020 and September 2020, the mercury concentration in samples from monitoring well V-25 decreased from 2,370 micrograms per litre (µg/L) to 261 µg/L. The natural fluctuations complicate the interpretation of post-injection data because the reductions observed are the combined result of the injections, as well as the fluctuations typical of the groundwater conditions at the Site. The high regional water table in 2021 may have contributed to the fluctuations in concentrations in 2021, as the water table fluctuation may have caused flushing of contaminants, as well as dilution of concentrations, depending on the area, and how much contaminant mass was in the vadose zone.

At monitoring well V-23, located south of the SPP source area, the concentrations of mercury in the two post-2021 injection samples (September and December 2021) were within the range of historical

¹ DNR, 2023. Recommended Modifications to the Groundwater Monitoring Program Approval. November 17, 2023.

concentrations, and thus showed no obvious decrease relative to the pre-injection samples. The data presented on Figure 2 show that concentrations of dissolved mercury at monitoring well V-23 have been relatively constant, within the same order of magnitude, over the past 8 years but are an order of magnitude less than in the SPP area. Concentrations of potassium, sodium, chloride, and sulfate in samples from monitoring well V-23 were relatively consistent immediately before and after the injections. The effects of the injections are not apparent in the chemistry at monitoring well V-23, likely due to the location of this well relative to the injection wells; dissolved mercury concentrations were already lower in the samples from this well than detected in wells in the former SPP area prior to injections.

The data for monitoring wells V-24 and V-25, located in the SPP area, are presented on Figures 3 and 4, respectively. The data show that pre-injection (pre-2021) concentrations of dissolved mercury appear to have been increasing over time at both locations, but concentrations at monitoring well V-24 stabilized following the 2021 injections and decreased after the 2022 injections. While some fluctuations in concentration have been observed, mercury concentrations at monitoring well V-24 decreased throughout 2023 and into 2024. However, mercury, chloride, potassium, and sodium concentrations observed in the second half of 2024 show a return to pre-injection concentrations. Mercury concentrations at monitoring well V-25 decreased following both the 2021 and 2022 injections. A rebound in mercury concentrations was observed at monitoring well V-25 approximately a year after the 2021 injections; however, a similar rebound was not observed following the 2022 injections, and mercury concentrations at monitoring well V-25 remained relatively low over the following 2 years. A slight increase in mercury concentrations was observed in June and December 2024. The dissolved mercury concentrations may indicate that the increased mass of sodium dithionite delivered at the second injection event suppressed mercury concentrations for a longer period of time however the increase observed in late 2024 indicate that the effects of the sodium dithionite may now be exhausted. These data indicate that the injections likely have reduced the concentrations of mercury in the aquifer, although the magnitude of these reductions is uncertain. The concentrations of sodium, sulfate, potassium, and chloride at monitoring wells V-24 and V-25 show no clear trends related to the injection events. This indicates that while injections may be removing mercury mass from the groundwater in the SPP area monitoring wells V-24 and V-25, the effect may be short-lived as water moves into the area from upgradient.

As discussed in the RADR, the success of the injection program will be evaluated over several rounds of monitoring following each injection. The data from subsequent groundwater monitoring rounds will be used to assess the distribution of amendment in the subsurface and determine if further injections should be completed.

4. Recommendations for Revisions to Injection and Monitoring Program

In 2023, and as part of the 2023 Annual Report, two recommendations were presented to DNR:

- 1) Modifications to the monitoring program (GHD, August 10, 2023) - this letter presented recommendations for the modification of the RADR program, which were approved by DNR on November 17, 2023.
- 2) Proposed Investigation of the Clarifier Purge Pit (CPP) Area (GHD, December 6, 2023) - this letter presented a proposal to complete additional characterization of the CPP area to identify potential upgradient sources of mercury. As of submission of the Quarterly Report #14 (November 19, 2024), DNR had not provided ERCO with comments on the December 6, 2023, letter. At that time, GHD requested that DNR not review the December 6, 2023, letter.

Based on the success of the injections to date in reducing dissolved mercury concentrations at monitoring well V-25, ERCO and Glenn Springs Holdings (GSH) have decided to proceed with a third injection of sodium dithionite in spring 2025. GHD will reevaluate the need for additional wells after the spring 2025 injection.

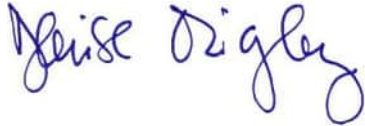
5. Schedule

The groundwater remedial action schedule through December 2025 is presented on Figure 5. The next groundwater sampling event will be completed in March 2025 and the data will be presented in the subsequent quarterly report. The quarterly report will be submitted within approximately 30 days of receipt of the validated laboratory data from the March 2025 event. The schedule for the next injection event is expected to be in May 2025 depending on contractor and reagent availability. An updated on the exact schedule will be provided to DNR once confirmed.

Should you have any questions or require additional information regarding this memorandum, please do not hesitate to contact GHD.

Regards,

GHD



Denise Gay Quigley, P.E., VMA
Project Manager

DGQ/jlf/5

Encl.: Table 1 - Analytical Results
 Figure 1 - Site Plan
 Figure 2 - Concentration Plot V-23
 Figure 3 - Concentration Plot V-24
 Figure 4 - Concentration Plot V-25
 Figure 5 - Project Schedule

Tables

Table 1

Analytical Results
2024 Annual Report
Groundwater Remedial Action by Chemical Stabilization
ERCO, 101 Highway 73 South, Nekoosa, Wisconsin

Sample Location: Sample Identification: Sample Date:	Units	V-23 11218888-V23-031824 3/18/2024	V-23 11218888-V23-061224 6/12/2024	V-23 11218888-V23-90324 09/03/2024	V-23 11218888-V23-120924 12/09/2024	V-24 11218888-V24-031824 3/18/2024	V-24 11218888-V24-061224 6/12/2024	V-24 11218888-V24-90324 09/03/2024	V-24 11218888-V24-100224 10/02/2024	V-24 11218888-V24-120924 12/09/2024
Parameters										
Metals										
Mercury (Method E1631)	ng/L	--	--	--	--	--	--	--	--	--
Mercury (Method E245.1)	ug/L	19	40	26	15	47	31	(1)	480	420
Mercury (dissolved) (Method E1631)	ng/L	--	--	--	--	--	--	--	--	--
Mercury (dissolved) (Method E245.1)	ug/L	10	8.9	3.1	6.8	25	21	(1)	400	490
Potassium	ug/L	1,300,000	1,200,000	220,000	600,000	11,000,000	670,000	3,900,000	--	4,600,000
Sodium	ug/L	710,000	660,000	190,000	310,000	330,000	290,000	470,000	--	4,800,000
General Chemistry										
Chloride	ug/L	1,600,000	1,800,000	240,000	730,000	4,900,000	2,600,000	3,400,000	--	4,000,000
Sulfide	ug/L	1,000 U	380	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	--	7600
Field Parameters										
Conductivity, field	umhos/cm	11,494	8,293	2,921	3,285	37,680	19,909	21,113	39,408	33,211
Dissolved oxygen (DO), field	mg/L	0.24	1.52	0.48	0.27	6.5	0.81	0.58	3.47	7.01
Oxidation reduction potential (ORP), field	millivolts	-44.2	172.9	-92.3	89.6	1.8	494.7	-101.6	-105.8	42.4
pH, field	s.u.	11 J	10.44	10.30	10.59	11.9	10.14	10.42	12.11	12.68

Notes:
ng/L - nanograms per liter.
µg/L - micrograms per liter.
mg/L - milligrams per liter.
J - estimated concentration.
U - not detected at the associated reporting limit.
s.u. - standard units.
umhos/cm - micromhos per centimeter.

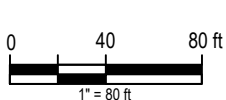
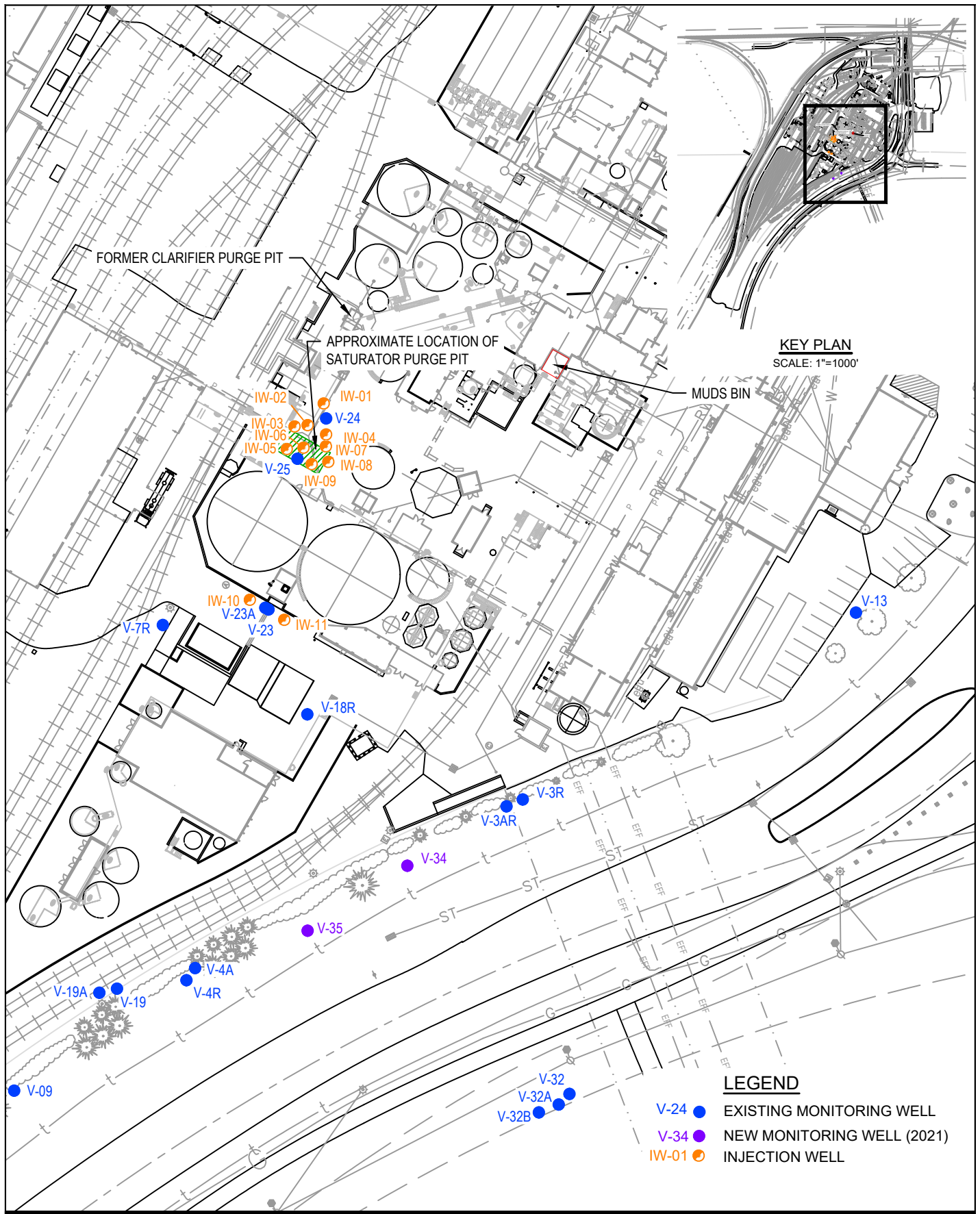
Table 1

Analytical Results
2024 Annual Report
Groundwater Remedial Action by Chemical Stabilization
ERCO, 101 Highway 73 South, Nekoosa, Wisconsin

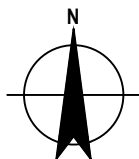
Sample Location: Sample Identification: Sample Date:	Units	V-25 11218888-V25-031824 3/18/2024	V-25 11218888-DUP1-031824 3/18/2024 Duplicate	V-25 11218888-V25-061224 6/12/2024	V-25 11218888-V25-90324 09/03/2024	V-25 11218888-V25-120924 12/09/2024	V-32B 11218888-V32B-9523 3/18/2024	V-32B 11218888-V32B-061024 6/10/2024	V-32B 11218888-V32B-90324 09/03/2024	V-32B 11218888-V32B-120924 12/09/2024
Parameters										
Metals										
Mercury (Method E1631)	ng/L	--	--	--	--	--	--	--	--	--
Mercury (Method E245.1)	ug/L	100	100	91	80	290	1.5	1.3	1.3	1.0
Mercury (dissolved) (Method E1631)	ng/L	--	--	--	--	--	--	--	--	--
Mercury (dissolved) (Method E245.1)	ug/L	34	34	86	36	100	1.4	1.3	1.2	0.98
Potassium	ug/L	7,600,000	8,400,000	3,300,000	960,000	2,300,000	--	--	--	--
Sodium	ug/L	190,000	170,000	370,000	330,000	2,700,000	--	--	--	--
General Chemistry										
Chloride	ug/L	5,600,000	5,700,000	4,500,000	1,600,000	2,400,000	2,600,000	2,500,000	2,400,000	2,500,000
Sulfide	ug/L	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	--	--	--	--
Field Parameters										
Conductivity, field	umhos/cm	29,712	29,712	19,485	6,859	15,713	12,391	10,483	9,592	10,362
Dissolved oxygen (DO), field	mg/L	0.6	0.6	.12	0.51	0.28	2.5	0.04	0.85	2.66
Oxidation reduction potential (ORP), field	millivolts	-19.3	-19.3	459.9	-90.9	23.2	132.4	23.9	-62.8	205.4
pH, field	s.u.	12.2	12.2	10.77	9.70	12.49	9.0	10.64	10.69	10.17

Notes:
ng/L - nanograms per liter.
µg/L - micrograms per liter.
mg/L - milligrams per liter.
J - estimated concentration.
U - not detected at the associated reporting limit.
s.u. - standard units.
umhos/cm - micromhos per centimeter.

Figures



Coordinate System:
NAD87 - WISCONSIN
CENTRAL

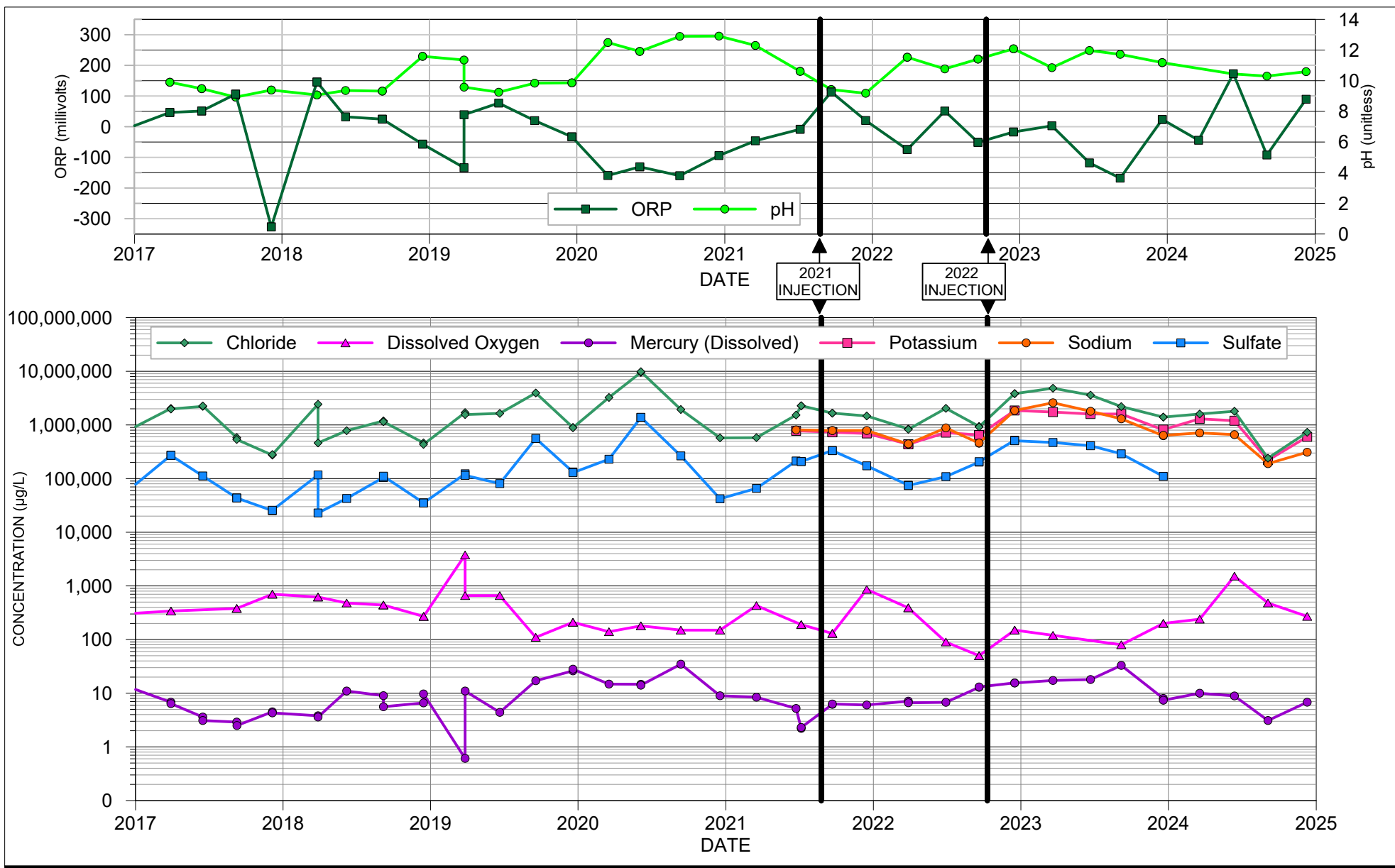


ERCO WORLDWIDE
PORT EDWARDS PLANT
NEKOOSA, WISCONSIN

SITE PLAN

Project No. 17721
Date November 2024

FIGURE 1

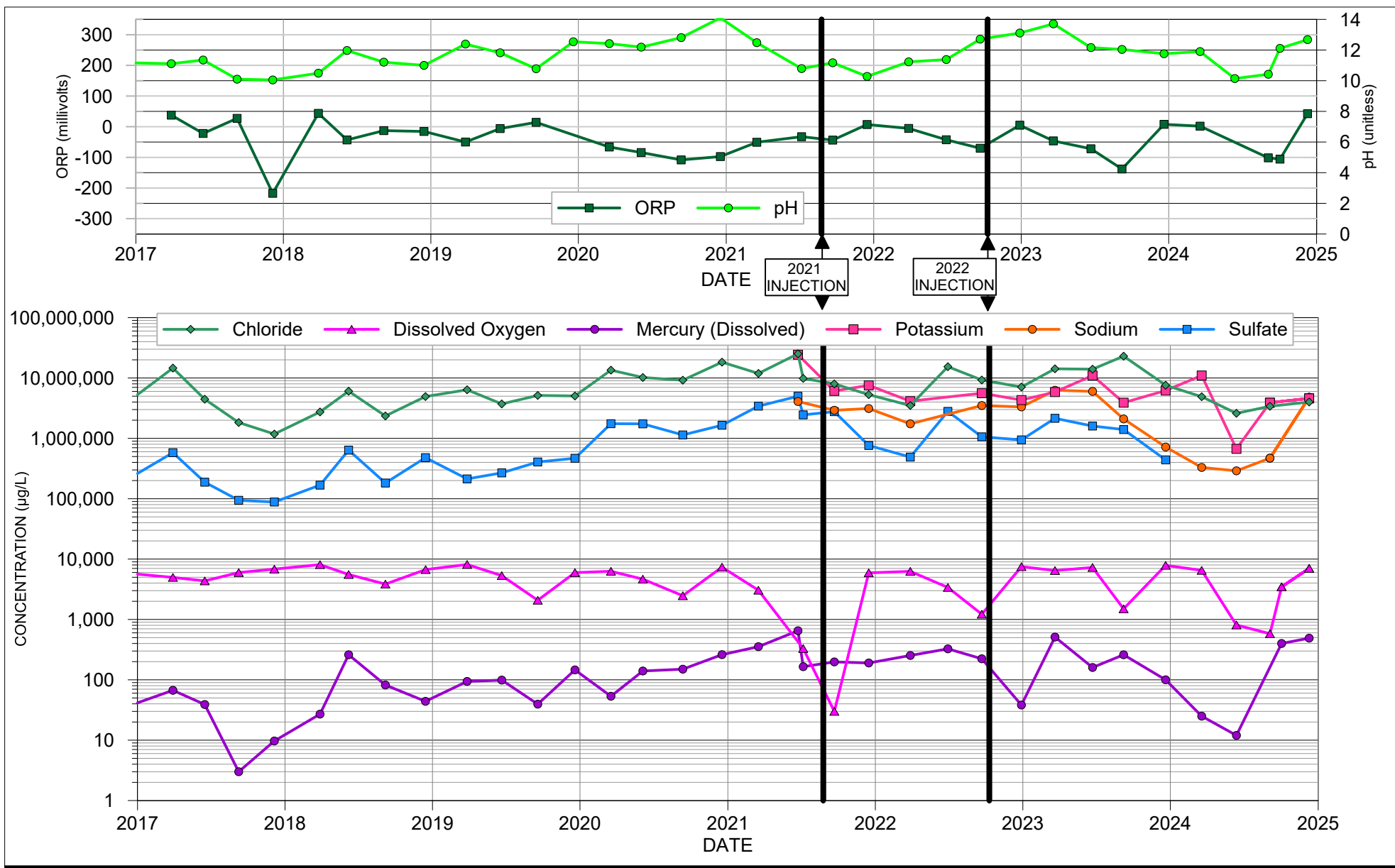


ERCO WORLDWIDE PORT EDWARDS PLANT
NEKOOSA, WISCONSIN

Project No. 11192391
Date January 15, 2025

CONCENTRATION PLOT
V-23

FIGURE 2

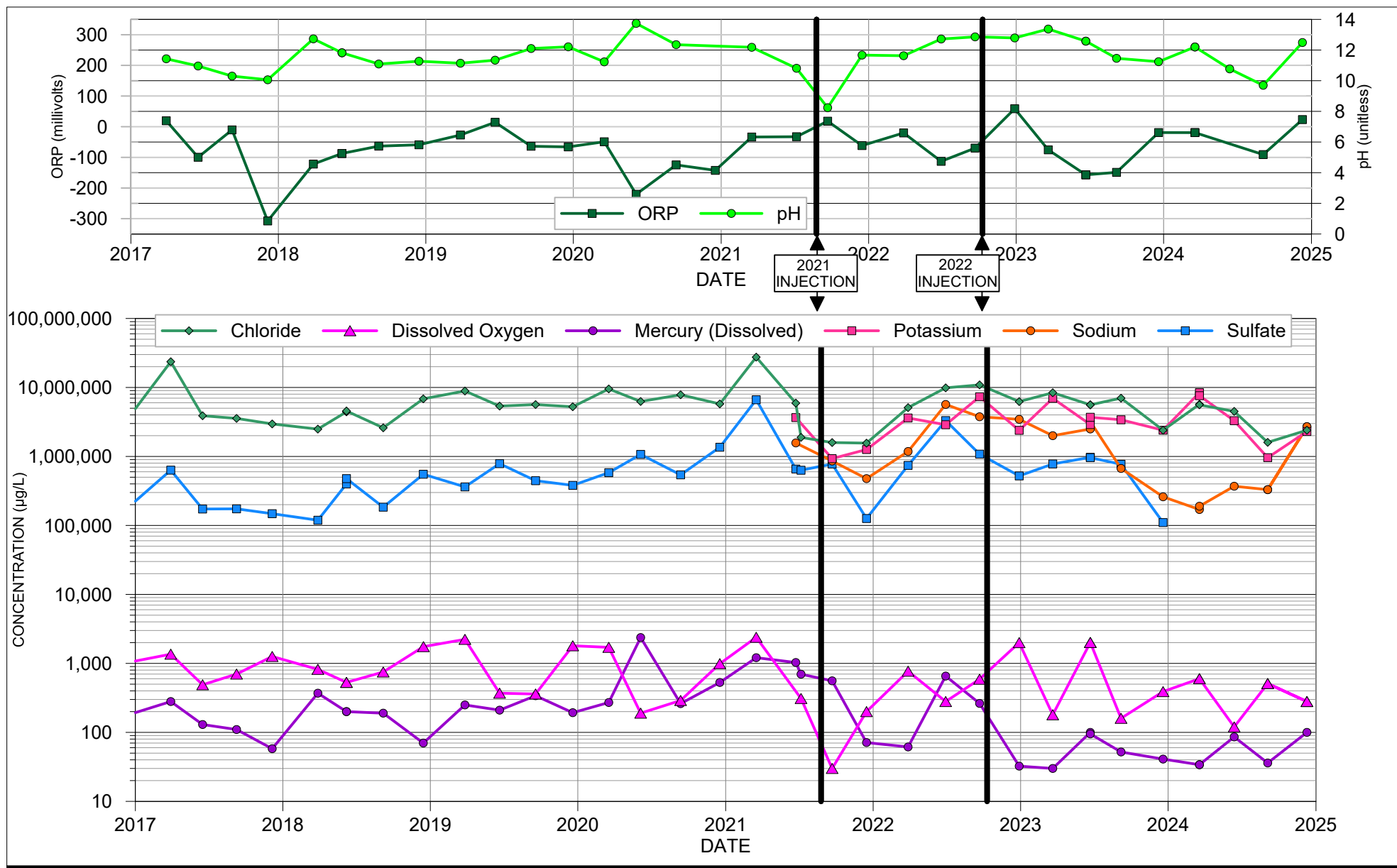


ERCO WORLDWIDE PORT EDWARDS PLANT
NEKOOSA, WISCONSIN

Project No. 11192391
Date January 15, 2025

CONCENTRATION PLOT
V-24

FIGURE 3



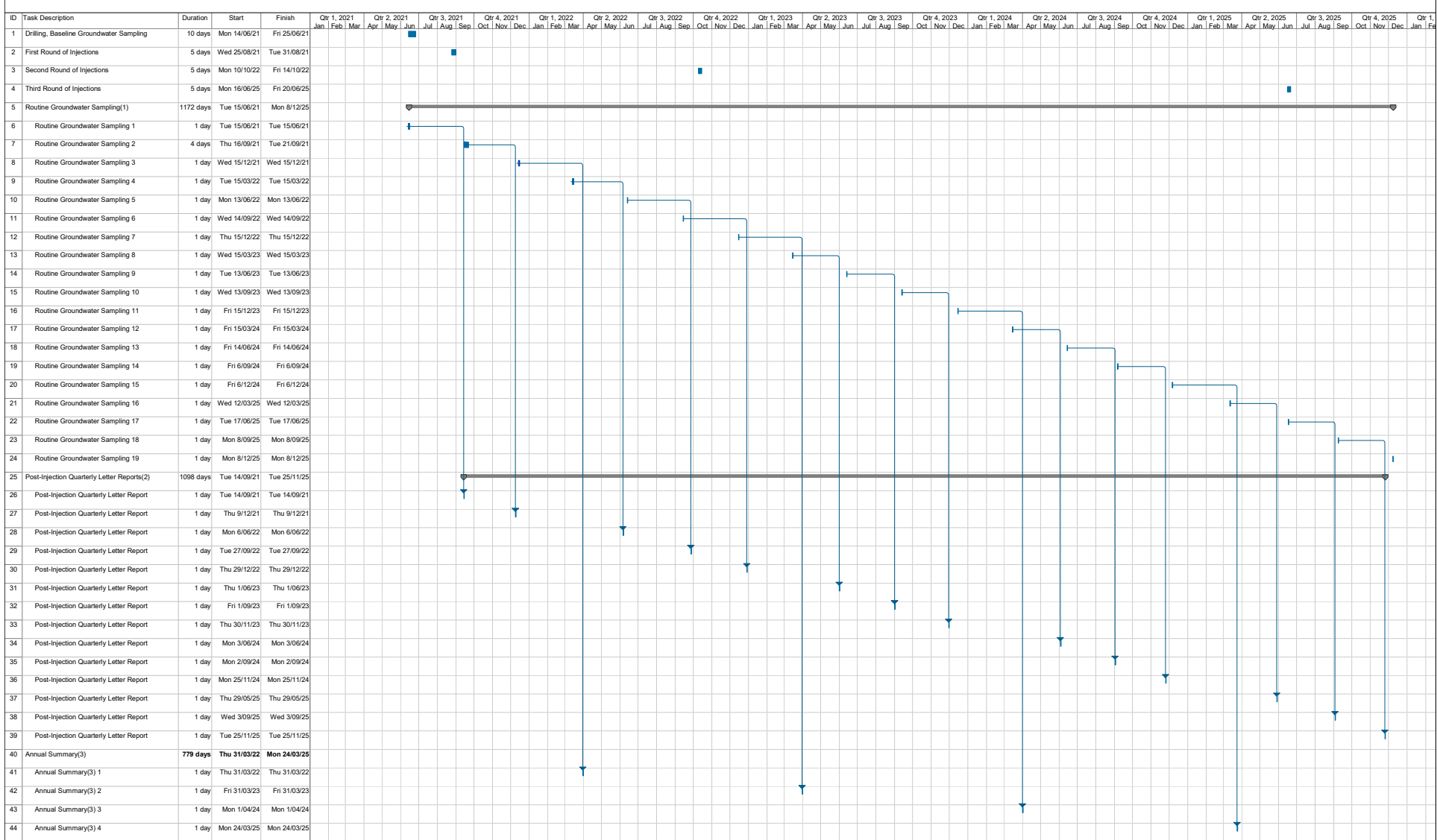
ERCO WORLDWIDE PORT EDWARDS PLANT
NEKOOSA, WISCONSIN

Project No. 11192391
Date January 15, 2025

CONCENTRATION PLOT
V-25

FIGURE 4

Figure 5 - Project Schedule
Groundwater Remedial Action by Chemical Stabilization
ERCO Worldwide
Port Edwards Plant
Nekoosa, Wisconsin



GHD Project: 11192391
Date: Thu 10/04/25

Task Summary


Notes:
(1) Sampling completed per DNR-approved RCRA Groundwater Monitoring Plan
(2) Quarterly letter reports will be submitted within 30 days of receipt of laboratory data
(3) Annual summary will be submitted with annual groundwater report

Appendix H – Financial Assurance

Financial Assurance Documents

1. 11/24/2025, ERCO, *2025 Financial Assurance Update*. (Table 1, 2, 3, 4A, 4B, 4C, and 5)
2. 7/23/2019, ERCO, *Financial Assurance Approach*.
3. 4/18/2019, GHD, *Remedial Action Options Report*.
4. 10/6/2025, The Bank of Nova Scotia, *Letter of Credit 97045/80085*.
5. 10/6/2025, The Bank of Nova Scotia, *Letter of Credit 97046/80085*.

Overview of 2025 Financial Assurance Updates
ERCO Worldwide (USA) Inc.
Port Edwards Plant
Nekoosa, Wisconsin

Supporting Table	Table Title	Purpose of Table and Description of 2025 Financial Assurance Updates
Table 2	2025 Financial Assurance Update - Present Value Calculations	- Calculation of the total present value for use in the financial assurance estimate - Includes annual costs for Long-Term Care, Corrective Action, and Saturator Purge Pit (SPP) remediation calculations - SPP cost estimate is shown as a 2025 present value since the total is the dollar value remaining from the original estimate - Financial assurance calculations are for the 30-year period from 2025 to 2054 and are based on 2025 estimates
Table 3	30-Year Long-Term Care and Corrective Action Present Value Calculations	- Calculation of the total present value for use in the financial assurance estimate - Includes values calculated on subsequent tables - Financial Assurance calculations for the 30-year period from 2025 to 2054
Table 4A	Detailed Long-Term Care Cost Breakdown	- Detailed long-term care costs based on costs incurred in 2024 and 2025 unit rates where available - Additional details provided in table assumptions - No changes to the long-term care costs anticipated over the 30-year financial assurance period.
Table 4B	Detailed Facility NR 140 (Perimeter Monitoring) Cost Breakdown	- Detailed NR-140 (perimeter monitoring) based on costs incurred in 2024 and 2025 unit rates - Additional details provided in table assumptions - No changes to the NR-140 (perimeter monitoring) costs anticipated over the 30-year financial assurance period.
Table 4C	Detailed Corrective Action Cost Breakdown	- Detailed Corrective Action costs based on costs incurred in 2024 and 2025 unit rates - Additional details provided in table assumptions - No changes to the corrective action costs anticipated over the 30-year financial assurance period.
Table 5	Detailed Saturator Purge Pit Spending Summary	- Summary of costs incurred relative to the SPP remedial design cost estimate in 2025 dollars - Additional details provided in table assumptions - While installing additional wells may not be necessary to achieve case closure, the cost estimate for the full implementation in the RAOR is believed to provide a reasonable contingency for additional activities that may be necessary with the current financial assurance estimate.

2025 Financial Assurance Update - Present Value Calculations
ERCO Worldwide (USA) Inc.
Port Edwards Plant
Nekoosa, Wisconsin

	LTC	CA	SPP Estimate	SPP Spend	Balance
Basis Estimate:	\$23,210	\$58,600	\$1,100,000		
Basis Year:	2025	2025	2019		
Reference:	(1)	(1)	(2) (3)	See Table 5	
Inflation Factor (4):	1	1	1.2183		
Current Estimate:	\$23,210	\$58,600	\$1,340,130	\$630,796	\$709,334

Discount Rate: 0.02

Date Updated: 7/25/2025

Year	Period	Long-Term Care (LTC)		Corrective Action (CA)		Saturator Purge Pit (SPP)		PV Factor (5)
		Annual Cost	PV	Annual Cost	PV	Annual Cost	PV	
2025	0	\$23,210	\$23,210	\$58,600	\$58,600	\$709,334	\$709,334	1.000
2026	1	\$23,210	\$22,746	\$58,600	\$57,428	0	0	0.980
2027	2	\$23,210	\$22,305	\$58,600	\$56,315	0	0	0.961
2028	3	\$23,210	\$21,864	\$58,600	\$55,201	0	0	0.942
2029	4	\$23,210	\$21,446	\$58,600	\$54,146	0	0	0.924
2030	5	\$23,210	\$21,028	\$58,600	\$53,092	0	0	0.906
2031	6	\$23,210	\$20,610	\$58,600	\$52,037	0	0	0.888
2032	7	\$23,210	\$20,216	\$58,600	\$51,041	0	0	0.871
2033	8	\$23,210	\$19,798	\$58,600	\$49,986	0	0	0.853
2034	9	\$23,210	\$19,427	\$58,600	\$49,048	0	0	0.837
2035	10	\$23,210	\$19,032	\$58,600	\$48,052	0	0	0.820
2036	11	\$23,210	\$18,661	\$58,600	\$47,114	0	0	0.804
2037	12	\$23,210	\$18,289	\$58,600	\$46,177	0	0	0.788
2038	13	\$23,210	\$17,941	\$58,600	\$45,298	0	0	0.773
2039	14	\$23,210	\$17,593	\$58,600	\$44,419	0	0	0.758
2040	15	\$23,210	\$17,245	\$58,600	\$43,540	0	0	0.743
2041	16	\$23,210	\$16,897	\$58,600	\$42,661	0	0	0.728
2042	17	\$23,210	\$16,572	\$58,600	\$41,840	0	0	0.714
2043	18	\$23,210	\$16,247	\$58,600	\$41,020	0	0	0.700
2044	19	\$23,210	\$15,922	\$58,600	\$40,200	0	0	0.686
2045	20	\$23,210	\$15,620	\$58,600	\$39,438	0	0	0.673
2046	21	\$23,210	\$15,319	\$58,600	\$38,676	0	0	0.660
2047	22	\$23,210	\$15,017	\$58,600	\$37,914	0	0	0.647
2048	23	\$23,210	\$14,715	\$58,600	\$37,152	0	0	0.634
2049	24	\$23,210	\$14,437	\$58,600	\$36,449	0	0	0.622
2050	25	\$23,210	\$14,158	\$58,600	\$35,746	0	0	0.610
2051	26	\$23,210	\$13,880	\$58,600	\$35,043	0	0	0.598
2052	27	\$23,210	\$13,601	\$58,600	\$34,340	0	0	0.586
2053	28	\$23,210	\$13,323	\$58,600	\$33,636	0	0	0.574
2054	29	\$23,210	\$13,067	\$58,600	\$32,992	0	0	0.563
		LTC Subtotal:	\$530,200	CA Subtotal:	\$1,338,600	SPP Subtotal:	\$709,334	
						CA + SPP Total:	\$2,047,934	
						Financial Assurance Total (LTC + CA + SPP):	\$2,578,134	

Notes:

PV Present Value

LTC Long-Term Care

CA Corrective Action

SPP Saturator purge pit

(1) 2019-07-23 - ERCO - Financial Assurance Approach; including updated estimates 2025-07-25.

(2) 2019-04-18 - ERCO - Saturator Purge Pit Remedial Action Options Report; reviewed in 2025

(3) SPP estimate reduced from \$1,200,000 to \$1,100,000 after field work confirmed \$100,000 directional drilling not required. SPP Subtotal is the difference between the SPP estimate (\$1,100,000) and the SPP Spend (see Table 5). The SPP estimate is adequate for groundwater remediation based on data available as of the time of this estimate

2025 Financial Assurance Update - 30-Year Long-Term Care and Corrective Action Present Value Calculations

ERCO Worldwide (USA) Inc.

Port Edwards Plant

Nekoosa, Wisconsin

Year	Period	Long-Term Care (LTC) Costs		LTC Calculations			Corrective Action (CA) Costs (3)	CA Calculations		PV Factor (4) G
		Long-Term Care (1)	Facility NR 140 Perimeter (2)	LTC Total	Total with 10% Contingency	Factored PV (4)		Total with 10% Contingency	Factored PV (4)	
		(A)	(B)	C = A+B	D = C*1.1	= D*G		F = E*1.1	= F*G	
2025	0	\$14,800	\$6,300	\$21,100	\$23,210	\$23,210	\$53,300	\$58,600	\$58,600	1.000
2026	1	\$14,800	\$6,300	\$21,100	\$23,210	\$22,746	\$53,300	\$58,600	\$57,428	0.980
2027	2	\$14,800	\$6,300	\$21,100	\$23,210	\$22,305	\$53,300	\$58,600	\$56,315	0.961
2028	3	\$14,800	\$6,300	\$21,100	\$23,210	\$21,864	\$53,300	\$58,600	\$55,201	0.942
2029	4	\$14,800	\$6,300	\$21,100	\$23,210	\$21,446	\$53,300	\$58,600	\$54,146	0.924
2030	5	\$14,800	\$6,300	\$21,100	\$23,210	\$21,028	\$53,300	\$58,600	\$53,092	0.906
2031	6	\$14,800	\$6,300	\$21,100	\$23,210	\$20,610	\$53,300	\$58,600	\$52,037	0.888
2032	7	\$14,800	\$6,300	\$21,100	\$23,210	\$20,216	\$53,300	\$58,600	\$51,041	0.871
2033	8	\$14,800	\$6,300	\$21,100	\$23,210	\$19,798	\$53,300	\$58,600	\$49,986	0.853
2034	9	\$14,800	\$6,300	\$21,100	\$23,210	\$19,427	\$53,300	\$58,600	\$49,048	0.837
2035	10	\$14,800	\$6,300	\$21,100	\$23,210	\$19,032	\$53,300	\$58,600	\$48,052	0.820
2036	11	\$14,800	\$6,300	\$21,100	\$23,210	\$18,661	\$53,300	\$58,600	\$47,114	0.804
2037	12	\$14,800	\$6,300	\$21,100	\$23,210	\$18,289	\$53,300	\$58,600	\$46,177	0.788
2038	13	\$14,800	\$6,300	\$21,100	\$23,210	\$17,941	\$53,300	\$58,600	\$45,298	0.773
2039	14	\$14,800	\$6,300	\$21,100	\$23,210	\$17,593	\$53,300	\$58,600	\$44,419	0.758
2040	15	\$14,800	\$6,300	\$21,100	\$23,210	\$17,245	\$53,300	\$58,600	\$43,540	0.743
2041	16	\$14,800	\$6,300	\$21,100	\$23,210	\$16,897	\$53,300	\$58,600	\$42,661	0.728
2042	17	\$14,800	\$6,300	\$21,100	\$23,210	\$16,572	\$53,300	\$58,600	\$41,840	0.714
2043	18	\$14,800	\$6,300	\$21,100	\$23,210	\$16,247	\$53,300	\$58,600	\$41,020	0.700
2044	19	\$14,800	\$6,300	\$21,100	\$23,210	\$15,922	\$53,300	\$58,600	\$40,200	0.686
2045	20	\$14,800	\$6,300	\$21,100	\$23,210	\$15,620	\$53,300	\$58,600	\$39,438	0.673
2046	21	\$14,800	\$6,300	\$21,100	\$23,210	\$15,319	\$53,300	\$58,600	\$38,676	0.660
2047	22	\$14,800	\$6,300	\$21,100	\$23,210	\$15,017	\$53,300	\$58,600	\$37,914	0.647
2048	23	\$14,800	\$6,300	\$21,100	\$23,210	\$14,715	\$53,300	\$58,600	\$37,152	0.634
2049	24	\$14,800	\$6,300	\$21,100	\$23,210	\$14,437	\$53,300	\$58,600	\$36,449	0.622
2050	25	\$14,800	\$6,300	\$21,100	\$23,210	\$14,158	\$53,300	\$58,600	\$35,746	0.610
2051	26	\$14,800	\$6,300	\$21,100	\$23,210	\$13,880	\$53,300	\$58,600	\$35,043	0.598
2052	27	\$14,800	\$6,300	\$21,100	\$23,210	\$13,601	\$53,300	\$58,600	\$34,340	0.586
2053	28	\$14,800	\$6,300	\$21,100	\$23,210	\$13,323	\$53,300	\$58,600	\$33,636	0.574
2054	29	\$14,800	\$6,300	\$21,100	\$23,210	\$13,067	\$53,300	\$58,600	\$32,992	0.563
					LTC PV Total:	\$530,200			CA PV Total:	\$1,338,600

Notes:

Discount Rate (4): 0.02

PV Present Value

(1) Detailed Long-Term Care Cost Breakdown presented in Table 4A

(2) Detailed Facility NR 140 (Perimeter Monitoring) Cost Breakdown presented in Table 4B

(3) Detailed Corrective Action Cost Breakdown presented in Table 4C

(4) PV Factor Calculation: $1 / (1 + \text{Discount Rate})^{\text{Period}}$

2025 Financial Assurance Update - Detailed Long-Term Care Cost Breakdown
ERCO Worldwide (USA) Inc.
Port Edwards Plant
Nekoosa, Wisconsin

Long-Term Care Cost Breakdown (1)		Unit Cost	Quantity per event	Frequency per Year	Total Per Year	Unit	Total
A.1	Inspections & Maintenance (2)(3)						
	Waste Treatment Plant Muds Bin	\$93	4	1	4	hours	\$372
	Saturator Purge Pit Cap	\$93	4	4	16	hours	\$1,488
	Clarifier Purge Pit Cap	\$93	4	4	16	hours	\$1,488
	Maintenance	\$1,000	-	-	1	annually	\$1,000
						Subtotal A.1	\$4,348
A.2	Analytical Costs (4)						
	Dissolved Mercury	\$75	-	-	6	Each	\$450
	Chloride	\$12	-	-	6	Each	\$72
						20% QA/QC	\$104
						Subtotal A.2	\$626
A.3	Field Work for Groundwater Monitoring (5)						
	Labor	\$93	44	1	44	hours	\$4,092
	Equipment and Expenses	\$500	1	1	1	Each	\$500
						Subtotal A.3	\$4,592
A.4	Reporting and Project Administration (6)	\$225	10	1	10	hours	\$2,250
A.5	Budget for Monitoring Well Repair/Maintenance (7)						\$3,000
Total One-Year LTC Costs (Rounded):							\$14,800
With 10% Contingency:							\$16,300

Assumptions:

QA/QC Quality assurance/quality control

- (1) Long-term care (LTC) plan includes cap inspections and maintenance, groundwater monitoring of mercury and chloride, and associated reporting:
 - annual inspection of steel liner covering concrete wall, ceiling, and floor for waste treatment plant muds bin
 - minimum 3 times per year inspection of epoxy-coated concrete cap (approximately 11 foot by 25 foot area) for Saturator Purge Pit (currently done quarterly)
 - minimum 3 times per year inspection of epoxy-coated concrete cap (approximately 5 foot by 15 foot area) for Clarifier Purge Pit (currently done quarterly)
 - groundwater monitoring wells, frequency, and parameters per the 2010 Groundwater Monitoring Plan (approved modifications 2016, 2017, and 2023)
 Consultant/contractor employee rate estimated based on 2025 consultant costs.
 LTC plan obligations are not anticipated to increase. Cost of inspections and maintenance of plant facilities and emergency response equipment and other items required under CMP-12 are part of plant operating costs and not included in these estimates.
- (2) Consultant/contractor employee rate estimated based on 2025 consultant costs.
- (3) Maintenance costs are based on prior costs, consistent with previous estimates, and may include minor epoxy repair or no cost at all
- (4) Analytical costs based on laboratory rates for 2025 from Eurofins Laboratory.
- (5) Field Work costs based on incurred costs for 2025. Cost includes \$200 for mobilization [vehicle mileage], and \$300 for equipment/consumables [pump, field parameter monitor, gloves, ice, filters].
- (6) Annual groundwater monitoring report and Corrective Action quarterly data submittals and report are combined. Consultant/contractor employee rate estimated based on 2025 consultant costs.
- (7) Estimated budget for periodic well repair or replacement (\$15,000 every 5 years, divided into an annual allowance of \$3,000)

2025 Financial Assurance Update - Detailed Facility NR 140 (Perimeter Monitoring) Cost Breakdown
ERCO Worldwide (USA) Inc.
Port Edwards Plant
Nekoosa, Wisconsin

Facility Wide NR 140 Cost Breakdown (1)		Unit Cost	Quantity per event	Frequency per Year	Total Per Year	Unit	Total
B.1 Analytical Costs (1)	VOCs	\$60			5	Each	\$300
	Dissolved Mercury	\$75			2	Each	\$150
	Chloride	\$12			6	Each	\$72
						20% QA/QC	\$104
						Subtotal B.1	\$626
B.2 Field Work (2)(3)	Labor	\$93	29	1	29	hours	\$2,697
	Equipment and Expenses	\$500	1	1	1	Each	\$500
						Subtotal B.2	\$3,197
B.3 Reporting and Project Administration (4)		\$225	1	1	1	hours	\$225
		\$158	14	1	14	hours	\$2,212
						Subtotal B.3	\$2,437
Total One-Year Facility NR 140 Costs (Rounded):							\$6,300
With 10% Contingency:							\$6,900

Assumptions:

QA/QC Quality assurance/quality control

- (1) NR 140 Perimeter Monitoring plan includes groundwater monitoring of volatile organic compounds (VOCs), mercury, and chloride, and associated reporting:
 - groundwater monitoring wells, frequency, and parameters per the 2010 Groundwater Monitoring Plan (approved modifications 2016, 2017, and 2023)
 Analytical costs based on laboratory rates for 2025 from Eurofins Laboratory.
- (2) Field Work costs based on incurred costs for 2025. Cost includes \$200 for mobilization [vehicle mileage], and \$300 for equipment/consumables [pump, field parameter monitor, gloves, ice, filters].
- (3) Consultant/contractor employee rate estimated based on 2025 consultant costs.
- (4) Costs for Facility NR 140 Perimeter Reporting is included with Corrective Action cost estimate, as per the 2019-04-08 WDNR Letter that permitted combining of the CA Report and RR program Annual Report; 2025 contractor rate used.

Table 4C

2025 Financial Assurance Update - Detailed Corrective Action Cost Breakdown
ERCO Worldwide (USA) Inc.
Port Edwards Plant
Nekoosa, Wisconsin

Corrective Action Cost Breakdown (1)		Unit Cost	Quantity per event	Frequency per Year	Total Per Year	Unit	Total
C.1	Inspections (1)						
	Cell Room Groundwater Collection Trench	\$93	4	4	16	hours	\$1,488
C.2	Operation & Maintenance (1)(2)						
	Cell Room Groundwater Collection Trench Operation	\$93	2	12	24	hours	\$2,232
	Pump and System Maintenance	\$1,000				annually	\$1,000
						Subtotal C.2	\$3,232
C.3	Analytical Costs (3)						
	VOCs	\$60			15	Each	\$900
	Dissolved Mercury	\$75			23	Each	\$1,725
	Chloride	\$12			31	Each	\$372
						20% QA/QC	\$599
						Subtotal C.3	\$3,596
C.4	Field Work (1)(4)						
	Labor	\$93	70	4	256	hours	\$23,808
	Equipment and Expenses	\$500	1	4	4	Each	\$2,000
						Subtotal C.4	\$25,808
C.5	Reporting and Project Administration (5)						
	Annual Report	\$225	20	1	20	hours	\$4,500
	Annual Report	\$158	60	1	60	hours	\$9,480
	FA Report	\$280	8	1	8	hours	\$2,240
						Subtotal C.5	\$16,220
C.6	Budget for Monitoring Well Repair/Maintenance (6)						\$3,000
Total One-Year Corrective Action Cost (Rounded):							\$53,300
With 10% Contingency:							\$58,600

Assumptions:

QA/QC Quality assurance/quality control

- (1) Corrective Action (CA) obligations includes inspection, operation, and maintenance of the cell room groundwater collection trench, groundwater monitoring of volatile organic compounds (VOCs), mercury, and chloride, and associated reporting:
 - operation and maintenance per the 2000 Corrective Action Operation and Maintenance Plan
 - groundwater monitoring wells, frequency, and parameters per the 2010 Groundwater Monitoring Plan (approved modifications 2016, 2017, and 2023)
 Analytical costs based on GSH contract laboratory rates for 2025.
- (2) Estimated assumes one operational visit per month responding to alarms and assumes the repair and/or replacement of key components every 10 years. Maintenance costs are based on prior costs and periodic pump replacement every 10-15 years, represented by an average \$1,000/year cost
- (3) Analytical costs based on laboratory rates for 2025 from Eurofins Laboratory.
- (4) Field Work costs based on incurred costs for 2025. Cost includes \$200 for mobilization [vehicle mileage], and \$300 for equipment/consumables [pump, field parameter monitor, gloves, ice, filters].
- (5) Annual groundwater monitoring report and Corrective Action quarterly data submittals and report are combined. Consultant/contractor employee rate estimated based on 2025 consultant costs.
Financial Assurance submitted separately each year; 2025 consultant rate used.
- (6) Estimated budget for periodic well repair or replacement (\$15,000 every 5 years, averaging to \$3,000 per year)

2025 Financial Assurance Update - Detailed Saturated Purge Pit Spending Summary
ERCO Worldwide (USA) Inc.
Port Edwards Plant
Nekoosa, Wisconsin

SPP Remediation Spend as of: 2025-07-24

Year	Estimate	Estimate in 2025 Dollars (A)	Spend	Spend in 2025 Dollars (B)	Spending Details	Addition Notes
2019	\$1,200,000	\$1,461,960				Initial estimate
2019	-\$100,000	-\$121,830			Revised estimate scope to remove contingency plan for angled drilling from cost	Built into RAOR \$1.2M estimate
2020			\$43,799.69	\$52,450.13	GHD Remedial Design/Treatability Study (1)	Phase D22101
2021			\$61,912.65	\$73,242.66	ERCO remediation/disposal/time expense to GSH Q2/Q3 2021 (2) (3)	per KH 10/18/21
2020-2021			\$59,287.11	\$70,136.65	RD and RA approvals, coordination, and permitting (1)	
2021			\$112,897.25	\$133,557.45	First Injection and wells installations 2021 (1)	Phase D22102
2021			\$18,824.30	\$22,269.15	GHD Reporting thru April 2022 (1)	Phase D22103
2021			\$2,278.00	\$2,694.87	2021 Q4 AECOM Monitoring (4)(5)	
2022			\$34,732.83	\$39,453.02	GHD RA spend thru December 2022	Phase D22102, D22103
2022			\$57,399.53	\$65,200.13	GHD Second injection	
2022			\$2,067.00	\$2,347.91	2022 Q1 AECOM Monitoring (4)(6)	
2023			\$14,637.71	\$15,537.93	GHD RA spend thru April 2023 (7)	
2023			\$42,808.30	\$45,441.01	GHD RA spend May-Dec 2023 (7)	
2024			\$15,102.51	\$15,467.99	GHD RA spend Jan-July 2024 (8)	
2024			\$12,740.83	\$13,049.16	GHD RA spend August-December 2024 (8)	
2025			\$79,948.24	\$79,948.24	GHD RA spend Jan-June 2025 (9)	
TOTAL:	\$1,100,000	\$1,340,130	\$558,436	\$630,796		
Balance (A-B):				\$709,334		

Inflation Factor (10)		
Year	Annual Factor	Compound Factor (2025 Dollars)
2019	1.0174	1.2183
2020	1.0122	1.1975
2021	1.0415	1.1830
2022	1.0701	1.1359
2023	1.0364	1.0615
2024	1.0242	1.0242
2025	1.0242	1.0000

References:

- (1) 1192391 2022-05-03 Financial Assurance Update
(2) 2021-10-18 - ERCO - SPP Remediation Expenses Q2
(3) 2021-10-18 - ERCO - SPP Remediation Expenses Q3
(4) 2022-04-21 Change Order for 2021 and 2022 RCRA Groundwater Monitoring
(5) Q4-2021 Chargeback
(6) Q1-2022 Chargeback
(7) 2023 Chargeback
(8) 2024 Chargeback
(9) 2025 Chargeback
(10) 2025-03-27 - WDNR - Owner Financial Responsibility Inflation Factor Table. Estimates are multiplied by the compound factor for the year of the spend to calculate (inflate to) 2025 dollars.



July 23, 2019

Reference No. 11192391

Mr. Douglas Coenen, P.E.
Waste Management Specialist
Waste and Materials Management Program
Wisconsin Department of Natural Resources
101 S. Webster Street HW/5
PO Box 792
Madison, Wisconsin
U.S.A. 53707-7921

Dear Mr. Coenen:

**Re: Financial Assurance Approach and Calculations
2018-2019 Hazardous Waste Compliance Assessment
ERCO Worldwide (USA), Inc.
Nekoosa, WI**

This letter is in response to Wisconsin Department of Natural Resources' (WDNR's) April 8, 2019 letter to ERCO Worldwide (USA) Inc. (ERCO) regarding the ERCO facility in Nekoosa, WI (Site). WDNR's letter discusses compliance requirements and requests information regarding plans for Long-Term Care and Corrective Action activities at the Site, and financial assurance cost estimates. This letter responds to the comments made in WDNR's letter regarding financial assurance, and provides updated cost estimates for review and approval.

Responses to WDNR's April 8, 2019 comments regarding long-term care and corrective action activities at the Site was provided by ERCO via multiple email transmittals on May 28, May 30, and May 31, 2019. As you are aware, and per your request, ERCO updated its plans for long-term care and corrective action activities into one consolidated Long-Term Care/Corrective Action Plan (LTC/CA Plan) (GHD, 2019) that was submitted to WDNR on July 23, 2019.

Financial Assurance

Historically, ERCO has prepared cost estimates and maintained financial assurance in substantial compliance with the regulations, as required, for long-term care (for the muds bin, saturator purge pit, and clarifier purge pit), and corrective action (groundwater collection and Site-wide groundwater monitoring). ERCO has updated its financial assurance cost estimates to be consistent with the work activities identified in the consolidated Long-Term Care/Corrective Action Plan (LTC/CA Plan) (GHD, 2019). Based on discussions between WDNR and ERCO, we understand that WDNR is receptive to ERCO applying an alternate approach that is more consistent with an undetermined end point in the remediation activities. ERCO proposes utilizing an approach consistent with financial assurance estimating conducted for

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ERCO Worldwide (USA) Inc.

Port Edwards Plant
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USEPA Superfund. As such, ERCO's updated financial assurance cost estimate is based on using a simple Discount Rate formula. Table 1 presents ERCO's updated financial assurance cost estimate, broken out by year and task grouping (Corrective Action, Long-Term Care, and Facility NR 140 Perimeter Monitoring). Detailed calculations supporting the cost estimate are provided for each task grouping in Table A, Table B, and Table C, respectively.

The following summarizes some key considerations used in the development of these cost estimates:

1. ERCO is proposing to use a 3 percent discount rate applied to 30 years of long-term care and corrective action costs to develop a net present value estimate of Long-Term Care and Corrective Action costs for financial assurance purposes. This discount rate is reflective of the expected spread between inflation and interest costs over the life of the long-term care and corrective action period. USEPA has recently accepted a 3 percent discount rate for other similar assessments, and this discount rate is considered to be conservatively low.
2. ERCO is proposing a 30 year period for financial assurance because this is the typical period applied by USEPA, and USEPA has recently accepted this period for other similar assessments.
3. Although it is atypical to include a contingency in USEPA financial assurance estimates, ERCO has included a 10 percent contingency in Table 1, consistent with WDNR recommendations.
4. WDNR suggests that ERCO revisit the cost annually and revise the cost estimate within 60 days if the actual costs differ from the estimated cost by 5 percent. Given that ERCO is applying a net present value approach that includes a 10 percent contingency, ERCO requests that WDNR allow ERCO to simplify this process. The annual financial assurance report would revise the estimates only if there is a substantive change to the programs that results in a greater than 10 percent change to the net present value estimate.

Should you have any questions or require additional information, please contact me at 715-887-4565 or mswenson@ercoworldwide.com or Denise Quigley of GHD at 519-340-4196 or denise.quigley@GHD.com.

Yours truly,



Mark Swenson
Plant Manager, ERCO Worldwide

Encl.

cc: M. Tischauser, WDNR
M. Willkom, WDNR
P. Rajurkar, ERCO Worldwide

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E. Fattore, ERCO Worldwide
K. Hansen, ERCO Worldwide
C. Babcock, Glenn Springs Holdings
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Table 1

Draft for Review

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Financial Assurance Calculations - Long-Term Care and Corrective Action
ERCO Worldwide (USA) Inc.
Port Edwards Plant
Nekoosa, Wisconsin

Year		Period		Long-Term Care							Corrective Action							PV Factor		
				Long-Term Care			Facility NR 140 Perimeter													
				Sampling & Reporting		Inspections & Maintenance	Field Monitoring & Reporting		Total	Contingency	Present Value (Discounted, 3% Discount Rate)	Sampling & Reporting		Inspections & Maintenance	Total	Contingency	Present Value (Discounted, 3% Discount Rate)			
2019	0	\$10,000	\$2,470	\$3,760	\$5,000	\$1,319	\$22,548	\$24,803	\$24,803	\$52,000	\$6,071	\$3,560	\$61,631	\$67,794	\$67,794	1.00000				
2020	1	\$10,000	\$2,470	\$3,760	\$5,000	\$1,319	\$22,548	\$24,803	\$24,081	\$52,000	\$6,071	\$3,560	\$61,631	\$67,794	\$65,819	0.97087				
2021	2	\$10,000	\$2,470	\$3,760	\$5,000	\$1,319	\$22,548	\$24,803	\$23,379	\$52,000	\$6,071	\$3,560	\$61,631	\$67,794	\$63,902	0.94260				
2022	3	\$10,000	\$2,470	\$3,760	\$5,000	\$1,319	\$22,548	\$24,803	\$22,698	\$52,000	\$6,071	\$3,560	\$61,631	\$67,794	\$62,041	0.91514				
2023	4	\$10,000	\$2,470	\$3,760	\$5,000	\$1,319	\$22,548	\$24,803	\$22,037	\$52,000	\$6,071	\$3,560	\$61,631	\$67,794	\$60,234	0.88849				
2024	5	\$10,000	\$2,470	\$3,760	\$5,000	\$1,319	\$22,548	\$24,803	\$21,395	\$52,000	\$6,071	\$3,560	\$61,631	\$67,794	\$58,480	0.86261				
2025	6	\$10,000	\$2,470	\$3,760	\$5,000	\$1,319	\$22,548	\$24,803	\$20,772	\$52,000	\$6,071	\$3,560	\$61,631	\$67,794	\$56,776	0.83748				
2026	7	\$10,000	\$2,470	\$3,760	\$5,000	\$1,319	\$22,548	\$24,803	\$20,167	\$52,000	\$6,071	\$3,560	\$61,631	\$67,794	\$55,123	0.81309				
2027	8	\$10,000	\$2,470	\$3,760	\$5,000	\$1,319	\$22,548	\$24,803	\$19,580	\$52,000	\$6,071	\$3,560	\$61,631	\$67,794	\$53,517	0.78941				
2028	9	\$10,000	\$2,470	\$3,760	\$5,000	\$1,319	\$22,548	\$24,803	\$19,010	\$52,000	\$6,071	\$3,560	\$61,631	\$67,794	\$51,958	0.76642				
2029	10	\$10,000	\$2,470	\$3,760	\$5,000	\$1,319	\$22,548	\$24,803	\$18,456	\$52,000	\$6,071	\$3,560	\$61,631	\$67,794	\$50,445	0.74409				
2030	11	\$10,000	\$2,470	\$3,760	\$5,000	\$1,319	\$22,548	\$24,803	\$17,918	\$52,000	\$6,071	\$3,560	\$61,631	\$67,794	\$48,976	0.72242				
2031	12	\$10,000	\$2,470	\$3,760	\$5,000	\$1,319	\$22,548	\$24,803	\$17,396	\$52,000	\$6,071	\$3,560	\$61,631	\$67,794	\$47,549	0.70138				
2032	13	\$10,000	\$2,470	\$3,760	\$5,000	\$1,319	\$22,548	\$24,803	\$16,890	\$52,000	\$6,071	\$3,560	\$61,631	\$67,794	\$46,164	0.68095				
2033	14	\$10,000	\$2,470	\$3,760	\$5,000	\$1,319	\$22,548	\$24,803	\$16,398	\$52,000	\$6,071	\$3,560	\$61,631	\$67,794	\$44,820	0.66112				
2034	15	\$10,000	\$2,470	\$3,760	\$5,000	\$1,319	\$22,548	\$24,803	\$15,920	\$52,000	\$6,071	\$3,560	\$61,631	\$67,794	\$43,514	0.64186				
2035	16	\$10,000	\$2,470	\$3,760	\$5,000	\$1,319	\$22,548	\$24,803	\$15,457	\$52,000	\$6,071	\$3,560	\$61,631	\$67,794	\$42,247	0.62317				
2036	17	\$10,000	\$2,470	\$3,760	\$5,000	\$1,319	\$22,548	\$24,803	\$15,006	\$52,000	\$6,071	\$3,560	\$61,631	\$67,794	\$41,016	0.60502				
2037	18	\$10,000	\$2,470	\$3,760	\$5,000	\$1,319	\$22,548	\$24,803	\$14,569	\$52,000	\$6,071	\$3,560	\$61,631	\$67,794	\$39,822	0.58739				
2038	19	\$10,000	\$2,470	\$3,760	\$5,000	\$1,319	\$22,548	\$24,803	\$14,145	\$52,000	\$6,071	\$3,560	\$61,631	\$67,794	\$38,662	0.57029				
2039	20	\$10,000	\$2,470	\$3,760	\$5,000	\$1,319	\$22,548	\$24,803	\$13,733	\$52,000	\$6,071	\$3,560	\$61,631	\$67,794	\$37,536	0.55368				
2040	21	\$10,000	\$2,470	\$3,760	\$5,000	\$1,319	\$22,548	\$24,803	\$13,333	\$52,000	\$6,071	\$3,560	\$61,631	\$67,794	\$36,443	0.53755				
2041	22	\$10,000	\$2,470	\$3,760	\$5,000	\$1,319	\$22,548	\$24,803	\$12,945	\$52,000	\$6,071	\$3,560	\$61,631	\$67,794	\$35,381	0.52189				
2042	23	\$10,000	\$2,470	\$3,760	\$5,000	\$1,319	\$22,548	\$24,803	\$12,568	\$52,000	\$6,071	\$3,560	\$61,631	\$67,794	\$34,351	0.50669				
2043	24	\$10,000	\$2,470	\$3,760	\$5,000	\$1,319	\$22,548	\$24,803	\$12,202	\$52,000	\$6,071	\$3,560	\$61,631	\$67,794	\$33,350	0.49193				
2044	25	\$10,000	\$2,470	\$3,760	\$5,000	\$1,319	\$22,548	\$24,803	\$11,846	\$52,000	\$6,071	\$3,560	\$61,631	\$67,794	\$32,379	0.47761				
2045	26	\$10,000	\$2,470	\$3,760	\$5,000	\$1,319	\$22,548	\$24,803	\$11,501	\$52,000	\$6,071	\$3,560	\$61,631	\$67,794	\$31,436	0.46369				
2046	27	\$10,000	\$2,470	\$3,760	\$5,000	\$1,319	\$22,548	\$24,803	\$11,166	\$52,000	\$6,071	\$3,560	\$61,631	\$67,794	\$30,520	0.45019				
2047	28	\$10,000	\$2,470	\$3,760	\$5,000	\$1,319	\$22,548	\$24,803	\$10,841	\$52,000	\$6,071	\$3,560	\$61,631	\$67,794	\$29,631	0.43708				
2048	29	\$10,000	\$2,470	\$3,760	\$5,000	\$1,319	\$22,548	\$24,803	\$10,525	\$52,000	\$6,071	\$3,560	\$61,631	\$67,794	\$28,768	0.42435				
2049	30	\$10,000	\$2,470	\$3,760	\$5,000	\$1,319	\$22,548	\$24,803	\$10,219	\$52,000	\$6,071	\$3,560	\$61,631	\$67,794	\$27,930	0.41199				
Present Value Total, Long-Term Care									\$510,958	Present Value Total, Corrective Action							\$1,396,584			

Notes:

Discount Rate: 0.03

Table A

Corrective Action Cost Estimate
ERCO Worldwide (USA) Inc.
Port Edwards Plant
Nekoosa, Wisconsin

		Unit Cost	Quantity per event	Frequency per Year	Total Quantity Per Year	Unit	Total
Corrective Action Cost Breakdown							
A.1	Inspections (1)						
	Cell Room Groundwater Collection Trench	\$ 35	4	4	16	hours	\$ 560
A.2	Operation & Maintenance (2)						
	Cell Room Groundwater Collection Trench Operation	\$ 500				annually	\$ 500
	Pump and System Maintenance	\$ 500				annually	\$ 500
						Subtotal A.2	\$ 1,000
A.3	Analytical Costs (3)						
	VOCs	\$ 50			15	Each	\$ 750
	Ethane, Ethene, Methane	\$ 50			15	Each	\$ 750
	Dissolved Iron	\$ 6			15	Each	\$ 90
	Total Organic Carbon	\$ 32			15	Each	\$ 480
	Dissolved Mercury	\$ 85			23	Each	\$ 1,955
	Nitrate	\$ 11			15	Each	\$ 165
	Alkalinity	\$ 11			15	Each	\$ 165
	Chloride	\$ 11			36	Each	\$ 396
	Sulfate	\$ 11			28	Each	\$ 308
						Subtotal	\$ 5,059
						20% QA/QC	\$ 1,012
						Subtotal A.3	\$ 6,071
A.4	Field Work (4)						\$ 30,000
A.5	Reporting and Project Administration (5)						
	Annual Report						\$ 20,000
	FA Report						\$ 2,000
						Subtotal A.5	\$ 22,000
A.6	Budget for Monitoring Well Repair/Maintenance (6)						\$ 2,000
Total Corrective Action Combined Costs For One Year (Rounded)							\$ 61,600
With Contingency (10%) Costs							\$ 67,800

Notes:

1. Average ERCO employee rate estimated at \$35/hour.
2. Estimated costs based on previous estimates and assumed repairs averaged out annually.
3. Analytical costs based on GSH contract laboratory rates. Field work and reporting estimated based on past costs.
4. Based on prior costs per previous estimates
5. Assumes that annual groundwater monitoring report and CA quarterly data submittals and report are combined. Financial Assurance submitted separately each April
6. Estimated budget for periodic well repair or replacement (\$10,000 every 5 years)

Table B

**Long-Term Care Cost Estimate
ERCO Worldwide (USA) Inc.
Port Edwards Plant
Nekoosa, Wisconsin**

		Unit Cost	Quantity per event	Frequency per Year	Total Quantity Per Year	Unit	Total
Long-Term Care Cost Breakdown (1)							
B.1	Inspections & Maintenance (2)(3)						
	Waste Treatment Plant Muds Bin	\$ 35	4	1	4	hours	\$ 140
	Saturator Purge Pit Cap	\$ 35	4	4	16	hours	\$ 560
	Clarifier Purge Pit Cap	\$ 35	4	4	16	hours	\$ 560
	Maintenance	\$ 500			1	annually	\$ 500
						Subtotal B.1	\$ 1,760
B.2	Analytical Costs (4)						
	Dissolved Mercury	\$ 85			18	Each	\$ 1,530
	Chloride	\$ 11			24	Each	\$ 264
	Sulfate	\$ 11			24	Each	\$ 264
						Subtotal	\$ 2,058
						20% QA/QC	\$ 412
						Subtotal B.2	\$ 2,470
B.3	Field Work (4)(5)						\$ 8,000
B.4	Reporting and Project Administration (5)						\$ 2,000
B.5	Budget for Monitoring Well Repair/Maintenance (6)						\$ 2,000
Total Long-Term Care Combined Costs For One Year (Rounded)							\$ 16,200
With Contingency (10%) Costs							\$ 17,800

Notes:

1. Cost of inspections and maintenance of plant facilities and emergency response equipment and other items required under CMP-11 are part of plant operating costs and not included in these estimates.
2. ERCO employee rate estimated at \$35/hour.
3. Based on prior costs per previous estimates
4. Analytical costs based on GSH contract laboratory rates. Field work and reporting estimated based on past costs and combined with routine events for corrective action monitoring
5. Assumes that annual groundwater monitoring report and corrective action report are combined, and Financial Assurance submitted separately
6. Estimated budget for periodic well repair or replacement (\$10,000 every 5 years)

Table C

**Facility NR 140 Perimeter Cost Estimate
ERCO Worldwide (USA) Inc.
Port Edwards Plant
Nekoosa, Wisconsin**

Facility Wide NR 140 Cost Breakdown		Unit Cost	Total Quantity Per Year	Unit	Total
C.1	Analytical Costs (1)				
	VOCs	\$ 50	5	Each	\$ 250
	Ethane, Ethene, Methane	\$ 50	4	Each	\$ 200
	Dissolved Iron	\$ 6	4	Each	\$ 24
	Total Organic Carbon	\$ 32	4	Each	\$ 128
	Dissolved Mercury	\$ 85	3	Each	\$ 255
	Nitrate	\$ 11	4	Each	\$ 44
	Alkalinity	\$ 11	4	Each	\$ 44
	Chloride	\$ 11	7	Each	\$ 77
	Sulfate	\$ 11	7	Each	\$ 77
	Subtotal				\$ 1,099
	20% QA/QC				\$ 220
	Subtotal C.1 Perimeter Monitoring Analytical Costs				\$ 1,319
C.2	Field Work (2)				\$ 3,000
C.3	Reporting and Project Administration (3)(4)				\$ 2,000
Facility NR 140 Perimeter Combined Costs For One Year (Rounded)					\$ 6,300
With Contingency (10%) Costs					\$ 6,900

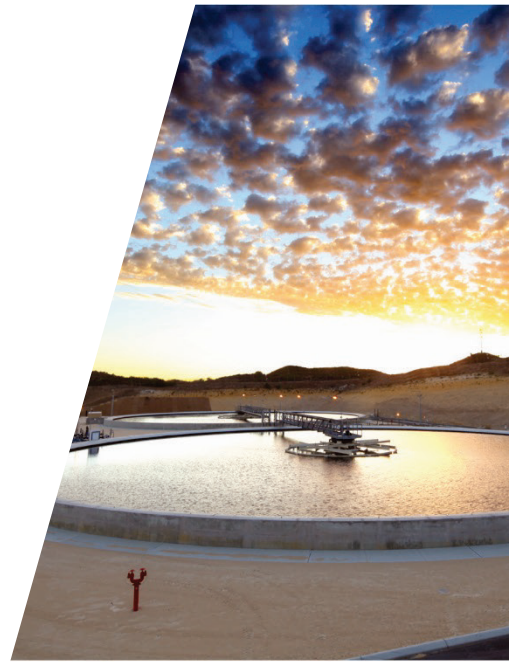
Notes:

1. Analytical costs based on GSH contract laboratory rates. Field work and reporting estimated based on past costs and combined with routine events for corrective action monitoring
2. Based on prior costs per previous estimates
3. Costs for Facility NR 140 Perimeter Reporting is included with Corrective Action cost estimate, as per the 2019-04-08 WDNR Letter that permitted combining of the CA Report and RR program Annual Report.
4. Estimated budget for periodic well repair or replacement (\$10,000 every 5 years) included under Long-Term Care and Corrective Action estimates



Remedial Action Options Report

ERCO Worldwide (USA) Inc.
Port Edwards Plant
Nekoosa, Wisconsin





April 18, 2019

Reference No. 11129197-10

Ms. Mae E. Willkom
Hydrogeologist, Remediation and Redevelopment
State of Wisconsin Department of Natural Resources
1300 Clairemont Avenue
Eau Claire, WI 54702

**Re: Remedial Action Options Report
ERCO Worldwide (USA) Inc., 101 Highway 73 South, Port Edwards, Wisconsin
(Site)
WDNR BRTS #02-7-000012**

Dear Ms. Willkom:

ERCO Worldwide (USA) Inc. (ERCO) is pleased to submit the attached Remedial Action Options Report (RAOR) for your review and comment. This RAOR was prepared in accordance with Chapter NR 722, Wisconsin Administration Code, to identify and evaluate options to address groundwater with elevated mercury concentrations in and downgradient of the former Saturator Purge Pit (SPP) area at the above-captioned Site.

The RAOR was prepared as requested in your January 24, 2019 letter to ERCO and consistent with our discussions during a teleconference between representatives of Wisconsin Department of Natural Resources (DNR), ERCO, Glenn Springs Holdings (GSH), and GHD on March 1, 2019. As discussed during the March 1, 2019 call, other potential Site activities mentioned in your January 24, 2019 letter will be addressed, as appropriate, following the RAOR and implementation of the selected remedial action.

Should you have any questions on the above, please do not hesitate to contact Denise Quigley at 519-340-4196 or denise.quigley@GHD.com or Mark Swenson at 715-887-4565 or mswenson@ercoworldwide.com.

Yours truly,

Mark Swenson
Plant Manager ERCO Worldwide

cc: Denise Quigley, GHD
Kevin Hansen, ERCO
Clint Babcock, Glenn Springs Holdings
Ian Richardson, GHD

Engineering • Research • Commitment • Optimization

ERCO Worldwide (USA) Inc.

Port Edwards Plant
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Table 2.1	Initial Screening of Technologies and Process Options for Mercury-Impacted Groundwater
Table 2.2	Remedial Options Summary

Appendix Index

Appendix A	Excerpts from "Annual Report Groundwater Monitoring Program January 1 to December 31, 2018" (AECOM, 2019)
Appendix B	March 2019 Analytical Data
Appendix C	Remedial Options Preliminary Cost Estimate Tables



List of Acronyms

BRRTS	Bureau for Remediation and Redevelopment Tracking System
CMI	Corrective Measure Implementation
DNR	The Department of Natural Resources
ES	Wisconsin Enforcement Standard
ft	feet
GHD	GHD Services Inc.
mg/kg	Milligrams per kilogram
RAOs	Remedial Action Objectives
RAOR	Remedial Action Options Report
Site	ERCO Port Edwards Plant
SPP	Saturator Purge Pit
TEAPs	Terminal Electron Acceptor Process
USEPA	United States Environmental Protection Agency
DNR	Wisconsin Department of Natural Resources
µg/L	Micrograms per liter
Wis. Admin. Code	Wisconsin Administrative Code



1. Introduction

This Remedial Action Options Report (RAOR or Report) was prepared by GHD to evaluate options to address mercury contamination in groundwater in the area of the former Saturator Purge Pit (SPP) at the ERCO Port Edwards Plant (Site). The RAOR is being submitted to the Wisconsin Department of Natural Resources (DNR) in response to the DNR's January 24, 2019 letter and in accordance with the requirements of Chapter NR 722, Wisconsin Administrative Code.

The DNR's January 24, 2019 letter outlines the review of the *Geochemical Evaluation and Conceptual Groundwater Model for the Occurrence and Movement of Mercury in Groundwater* located at ERCO Worldwide, Port Edwards, Wisconsin (WDNR BRRS #02-72-000012). This RAOR is being submitted to respond to DNR's request and their determination that *"the conclusions and recommendations of the Report are insufficient to document ensured immobilization of mercury contamination in and beyond the former Saturator Purge Pit (SPP) area"*.

1.1 Contacts

The contact information for the person(s) responsible for completing this evaluation (Responsible Party [RP]), and the environmental consultant preparing this Report on behalf of the RP are provided below.

- **RP Contact**

Mr. Mark Swenson, Plant Manager
ERCO Worldwide (USA), Inc.
Port Edwards Plant
101 Highway 73 South
Nekoosa, WI 54457
Telephone: (715) 887-4565
Email: mswenson@ercoworldwide.com

- **Environmental Consultant**

Mr. Ian Richardson, Project Advisor/Principal
Ms. Denise Quigley, Project Manager
Mr. Shawn Horn, Project Advisor
Mr. Charles Ahrens, Project Geologist
GHD Services Inc.
455 Phillip St.
Waterloo, ON, Canada N2L 3X2
Telephone: (519) 340-4196
Email: Ian.Richardson@ghd.com; Denise.Quigley@ghd.com

1.2 Site Description and Background

The Site is located approximately nine miles southwest of Wisconsin Rapids in Port Edwards, Wood County, as shown on Figure 1.1. The main plant site encompasses approximately 34 acres adjacent to the west bank of the Wisconsin River in an area that is largely undeveloped. A Site plan is provided on Figure 1.2.



Prior to 2009, the plant utilized a mercury-cell chlor-alkali process to manufacture industrial chemicals, including chlorine, sodium hydroxide, potassium hydroxide, and hydrochloric acid.

The principal source of mercury impact to the groundwater was related to the former SPP, which was a 2,000-gallon in-ground concrete tank that was removed in 1990. Contaminated soils were removed to the depth of the water table and the area was capped with concrete and impermeable resin. Groundwater samples collected from monitoring wells in the area of the SPP contained mercury at concentrations that exceeded the NR 140 Wisconsin Enforcement Standard (ES) of 2 µg/L.

The report entitled *Groundwater Collection at the Saturator Purge Pit Cell Room Soil Sediment Removal East of Highway 73 Waste Layer Excavation* (CH2M Hill, 1999) summarizes several corrective measures completed in 1998 as per an agreement with DNR to implement the state-equivalent of the Resource Conservation and Recovery Act (RCRA) Corrective Action Program. Requirements were documented in Vulcan Chemicals' modified plan of operation dated March 29, 1996. Vulcan successfully completed the following corrective action measures in 1998 as per their Corrective Measures Implementation (CMI) plan conditionally approved by DNR in August of 1998:

- Mercury-contaminated soil and sediment were excavated in the Unit 5 Spill Area, east of Highway 73, to achieve the neighborhood background value of 0.5 mg/kg. This work was to address residual mercury in soil exceeding the 0.5 mg/kg remedial clean up level (RCL). The impact was due to a 1976 failure of a 500,000-gallon tank of brine solution, which resulted in a release of at least 350,000 gallons of mercury-contaminated brine to the local wetlands. More than 3,000 tons of affected soil was previously removed in 1997 (remediation criterion was 20 mg/kg mercury at that time).
- East of Highway 73, sediment in the East Parcel wetlands were excavated due to contamination from mercury bearing groundwater that was intercepted by a WisDOT storm sewer that discharged to this location. Sediment was excavated to achieve the neighborhood background value of 0.5 mg/kg.
- A groundwater collection system was installed at the Cell Room and a groundwater extraction well was installed approximately 100 feet downgradient of the SPP area to capture mercury migrating from these source areas. Extracted groundwater was treated with other plant waste water at Vulcan's wastewater treatment plant and then discharged under permit to the Wisconsin River.
- A Waste Layer located at the southern end of the former Waste Pile Storage Area (Unit 1) was removed to the extent possible to achieve a synthetic precipitation leachate procedure (SPLP) concentration less than or equal to 0.2 µg/L. According to the report, limited areas of residual mercury remain beneath sections of the active railroad sidings.

The groundwater collection system installed at the Cell Room is still operational. Due to well maintenance problems caused by severe scaling and mineral encrustation, and evidence that the mercury in the groundwater was not mobile, DNR approved the shutdown of the extraction well downgradient of the SPP in January 2001. The extraction well was later abandoned in 2012 with approval from the DNR.



1.3 Site Geologic/Hydrogeologic Conditions

The overburden at the Site is relatively thin (approximately 10 to 25 feet (ft) thick) and consists of (in order of increasing depth).

- A sandy silt fill layer (not present in all boreholes)
- A sand layer
- A clayey silt layer

The overburden layers overlie fractured schist bedrock

The water table is generally found within the sand layer, and less commonly near the bottom of the sandy silt fill layer. The bulk of the impacted groundwater flow at the Site is expected to occur in the sand unit, as sands are more permeable than the underlying clayey silt, and the water table is generally below the sandy silt fill layer. Seasonal water table fluctuations may result in source area material periodically coming into contact with groundwater, and may partially explain the fluctuations in mercury concentrations observed in several wells historically.

Groundwater flow is generally to the south toward the Wisconsin River.

1.4 Contaminant Source

The contaminant source on Site consists of residual mercury or mercury compounds in the soil and groundwater near the former SPP. Routine groundwater monitoring indicates persistent detections of dissolved mercury in source area wells with concentrations ranging from 10s to 1,000s of $\mu\text{g/L}$. There is an area of groundwater where mercury exceeds the drinking water criterion (which is the NR 140 ES) of 2 $\mu\text{g/L}$, starting from the V-24/V-25 area and extending southward along the primary groundwater flow path, toward V-18. Figure 1.3 illustrates the estimated area where groundwater concentrations may exceed the ES of 2 $\mu\text{g/L}$ dissolved mercury. This area is approximated, and interpolates groundwater concentrations between wells based on groundwater flow direction and historic data. The extent of the impacted area has varied slightly over time, but the plume has essentially maintained the same size and shape.

As presented in the cross-section shown on Figure 1.4, the silt, which overlies the weathered bedrock, is thin in the area near wells V-24 and V-25. This means that there is a potential hydraulic connection between the source material in the overburden and the fractured bedrock. This connection provides a potential groundwater transport pathway from the source area to the downgradient monitoring well V-32B.

Caustic soda and caustic potash are manufactured at the Site and, if released to the environment, caustics can react with the silica-containing minerals in the soil, producing ions and minerals that can act as medium and long-term secondary sources of elevated pH to the groundwater. The groundwater pH near the source area is elevated, ranging from 10 to 12, and chloride concentrations are also high in comparison to other Site wells. Dissolved oxygen concentrations are generally low and oxidation-reduction potentials are variable, ranging from -100 to +100 millivolts.



1.5 Site Geochemical Conditions and 2019 Data Collection

ERCO completed an evaluation of the Site geochemical conditions in 2016 to help determine the types of geochemical processes that are occurring. The evaluation was submitted to DNR as part of the *Geochemical Evaluation and Conceptual Groundwater Model for the Occurrence and Movement of Mercury in Groundwater* (GHD, 2016), and is summarized below.

Redox indicator parameters were evaluated to determine the terminal electron acceptor processes (TEAPs) occurring in different areas of the site. The evaluation was based on a weight-of-evidence approach where each line of evidence is considered and then a final decision on the TEAP for a location is based on the overall conclusions from the data. The TEAP evaluation across the Site showed that the Site is generally anoxic, with more anaerobic conditions within the source area and in some downgradient wells. There is also some low-level methane in several wells, indicating that there are localized methanogenic conditions. There were elevated concentrations of sulfate in several wells, at values much higher than the background, indicating that sulfate was released at the Site and therefore, changes in sulfate concentrations cannot be used as indicators of redox conditions at the Site. The overall anoxic conditions indicate that sulfate reduction is not widespread, and the precipitation of Hg-sulfide minerals is not likely to be significant.

Conditions at several wells are mixed, meaning that there is evidence for multiple TEAPs in the same well.

The total organic carbon concentrations in the groundwater are generally less than 10 mg/L and often less than 5 mg/L, indicating that the amount of organic carbon, and therefore, the amount of more mobile methyl mercury, is expected to be low. This is supported by the fact that the reducing conditions are localized. ERCO collected samples in 2019 to confirm this expectation, as summarized below.

1.5.1 2019 Mercury State Data Collection

Although a significant amount of data exist to characterize total and dissolved mercury concentrations in groundwater, ERCO did not have data that defined the state of mercury in groundwater. Additional data were collected in March 2019 to fill this data gap, confirm the conclusions of the 2016 TEAP evaluation with respect to methyl mercury, and assist with the selection of remedial options.

On behalf of ERCO, GHD collected groundwater samples from groundwater monitoring wells V-18 and V-24 on March 7, 2019. The wells selected are located within the area of impacted groundwater containing greater than 2 µg/L dissolved mercury, as shown on Figure 1.3. The groundwater samples were collected using a peristaltic pump. TestAmerica of North Canton, Ohio analyzed the samples for methyl mercury, total mercury, and dissolved mercury. GHD attempted to collect a groundwater sample from a third well, located closer to the Wisconsin River (well V-32B), but the well was frozen at the time of groundwater sampling, so GHD was unable to collect a sample.



The laboratory analytical report is provided in Appendix B. As summarized in the laboratory analytical report, the data indicated:

- Sample W-190307-CA-01 from well V-18 contained 0.00132 µg/L methyl mercury, and sample W-190307-CA-02 from well V-24 contained 1.1 µg/L of methyl mercury. These concentrations are relatively low compared to the amount of total mercury detected in each sample.
- Sample W-190307-CA-01 from well V-18 contained 0.19 µg/L total mercury and no detectable dissolved mercury. Sample W-190307-CA-02 from well V-24 contained 240 µg/L total mercury and 210 µg/L dissolved mercury.
- Total and dissolved concentrations of mercury in the groundwater samples were comparable to concentrations detected in samples from these wells in 2018 and were similar to historic concentrations detected in groundwater samples from these wells.

Remedial strategies to immobilize or treat methyl mercury would be different from those targeting inorganic mercury. Since the methyl mercury concentrations in the samples from V-18 and V-24 comprises less than one percent of the mercury present in the samples, the remedial strategies considered in this RAOR will target the inorganic mercury present in groundwater in this area.

2. Remedial Action Options

2.1 Remedial Action Objectives

Remedial Action Objectives (RAOs) were developed based on the need to prevent mercury in groundwater from the Site from reaching the Wisconsin River. Specifically the objectives are to:

1. "(R)emove or immobilize residual mercury in the SPP area", as stated in DNR's January 24, 2019 letter to ERCO
2. Reduce mercury concentrations on Site to levels such that groundwater reaching the river would have a groundwater concentration less than 2 µg/L
3. Prevent future migration of mercury-impacted groundwater from the Site to the river or from the Site to deeper bedrock groundwater

2.2 Remedial Action Area

Figure 1.3 illustrates the estimated area where groundwater concentrations may exceed the NR 140 ES of 2 µg/L dissolved mercury. This area is approximated, and interpolates groundwater concentrations between wells based on groundwater flow direction and historic data. For the purpose of this RAOR, the proposed remedial action area is the approximately 20,000 square foot area shown on Figure 1.3 where mercury concentrations may be greater than 2 µg/L.

Also considered in this RAOR is the area between the estimated limit of the dissolved mercury plume and the Wisconsin River. Concentrations of dissolved mercury in groundwater in this area are less than the NR 140 ES of 2 µg/L, as evidenced by historic groundwater monitoring data for wells installed downgradient of the SPP and upgradient of the river. Although concentrations of mercury in groundwater in bedrock well V-32B (0.68 µg/L in June 2018) have been less than the ES of 2 µg/L, this deep bedrock well is located within 200 feet of the Wisconsin River.



2.3 Initial Screening of Remedial Action Options

GHD completed a review of multiple traditional remedial action options as well as innovative technologies as part of this RAOR. General response actions and remedial technologies potentially suitable for addressing high mercury concentrations on Site and preventing migration of mercury in groundwater to the Wisconsin River are summarized in Table 2.1 and include:

- No Action
- Institutional Controls
- Monitored Natural Attenuation (MNA)
- In Situ Removal Technologies:
 - In situ thermal desorption
 - Electrokinetic removal
 - In situ soil flushing
- Immobilization Technologies:
 - Containment
 - Chemical stabilization
 - Solidification
 - Vitrification
- Interception Technologies
 - Groundwater Extraction
 - Zero Valent Iron (ZVI) Permeable Reactive Barrier (PRB)
 - Greensand PRB
 - Activated Carbon PRB

The remedial technologies listed above and their process options were evaluated based on effectiveness, implementability, and relative cost. The technology screening is presented in Table 2.1. The retained technologies are highlighted in boldface in Table 2.1 and are discussed further, below. Where technologies were screened out based on one or more of effectiveness, implementability, and cost, Table 2.1 summarizes the rationale for not retaining them for further consideration.

2.4 Identification of Remedial Action Options

The retained technologies were assembled into a set of remedial action options that are intended to achieve the RAOs for the Site. The remedial action options retained for further consideration are summarized in Table 2.2 and include:

- Option 1 - No action (included for comparison only)
- Option 2 - Institutional Controls
- Option 3 - MNA



- Option 4 - Containment
- Option 5 – Chemical Stabilization
- Option 6 – Groundwater Extraction
- Option 7 – ZVI PRB

The following sections summarize the evaluation of each of the retained remedial options. A brief description of each technology, its advantages, its disadvantages, the estimated (preliminary conceptual) cost, and the probability of its success in achieving the RAOs are summarized in Table 2.2 and discussed further below.

2.4.1 Option 1 – No Action

The No Action option consists of no active remediation efforts, no engineering or institutional controls, and no long-term monitoring. Administrative activities may be required as part of the DNR long-term oversight responsibilities for the Site. This option serves as a baseline for comparison with other options and involves taking no action towards a remedy, implying no active management. The No Action option would not be expected to achieve the RAOs over time.

2.4.2 Option 2 – Institutional Controls

Institutional controls are already contemplated for this Site as part of the 1998 CMI. According to the report entitled “Groundwater Collection at the Saturator Purge Pit and Cell Room Soil and Sediment Removal East of Highway 73 Waste Layer Excavation” (CH2M Hill, 1999), the controls include filing a deed notification for the operating area identifying areas of residual environmental contamination in soil and groundwater that exceed NR 140 and NR 700 numerical standards. In addition, the CMI included plans to file a restriction on the deed preventing withdrawal of groundwater for potable use until such time concentrations of mercury in groundwater met applicable standards.

2.4.3 Option 3 – Monitored Natural Attenuation

MNA is a remedial approach that relies on natural subsurface mechanisms that are classified as either destructive or nondestructive. In certain circumstances, MNA can be sufficiently protective of human health and the environment. Destructive mechanisms are not applicable for mercury removal, however non-destructive mechanisms include sorption, dispersion, dilution, and volatilization. However, MNA has its inherent limitations and can be slow, making the time frame for completion relatively long. In order to support successful implementation of MNA at any given site, the United States Environmental Protection Agency (USEPA) recommends that the site be thoroughly characterized and scientific evidence provided to demonstrate that the degradation of the site contaminant is occurring at rates sufficient to be protective of human health and the environment. Three lines of evidence are needed per USEPA to support the occurrence of MNA for mercury at the Site:

- Documented reductions in mercury concentration at the field scale
- Hydrogeologic and geo-chemical analytical data demonstrating indirectly that natural attenuation processes are present at the Site that are adequate to reduce contaminant concentrations to required levels



- Site field data or microcosm studies that directly demonstrate a particular natural attenuation process

With respect to mercury contamination at this Site, MNA is subject to many uncontrollable natural processes and site conditions, which makes it slow and sometimes inadequate. Site conditions, such as redox potential, and pH could be manipulated to enhance MNA and speed up the precipitation rate for mercury at the Site.

As summarized in Table 2.2, MNA at the Site would consist of monitoring 13 monitoring wells twice per year for mercury and annual reporting on the progress of MNA.

MNA would be minimally disruptive to Site activities and would have a low cost; however, it would not achieve RAOs since this would not remove or immobilize mercury or prevent downgradient migration of mercury.

2.4.4 Option 4 – Containment – Downgradient Barrier Wall with Groundwater Extraction

A cut-off wall is a physical barrier that would prevent the impacted groundwater from reaching the river. The wall would be either constructed of soil-bentonite or cement-bentonite. Groundwater would be extracted from the upgradient side of the barrier in order to prevent groundwater from flowing over the wall. Extracted groundwater would be treated and then discharged.

Implementation of this remedy would involve the installation of a 350-foot slurry wall in the grassy area along Route 73. The wall would be installed to the top of bedrock which is estimated at 18 feet below ground surface (BGS) in this area. Two groundwater extraction wells (4-inch diameter polyvinylchloride [PVC]) would be installed along the wall. The wells would be screened at the top of the water table and would be operated at a rate which kept groundwater levels stable and below the top of the slurry wall. Based on previous issues with groundwater extraction at the Site, fouling of the extraction wells is likely to occur therefore the wells would need to be cleaned quarterly. Extracted groundwater would be treated using the existing on-Site treatment system prior to discharge.

This remedy would be effective for the control of groundwater migration through the overburden; however, this technology would not prevent potential migration of impacted groundwater through the bedrock.

2.4.5 Option 5 – Chemical Stabilization

Chemical stabilization of metals is the process of introducing a suitable reducing chemical reagent into the subsurface to precipitate metals as insoluble metal compounds, thereby preventing the continued migration of impacted groundwater. In the case of mercury the insoluble metal compound would be mercury sulfide. The mercury sulfides are stable because they undergo geochemical fixation onto the aquifer matrix (i.e., soil). Reagents such as sodium sulfide, calcium polysulfide, and sodium bisulfite can be used for the chemical reduction of metals. For mercury, chemical stabilization is based on the injection of a reducing agent into the aquifer in order to promote the precipitation of soluble mercury and converting it into a stable compound, such as mercuric sulfide.

Assuming that this remedy is implemented over the approximate 20,000-square-foot area where mercury concentrations exceed 2 µg/L, implementation of this remedy would include the installation



of approximately 40 injection wells (2-inch diameter PVC) in the treatment area. The treatment area is in a very active area within the plant and therefore the injection wells would need to be installed where space is available. Installation of the injection wells would involve cutting through the concrete which covers the treatment area and repair of the concrete after well installation. For some areas that are inaccessible due to Site activities, angled or directional drilling may be used to install wells. The wells would be screened in the overburden within the sand and silt zones. A solution containing 5% sodium sulfide would be injected into each well once per year for 2 years. Monitoring would be performed annually, at a minimum, to assess the performance of the injections.

A phased approach would be appropriate for this remedy prior to attempting to install 40 injection points over a large area. The phased approach would start with the areas with the highest concentrations of mercury, allowing for evaluation and adjustment.

This remedy would be effective for the precipitation of dissolved mercury and for the stabilization of elemental mercury such that it would not dissolve in the groundwater. The mercury sulfide produced from this reaction is stable and the reaction is not reversible under the range of expected groundwater conditions. Precipitation of the mercury out of the groundwater would mean that further migration of groundwater that contains mercury into the bedrock would not occur. Therefore if the SPP area is the source of the mercury found in a bedrock well near the river (i.e., V-32B), the source of this mercury would be removed and concentrations along the river would eventually reduce. Moreover the sulfide reagent would be injected into the high mercury (SPP) area and is expected to move into any fractures or flow paths within the bedrock which permitted the migration of groundwater originally. As summarized in Section 1.4, Figure 1.4 illustrates that the silt, which overlies the weathered bedrock, is very thin in the vicinity of the source area near V-24 and V-25. Injecting the amendment in the area near V-24/V-25 should allow the amendment to follow the same groundwater transport pathway taken by the dissolved mercury. Therefore it is possible that dissolved mercury already present in the bedrock would also be treated and immobilized.

Since the amount of elemental mercury present in the treatment area is not known, the dose of sodium sulfide that will be required to stabilize the mercury is also unknown at this time. It is possible that several injection events will be required to treat all the mercury that is present.

2.4.6 Option 6 –Groundwater Extraction

Groundwater extraction is the most widely used technology for treatment of contaminated groundwater. It can also help to provide hydraulic containment of contaminated groundwater and prevent off-site migration of contaminants. This technology involves groundwater removal using one or a series of extraction wells to contain migration of contaminated groundwater. A pump and treat system allows a cone or cones of depression to form around the pumping well to assist in the recovery of dissolved phase contaminants. The recovered water is treated prior to discharge.

Groundwater extraction is a remedy that has been applied previously at the Site but was discontinued due to continued fouling of the extraction well, as well as health and safety risks associated with acid cleaning of the well in an area of caustic material storage. The space in the treatment area is highly utilized therefore there would not be room to install a trench for groundwater extraction and groundwater extraction would need to be performed using wells. The groundwater extraction wells would be moved south to the downgradient end of the plume in an attempt to avoid excessive fouling and undue maintenance costs.



Implementation of this technology at the Site would include installation of three groundwater extraction wells at the downgradient edge of the plume. Fouling of the extraction wells is likely to occur therefore the wells would be cleaned quarterly. Extracted groundwater would be treated using the existing on-Site treatment system prior to discharge.

This technology would be effective for maintaining hydraulic control of the impacted groundwater and preventing further downgradient migration through the overburden. It may also achieve sufficient hydraulic control that any migration through the bedrock would also cease; however, since bedrock pathways have not been determined, this is uncertain.

2.4.7 Option 7 – ZVI PRB

A PRB is a passive treatment that relies on the natural flow of groundwater to bring contaminants to the reactive media. It is a permanent structure, rarely relocated or modified. The barrier serves as a reactive zone to intercept and treat contaminated groundwater. Physical, chemical, and/or biological processes can be used as removal mechanisms for contaminants. When the contaminants make contact with the reactive media, chemical reactions take place to degrade or alter the contaminants and allow treated groundwater to pass through. In conventional trench-type PRB, the reactive medium must be more permeable than the surrounding soil matrix to ensure it is the preferred flow pathway. Hydraulic flow modeling is advisable to ensure that the barrier is not overtopped or bypassed. Inorganic compounds, such as soluble metal salts, can precipitate in the PRB. This precipitation may cause the barrier material to become less reactive, reduce the hydraulic conductivity, and result in clogging of the barrier or breakthrough of the plume. PRB can also consist of lines of wells for injection of the reactive media. Commonly used trench reactive media include zero valent iron (ZVI), zeolites, granular activated carbon (GAC), organic media, and proprietary substrates such as EHC[®], which is a mixture of iron and an organic substrate. A PRB is a passive treatment technology with very low operation and maintenance requirements; the major costs are the installation of the PRB and regeneration or replacement of the active medium when it becomes exhausted. ZVI PRBs have been shown to have a life of at least 20 years.

Implementation of this technology at the Site would involve the installation of a 350-foot wall consisting of 200 feet of slurry wall and 150 feet of ZVI gate in the grassy area along Route 73. The wall and PRB would be installed to the top of bedrock, which is estimated at 18 feet BGS in this area. The ZVI gate would be composed of 80 percent sand and 20 percent ZVI. Annual monitoring would be performed to ensure that the ZVI gate is functioning correctly.

This remedy would be effective for the interception and treatment of groundwater migrating through the overburden; however, this technology would not prevent potential migration of impacted groundwater through the bedrock.

2.5 Evaluation Criteria

The remedial action options described in Section 2.4 were evaluated using the following criteria in compliance with section NR 722.07 and section NR 722.09 Wis. Admin. Code.



2.5.1 Technical Feasibility

The technical feasibility of each remedial action option was evaluated using the following criteria: long-term effectiveness, short-term effectiveness, implementability, and remediation time frame. The definition of each criterion is provided below.

Long-term Effectiveness

This criterion evaluates the level of risk remaining after the remedial action is completed, and considers the degree to which the toxicity, mobility, and volume of contamination is expected to be reduced as well as the degree to which the remedial action option, if implemented, will protect public health, safety, and welfare of the environment over time.

Short-term Effectiveness

This criterion evaluates the level of risk associated with the construction and implementation period of a remedial action option, until case closure under chapter NR 726, Wis. Admin. Code.

Implementability

This criterion evaluates the feasibility of implementing a remedial action option, with consideration to the type of contaminants and water flow conditions present at the Site, the availability of materials, equipment, technologies and services, monitoring requirements, and the activities and time needed to obtain any necessary licenses, permits or approvals.

Restoration Time Frame

This criterion evaluates the expected time needed to achieve restoration, with consideration to the proximity of contamination to receptors, presence of sensitive receptors, presence of threatened or endangered species, current and potential use of the aquifer, the magnitude, mobility and toxicity of the contamination, geologic and hydrogeologic conditions, and the effectiveness, reliability and enforceability of continuing obligations.

2.5.2 Economic Feasibility

The economic feasibility of each remedial action option was evaluated in consideration of capital costs, initial costs (e.g., pre-design, design, and oversight), operation and maintenance costs, total present worth of the costs, and the costs associated with potential future liability.



2.6 Evaluation of Remedial Action Options

The following tables show the expected performance of each remedial action option in relation to the technical and economic feasibility criteria defined in Section 2.5.

Remedial Action Option	Technical Feasibility Criteria			
	Long-Term Effectiveness	Short-Term Effectiveness	Implementability	Restoration Time Frame
Option 1 – No Action	None	None	None	None
Option 2 – Institutional Controls	Moderate	Low	High	Long
Option 3 – MNA	Moderate	Low	High	Long
Option 4 – Downgradient barrier wall with groundwater extraction	Low	Low	Moderate	Long
Option 5 -Chemical Stabilization	High	High	Moderate	Short
Option 6 - Groundwater Extraction	Moderate	Moderate	Moderate	Long
Option 7 - ZVI Barrier	Moderate	Moderate	Moderate	Long

Remedial Action Option	Economic Feasibility Criteria				
	Capital Costs	Initial Costs	Annual Operation and Maintenance Costs	Total Present Worth of Costs	Costs Associated with Potential Future Liability
Option 1 – No Action	None	None	None	None	High
Option 2 – Institutional Controls	None	None	None	None	High
Option 3 – MNA	Low	Low	Moderate	Moderate	High
Option 4 – Downgradient barrier wall with groundwater extraction	High	High	Moderate	Moderate	High
Option 5 - Chemical Stabilization	Moderate	Moderate	Low	Low	Moderate
Option 6 - Groundwater Extraction	Low	Low	Moderate-High	Moderate-High	Moderate
Option 7 - ZVI Barrier	Low	Low	Low	Low	High



3. Selected Remedial Action

Based on the evaluation presented in Section 2.6, Option 5, Chemical Stabilization is the proposed remedy for the remedial action in the source area. Chemical stabilization is anticipated to be the most effective remedy that can best meet the RAOs.

3.1 Proposed Schedule

The design and construction of the remedy is expected to take approximately 10 to 16 months as follows:

	Estimated Duration
Remedial Design Report ⁽¹⁾	4 months
Construction ⁽²⁾⁽³⁾⁽⁴⁾	6 to 12 months
Total	10 to 16 months
Notes:	
(1) Design Report will include detailed design discussion, plans, specifications, treatability studies, and engineering calculations. The design report is subject to Agency permits and approvals, as necessary.	
(2) Phased approach assumed, with first phase including approx. 9 injection wells.	
(3) Dependent on weather, permit requirements, and DNR approvals, as necessary.	
(4) Construction Certification Report would require 3 months from the substantial completion of the remedy.	

3.2 Cost Estimate

An estimate of the approximate total cost of implementing Option 5 is shown in the table below (provided as an estimate, costs will be re-assessed during the design).

	Estimated Cost 2019 Dollars
Capital Costs	\$700,000
Initial Costs (pre-design, design, oversight)	\$90,000
Total Present Worth of Costs	\$1,200,000

3.3 Sustainable Remedial Action

In accordance with section NR 722.09(2m), Wis. Admin. Code, the selected remedial action option was evaluated based on sustainable remediation action criteria as follows:

Total energy use and the potential to use renewable energy

The selected remedy will not significantly increase energy use at the Site. When energy use is required, ERCO will use renewable energy where/if possible.

Generation of air pollutants, including particulate matter and greenhouse gas emissions

The selected remedy will not generate significant air pollutants or greenhouse gas emissions.



Water use and impacts to water resources

The selected remedy will not significantly increase water use at the Site. Groundwater quality will improve as a result of the selected remedy.

The future land use and enhancement of ecosystems, including minimizing unnecessary soil and habitat disturbance and destruction

The selected remedy will not involve soil or habitat disturbance, and is expected to improve future land use and the ecosystem by stabilizing or reducing mercury concentrations in groundwater and downgradient of the SPP.

Reducing, reusing and recycling materials and wastes, including investigative or sampling wastes

A recycling program will be implemented during construction

Optimizing sustainable management practices during long-term care and stewardship

The selected remedy has a short remediation time frame and is anticipated to be the most acceptable remedy to the Wisconsin community

3.4 Financial Assurance

As requested by DNR, ERCO has reviewed the requirements of Chapters 289 and 291 of the Wisconsin Statutes with respect to proof of financial responsibility, and can provide a standard method of proof (e.g., bond, letter of credit, or other mechanism as defined by the Statutes) once the remedy is approved and the cost of the remedy is defined.



4. Certifications

"I, Shawn G. Horn, hereby certify that I am a registered professional engineer in the State of Wisconsin, registered in accordance with the requirements of ch. A-E 4, Wis. Adm. Code; that this document has been prepared in accordance with the Rules of Professional Conduct in ch. A-E 8, Wis. Adm. Code; and that, to the best of my knowledge, all 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."



Project Advisor, PE E-31044

Signature, Title, and P.E. Number



P.E. Stamp

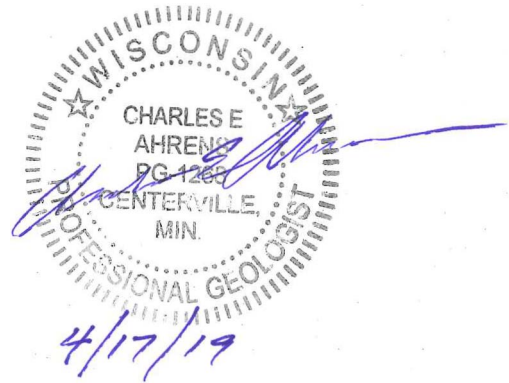


"I, Charles Ahrens, hereby certify that I am a hydrogeologist as that term is defined in s. NR 712.03 (1), Wis. Adm. Code, and that, to the best of my knowledge, all information contained in this document is correct and the documentation was prepared in compliance with all applicable requirements in chs. NR 700 to 726, Wis. Adm. Code."

A handwritten signature in blue ink, appearing to read "Charles Ahrens", written over a horizontal line.

Senior Geologist, PG #1268

Signature and Title



Date



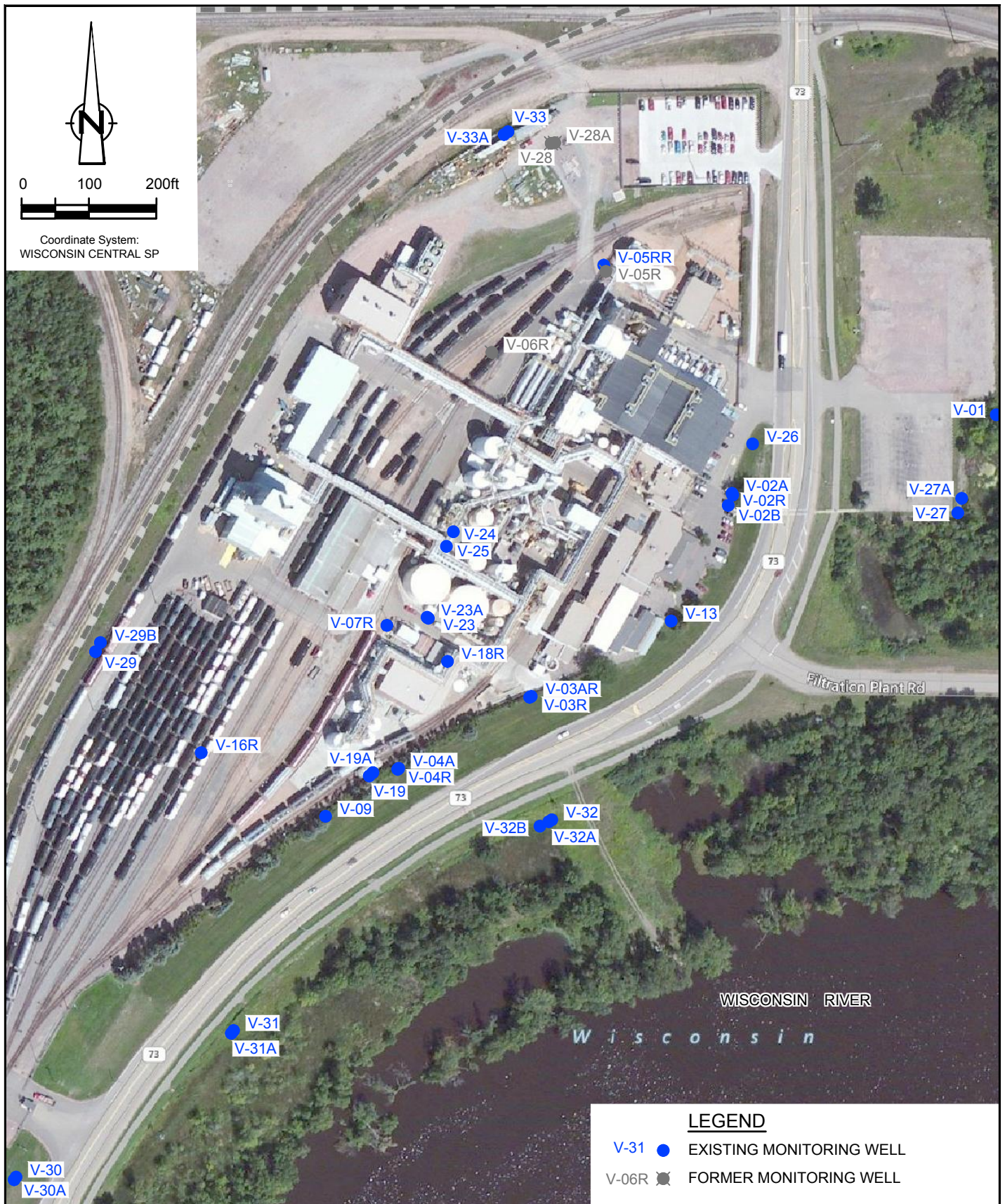
5. References

- AECOM, 2019. Annual Report Groundwater Monitoring Program January 1 to December 31, 2018. AECOM Project No. 60540204. March 2019.
- GHD, 2016. Geochemical Evaluation and Conceptual Groundwater Model for the Occurrence and Movement of Mercury in Groundwater, ERCO Worldwide (USA) Inc. November 22, 2016.



Apr 1, 2019

FIGURE 1.1



Source: Microsoft Product Screen Shot(s) Reprinted with permission from Microsoft Corporation, Acquisition Date August 2011, Accessed: 2016.



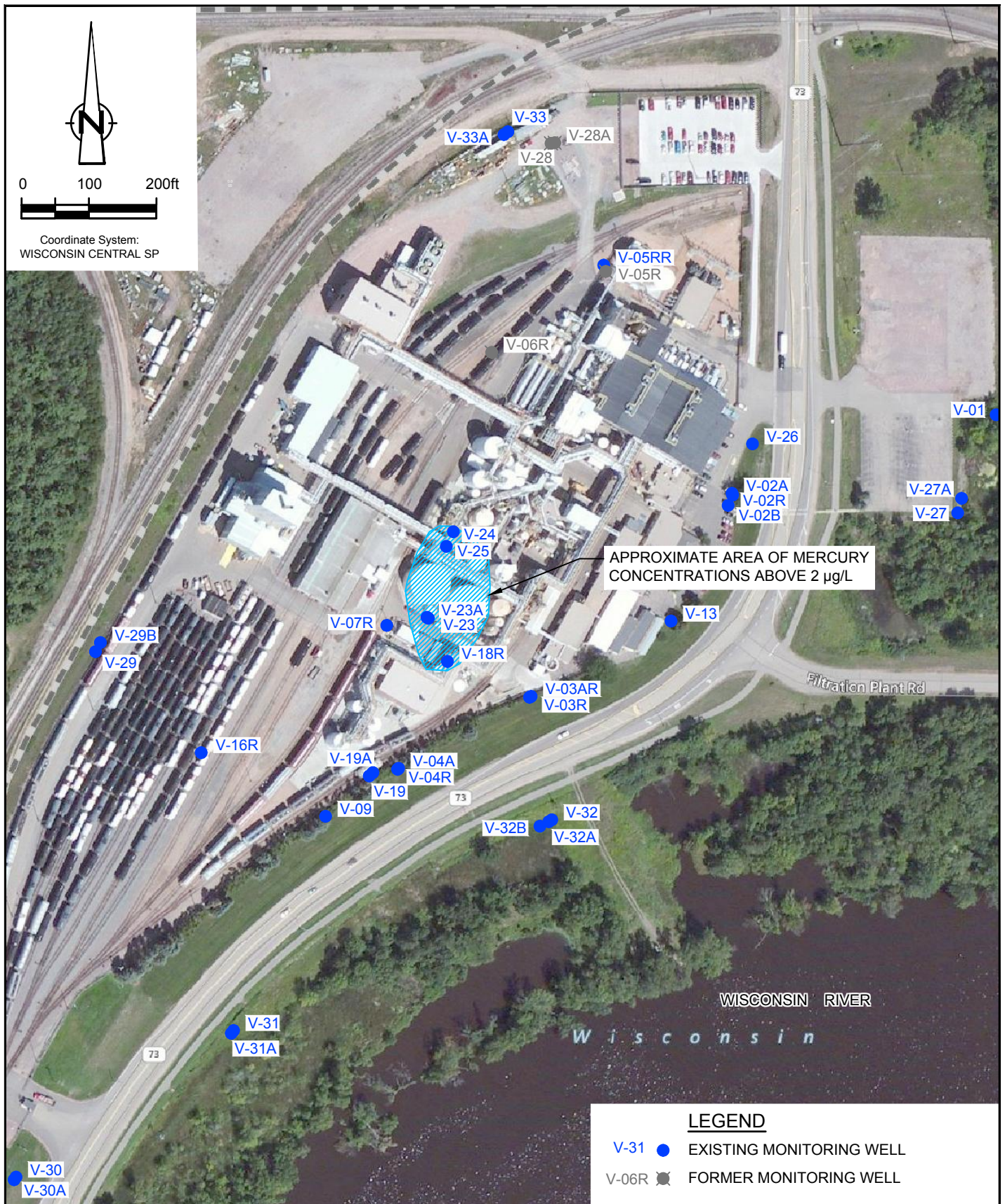
ERCO WORLDWIDE
PORT EDWARDS PLANT
NEKOOSA, WISCONSIN

SITE PLAN

11129197-00

Apr 4, 2019

FIGURE 1.2



Source: Microsoft Product Screen Shot(s) Reprinted with permission from Microsoft Corporation, Acquisition Date August 2011, Accessed: 2016.

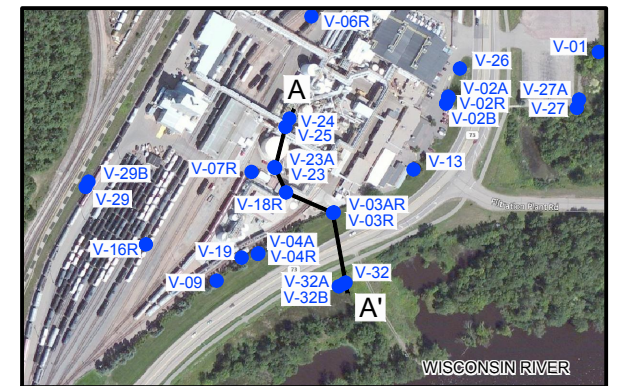
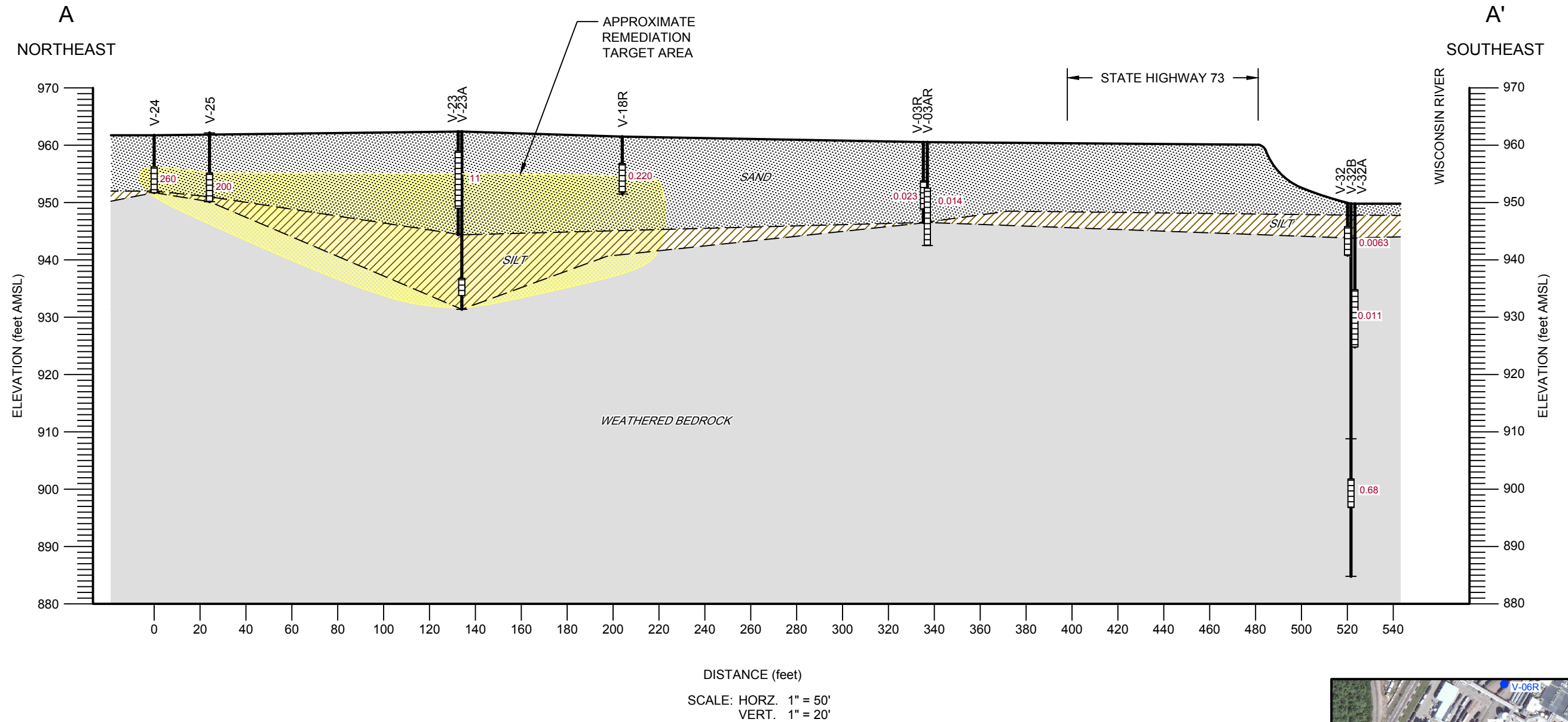


ERCO WORLDWIDE
PORT EDWARDS PLANT
NEKOOSA, WISCONSIN
APPROXIMATE AREA OF
MERCURY IMPACT IN GROUNDWATER

11129197-00

Apr 4, 2019

FIGURE 1.3



CROSS-SECTION LOCATION
SCALE: 1"=500'

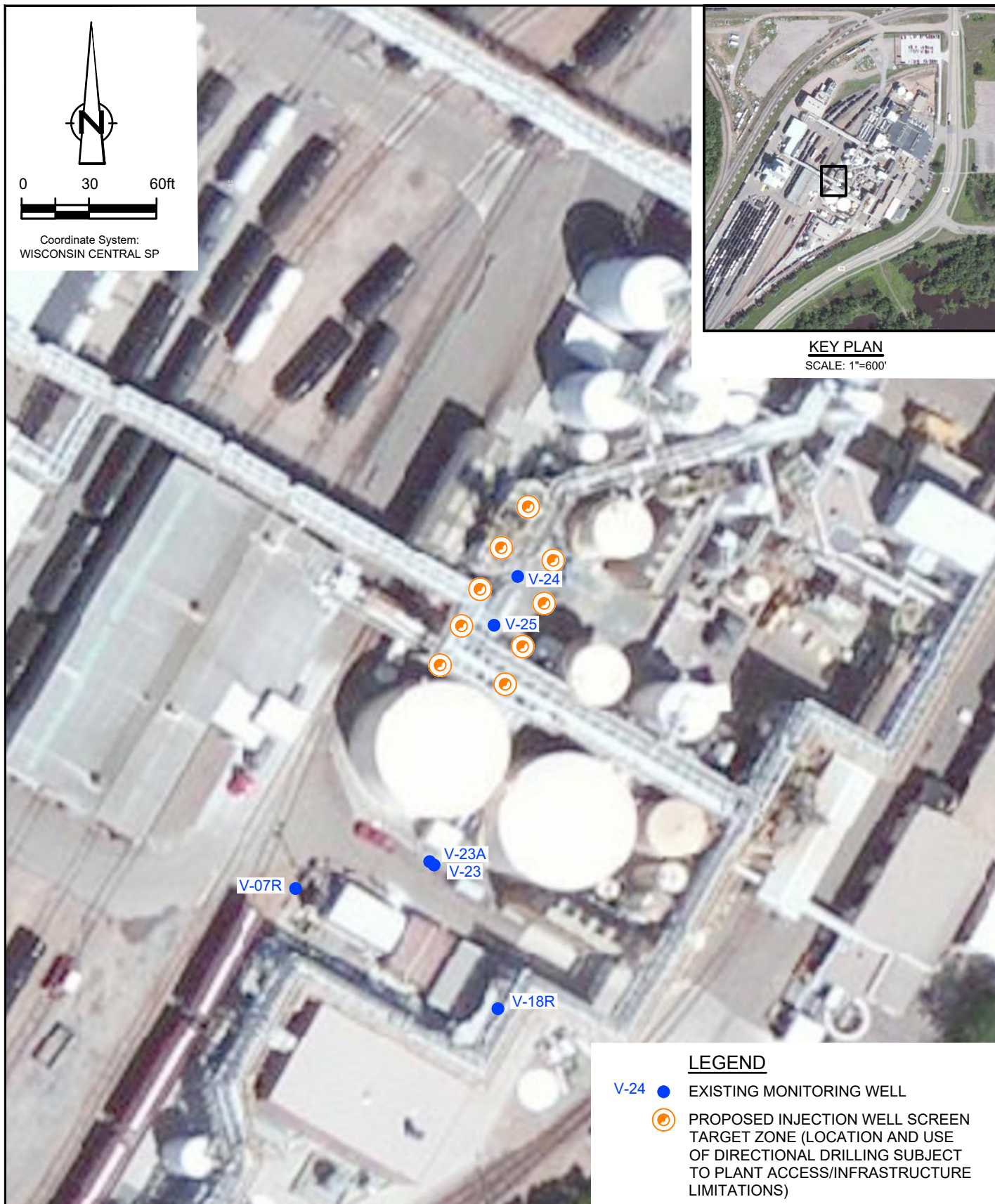


ERCO WORLDWIDE (USA)
101 STATE HIGHWAY 73 SOUTH
NEKOOSA, WISCONSIN 54457

CROSS SECTION A-A'

11129197-00
Apr 16, 2019

FIGURE 1.4



Source: Microsoft Product Screen Shot(s) Reprinted with permission from Microsoft Corporation, Acquisition Date August 2011, Accessed: 2016.



ERCO WORLDWIDE
PORT EDWARDS PLANT
NEKOOSA, WISCONSIN
CHEMICAL STABILIZATION
PHASE I INJECTION WELL LOCATIONS

11129197-00

Apr 15, 2019

FIGURE 3.1

Table 2.1

Initial Screening of Technologies and Process Options for Mercury-Impacted Groundwater
ERCO Worldwide (USA) Inc.
Port Edwards Plant
Nekoosa, Wisconsin

General Response Action	Remedial Technology	Process Option	Description	Effectiveness	Implementability	Cost	Retained (Yes/No) and Rationale for Not Retaining
No Action	Not applicable (NA)	NA	No actions are taken	N/A	N/A	none	No - not protective of the environment or acceptable to the regulator
Institutional Controls	Access Restrictions	Deed Restrictions	Deeds for property in the area of influence would include restrictions on property / groundwater use.	Moderate	Moderate	Low	Yes - possible option if plume stability can be demonstrated
	Monitoring	Groundwater Monitoring	Ongoing monitoring of wells.	Moderate	Easy	Low	Yes - possible option if plume stability can be demonstrated
Monitored Natural Attenuation (MNA)	MNA	MNA	Monitor wells to track natural decreases in contaminant concentrations that occur with time. Organic contaminants are allowed to naturally attenuate via biodegradation, dispersion, dilution, or adsorption	Low	Easy	Low	Yes - possible option if plume stability can be demonstrated
In Situ Removal	In situ thermal desorption	In situ thermal desorption	Heating of soil and groundwater to volatilize mercury with extraction of vapors and condensation of the mercury into liquid elemental mercury	Low - only effective for elemental Hg	Moderate -Difficult	High	No - only effective for elemental mercury and much of the mercury at the Site is in the dissolved form
	Electrokinetic Removal	Electrokinetic Removal	Use of a low intensity between a cathode and an anode embedded in the subsurface. Hg 2+ ions would move towards the cathode and would be extracted in this location.	Low – Would be effective only for charged mercury ions and is inhibited by the presence of elemental mercury	Difficult - a close spacing between electrodes may be required necessitating multiple extraction locations	High	No - this is not a well established technology and would be inhibited by the presence of elemental mercury
	In situ soil flushing	In situ soil flushing	Extraction of mercury from soil using a washing solution such as organic or inorganic acids to mobilize the mercury out of the soil. Mobilized mercury is extracted via a groundwater extraction system	Low- potential to mobilize a fairly stable mercury plume	Difficult - it may be difficult to achieve full hydraulic control of the mobilized mercury	High	No - too much risk of mobilizing a fairly stable mercury plume
Immobilization Technologies	Containment	Slurry Wall	The impacted area is surrounded with a slurry wall so that the groundwater is not able to migrate	Moderate – Risk associated with migration is removed, however mercury impacts remain	Moderate	Moderate	Yes - a viable technology for control of groundwater migration
	Chemical Stabilization	Injection of sulfur compound	Sulfur-containing compounds are injected to react with mercury in the groundwater and precipitate it as an insoluble mercury sulfide. Elemental mercury can also form a sulfide.	High - mercury is irreversibly precipitated	Moderate	Low – Moderate	Yes - effective for the removal of mercury from groundwater
	Solidification	Soil mixing with materials to encapsulate mercury	Solidification agents such as Portland cement, sulfur compounds or sulfur containing polymers are mixed into the soil to encapsulate the mercury	High - mercury is immobilized	Difficult - no access for soil mixing in the impacted area	High	No - no access for soil mixing in the impacted area
	Vitrification	Vitrification	Soils are heated to a melting point and then cooled to form a solidified, chemically inert mass with contaminants immobilized within	High - mercury is immobilized	Difficult - presence of below ground infrastructure in the impacted area	High	No - no access for soil heating in the impacted area
Interception Technologies	Groundwater Extraction	Groundwater Extraction at downgradient edge of the plume	Groundwater would be extracted at the downgradient edge of the plume to prevent it from migrating	Moderate - risk of pulling the contaminant downgradient if pumping rate is not carefully controlled	Moderate	High - would need to be performed for a long period of time	Yes - a viable technology for control of groundwater migration
	Permeable Reactive Barrier	Zero Valent Iron (ZVI) Barrier	Mercury would be removed from groundwater as it passes through a ZVI barrier placed at the downgradient edge of the plume. The barrier would ensure that mercury does not migrate downgradient	Moderate - migration of mercury would not occur, however mercury would remain in the source area	Moderate-Difficult - a trench would be required	Moderate-High	Yes - a viable technology for control of groundwater migration
		Greensand barrier	Mercury would be removed from groundwater as it passes through a greensand barrier placed at the downgradient edge of the plume. The barrier would ensure that mercury does not migrate downgradient	Moderate - Low - greensand barrier is not expected to be as effective as ZVI, mercury would remain in the source area	Moderate-Difficult - a trench would be required	Moderate-High	No - this PRB would not be as effective or long lasting as a ZVI PRB
		Activated Carbon Barrier	Mercury would be removed from groundwater as it passes through an activated carbon barrier placed at the downgradient edge of the plume. The barrier would ensure that mercury does not migrate downgradient	Moderate - migration of mercury would not occur, however mercury would remain in the source area	Moderate-Difficult - a trench would be required	Moderate-High	No - this PRB would not be as effective or long lasting as a ZVI PRB

Notes:

Bold typeface indicates a technology or process option that was incorporated in the development of alternatives. Effectiveness and cost scales defined as low, medium and, high.
Implementability scale defined as easy, moderate, and difficult.
Hg - mercury
N/A - not applicable

Table 2.2 Remedial Options Summary ERCO Worldwide (USA) Inc. Port Edwards Plant Nekoosa, Wisconsin							
Technology	Description	Treatment Duration	Advantages	Disadvantages	Assumptions	Cost	Probability of Success (H, M, L)
Institutional Controls				Already addressed by 1998 CMI			
Monitored Natural Attenuation (MNA)	Groundwater monitoring would continue while natural processes cause the mercury concentration to decrease over time	Long term	- Minimal disruption of site activities - Low cost	Downgradient migration may occur	- Monitoring of up to 6 wells quarterly, 12 wells annually 10 years of O&M assumed for cost purposes	\$1.1 million	L
Downgradient Barrier Wall with Groundwater Extraction	A slurry wall would be installed downgradient of the source area to protect the river. Extraction of groundwater would be performed upgradient of the wall to prevent groundwater from overtopping the wall	Long term	- Would prevent migration of impacted groundwater through the overburden zone - Less groundwater extraction would be required than with groundwater extraction as a stand alone remedy	- Migration of impacted groundwater may still occur through the bedrock - Extracted groundwater would need to be treated prior to discharge - Extraction wells would be subject to fouling	- A 350 foot long slurry wall would be installed in the grassy area along Route 73 - The wall would be installed to bedrock (estimated 18 feet) 2 groundwater extraction wells would be installed along the length of the wall - Extraction wells would be cleaned quarterly - Extracted groundwater would be treated using an on site treatment system (existing) prior to discharge 10 years of O&M assumed for cost purposes	\$2.1 million	L
Chemical Stabilization	An aqueous solution of sodium sulfide would be injected into overburden injection wells in the area where mercury concentrations exceed 2 µg/L. The sodium sulfide would cause mercury to precipitate as mercury sulfide	2-3 years	- Would be effective for the treatment of elemental Hg as well as dissolved Hg - Aqueous reagent can be injected using injection wells with minimal disruption to plant activities - pH in the high concentration area is already high therefore there would be no negative effective of adding sodium sulfide which can cause transient high pH - Can be implemented in phased approach	Amount of mercury in the treatment area is not known therefore more sodium sulfide injections may be required than initially planned	- A treatability and pilot study would be performed prior to full scale application - Area where Hg > 2 µg/L would be treated 40 injection wells would be installed in the treatment area - Wells would be installed and screened in the sand and silt zones - A solution containing 5% sodium sulfide would be injected into each well once per year for 2 years - Monitoring would be performed annually to assess the success of the injections	\$1.2 million	H

Table 2.2 Remedial Options Summary ERCO Worldwide (USA) Inc. Port Edwards Plant Nekoosa, Wisconsin							
Technology	Description	Treatment Duration	Advantages	Disadvantages	Assumptions	Cost	Probability of Success (H, M, L)
Groundwater Extraction	Groundwater extraction would be performed at the downgradient edge of the plume to prevent migration	Long term	• Would prevent migration of impacted groundwater through the overburden zone • May prevent impacted groundwater from flowing downwards into the bedrock	• There is no space for a trench in the area of highest mercury concentrations (in area of active plant), therefore extraction would need to be performed using wells which would be subject to fouling • Extracted groundwater would need to be treated prior to discharge	• 3 groundwater extraction wells would be installed at the downgradient end of the plume • Extraction wells would be cleaned quarterly • Extracted groundwater would be treated using an existing on site treatment system prior to discharge • 10 years of O&M is assumed for cost purposes	\$2.7 million	M
ZVI Barrier	A slurry wall would be installed downgradient of the source area to protect the river. The slurry wall would have a ZVI gate which would remove mercury from groundwater as it moves through the gate	Long term	• Would prevent migration of impacted groundwater through the overburden zone • Groundwater extraction would not be required • ZVI barrier would be expected to last more than 20 years	• Migration of impacted groundwater may still occur through the bedrock	• A 350 foot wall consisting of 200 feet of slurry wall and 150 feet of ZVI gate would be installed in the grassy area along route 73 • The wall would be installed to bedrock (estimated 18 feet) • The ZVI gate would consist of 80% sand and 20% ZVI • Annual monitoring would be performed to ensure that the ZVI gate is functioning correctly • 10 years of O&M is assumed for cost purposes	\$1.7 million	L
Notes:							
H	- High						
M	- Moderate						
L	- Low						
ZVI	-Zero Valent Iron						

Appendices

Appendix A
Excerpts from "Annual Report Groundwater Monitoring
Program January 1 to December 31, 2018"
(AECOM, 2019)

P:\60540204\900 Work\920 GIS\Figures\January 2019\60288144 Figure 4 JUNE SAND AQUIFER GROUNDWATER.mxd Tuesday, March 19, 2019 - 3:26:28 PM

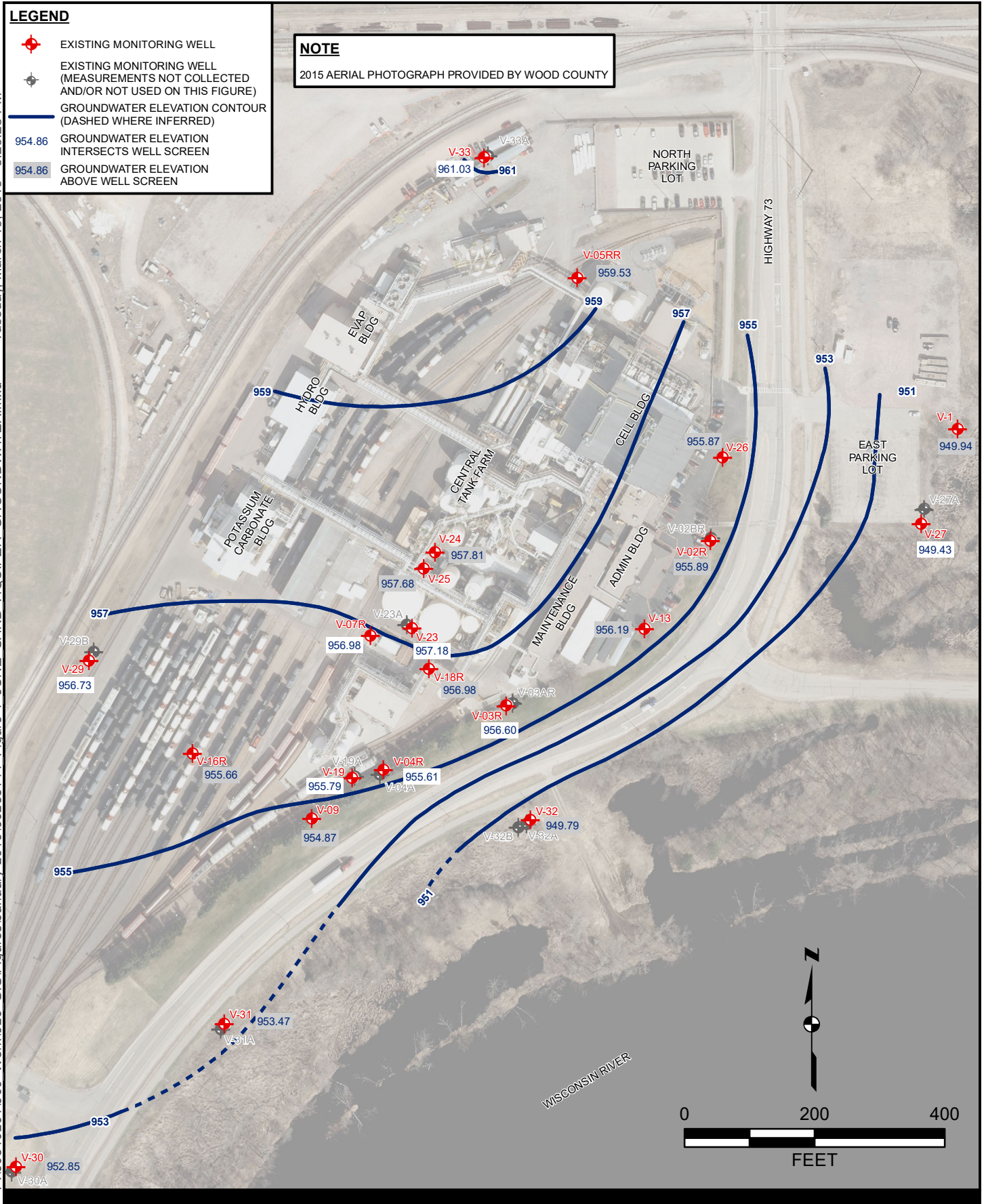
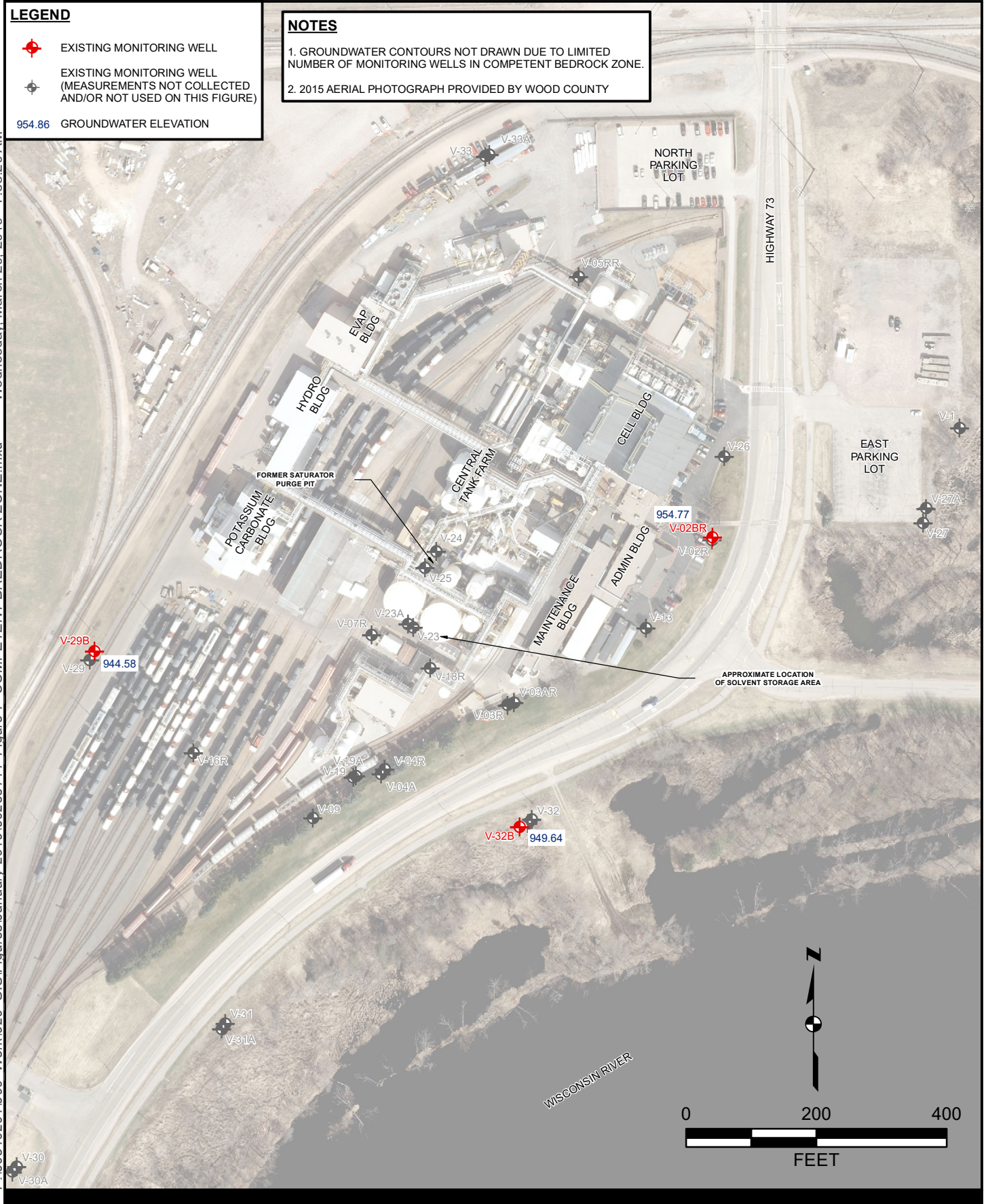


FIGURE 4
GROUNDWATER ELEVATION CONTOUR MAP
SAND AQUIFER - JUNE 2018
ERCO WORLDWIDE
Project No.: 60540204 Date: MARCH 2019

P:\60540204\1900 Work\1920 GIS\Figures\January 2019\160288144 Figure 7 COMPETENT BEDROCK ZONE.mxd Wednesday, March 20, 2019 - 7:38:20 AM



LEGEND

EXISTING MONITORING WELL

EXISTING MONITORING WELL
(MEASUREMENTS NOT COLLECTED
AND/OR NOT USED ON THIS FIGURE)

954.86 GROUNDWATER ELEVATION

NOTES

1. GROUNDWATER CONTOURS NOT DRAWN DUE TO LIMITED
NUMBER OF MONITORING WELLS IN COMPETENT BEDROCK ZONE.

2. 2015 AERIAL PHOTOGRAPH PROVIDED BY WOOD COUNTY

FIGURE 7
GROUNDWATER ELEVATION MAP
COMPETENT BEDROCK ZONE - JUNE 2018
ERCO WORLDWIDE
Project No.: 60540204 Date: MARCH 2019



P:\60540204\900 Work\920 GIS\Figures\January 2019\60288144 Figure 10 SAND AQUIFER MERCURY.mxd Tuesday, March 19, 2019 - 3:38:13 PM

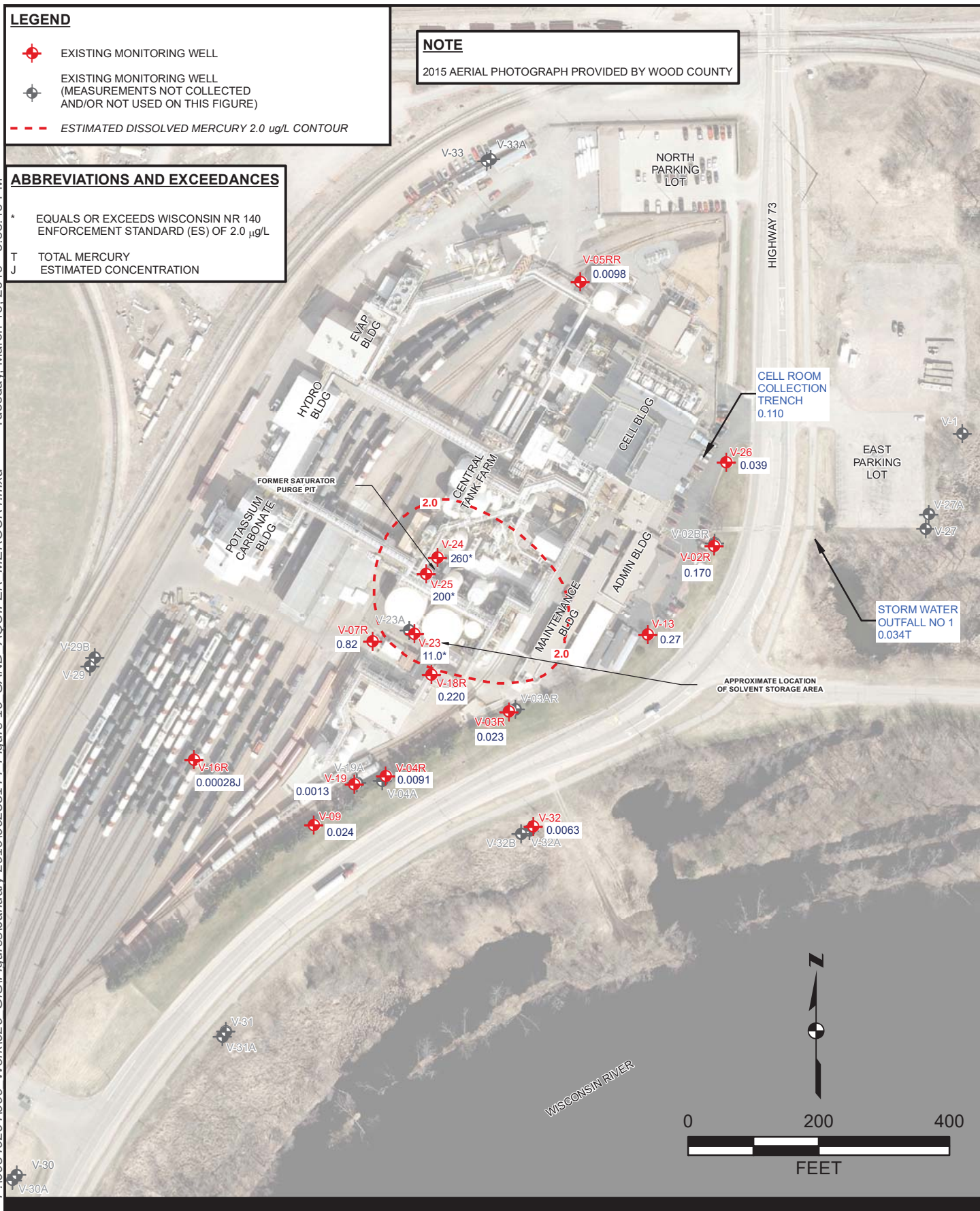


FIGURE 10
DISSOLVED MERCURY CONCENTRATIONS ($\mu\text{g/L}$)
IN SAND AQUIFER - JUNE 2018
ERCO WORLDWIDE
Project No.: 60540204 Date: MARCH 2019

P:\60540204\1900 - Work\920 - GIS\Figures\January 2019\60288144 - Figure 11 - BEDROCK AQUIFER MERCURY.mxd Wednesday, January 02, 2019 - 3:11:50 PM

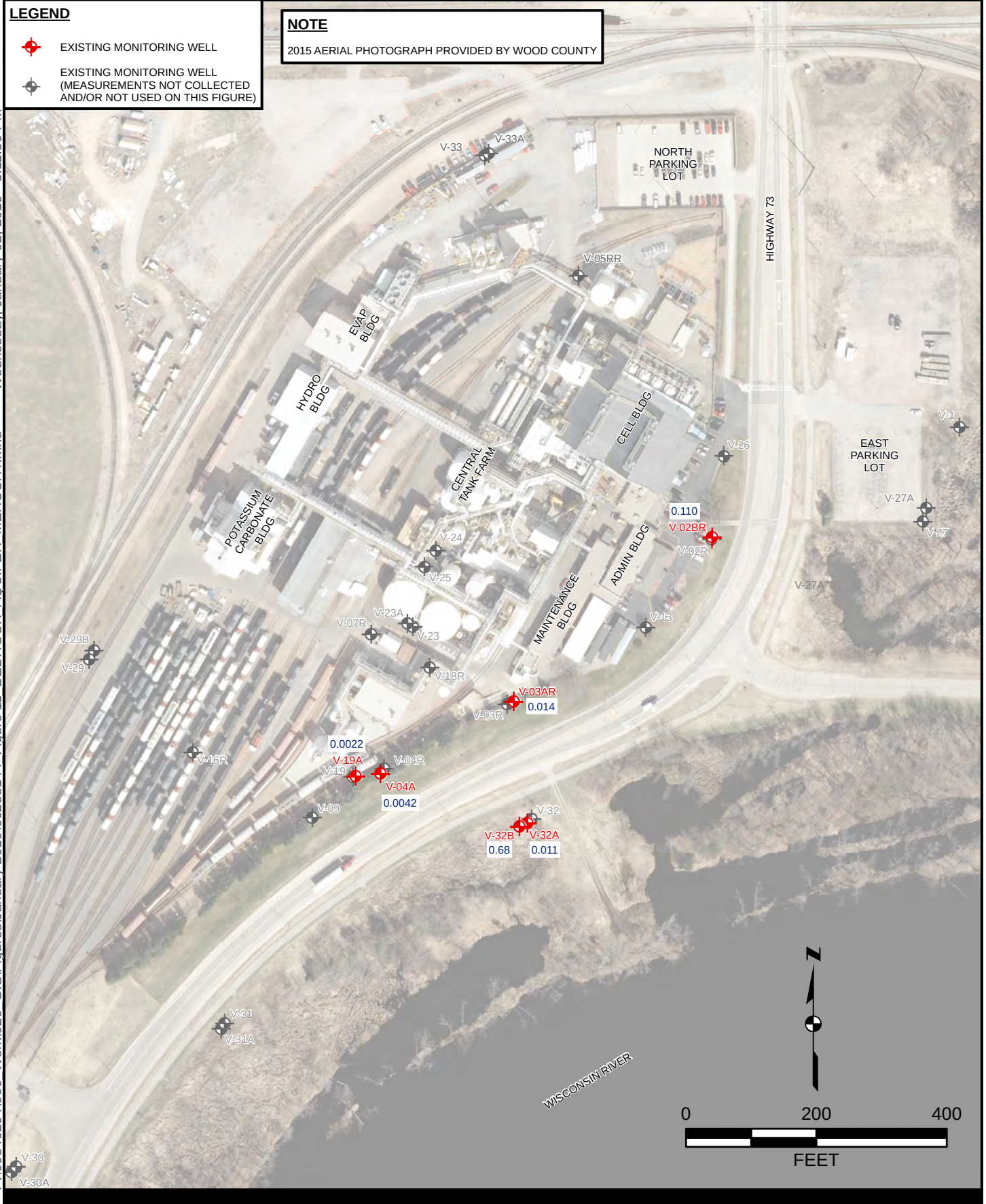


FIGURE 11
DISSOLVED MERCURY CONCENTRATIONS ($\mu\text{g/L}$)
IN WEATHERED BEDROCK - CLAY/COMPETENT
BEDROCK ZONE - JUNE 2018
ERCO WORLDWIDE
Project No.: 60540204 Date: JANUARY 2019

P:\60540204\1900 Work\920 GIS\Figures\January 2019\60288144 Figure 15 BEDROCK JUNE14 pH.mxd Wednesday, January 02, 2019 - 4:05:30 PM

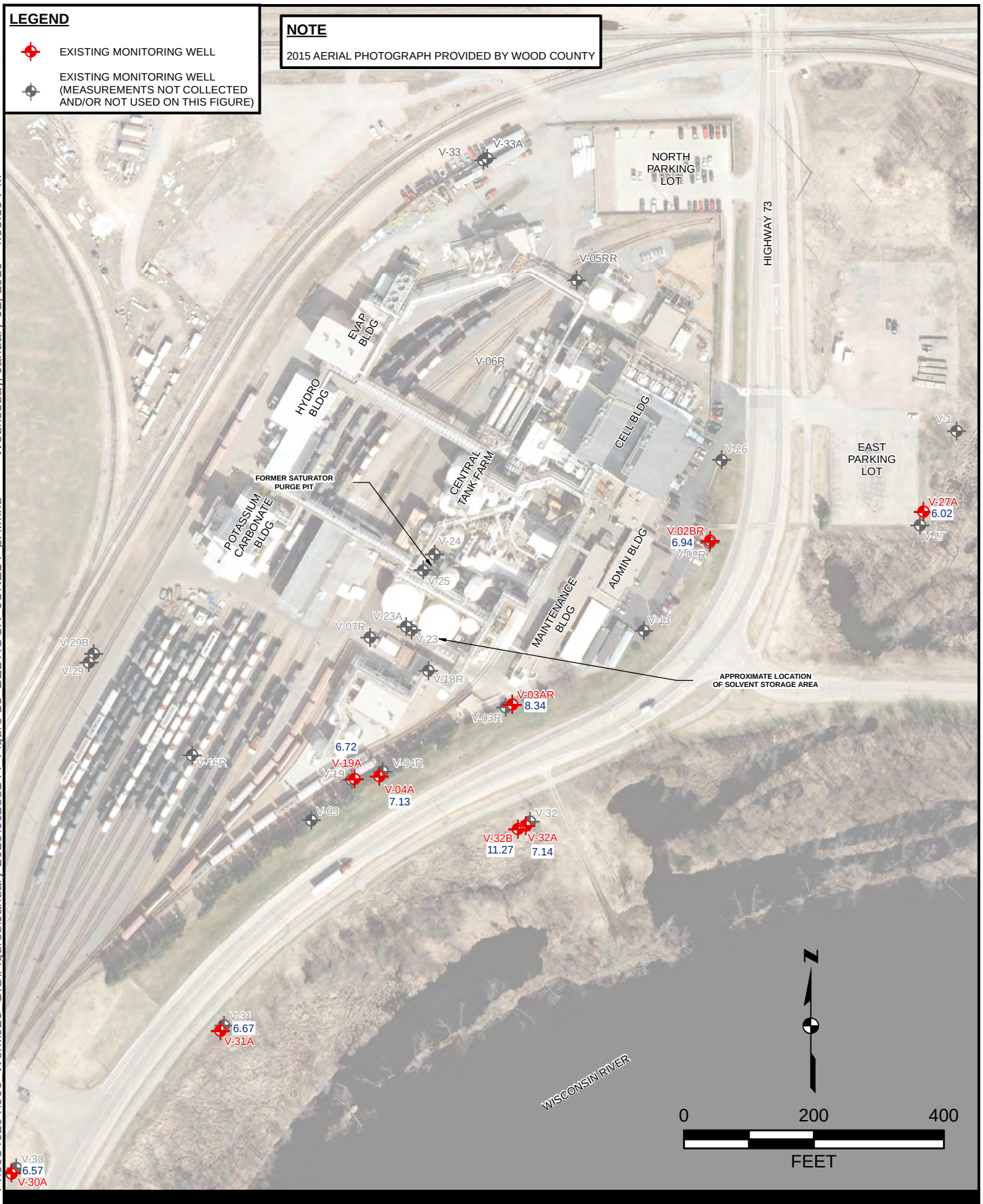


FIGURE 15
pH MAP FOR
WEATHERED BEDROCK - CLAY/COMPETENT
BEDROCK ZONE - JUNE 2018
ERCO WORLDWIDE
Project No.: 60540204 Date: JANUARY 2019

P:\60540204\1900 Work\920 GIS\Figures\January 2019\60288144 Figure 16 VERTICAL HYDRAULIC GRADIENTS.mxd Wednesday, January 02, 2019 - 4:12:19 PM

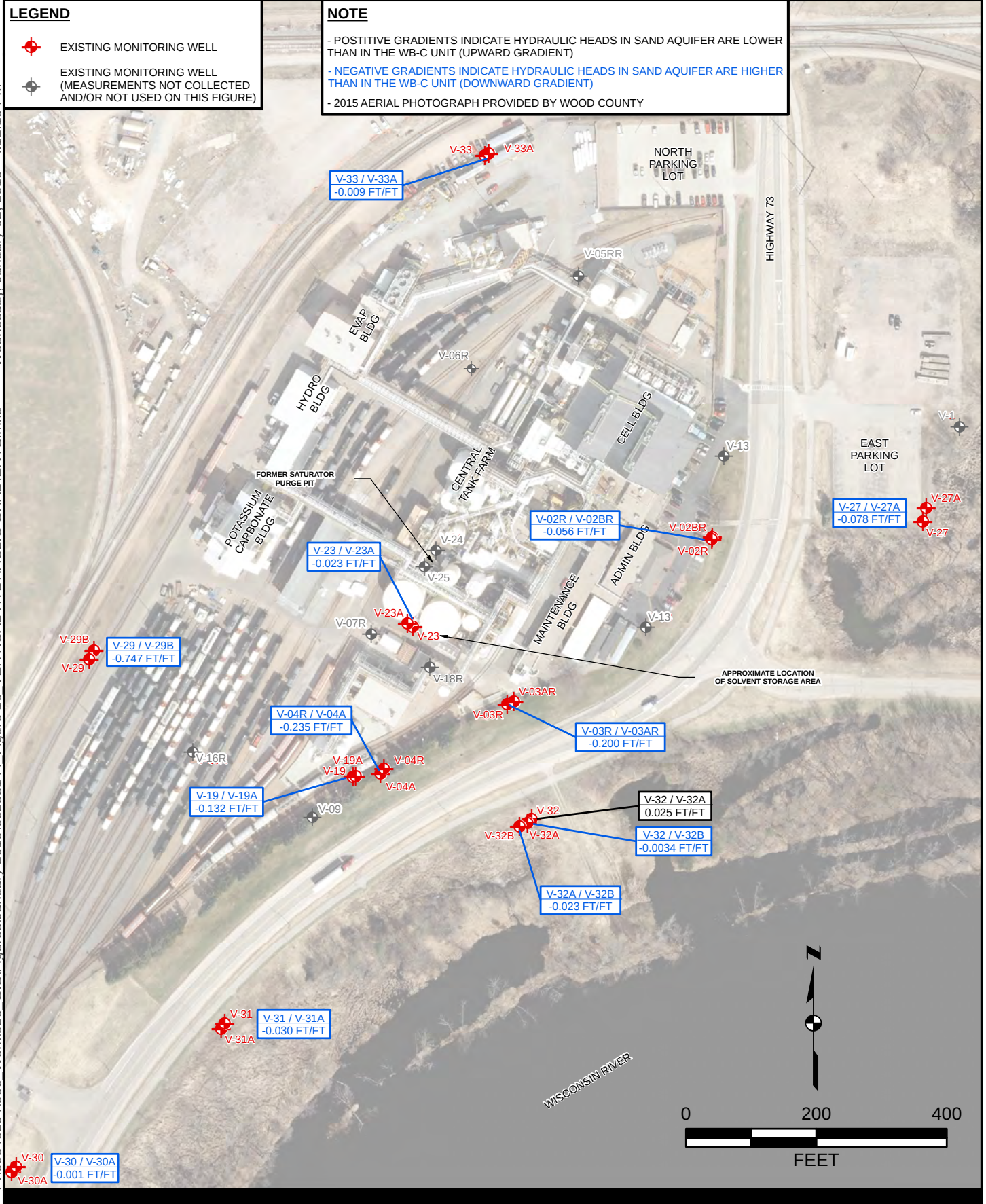


FIGURE 16
VERTICAL HYDRAULIC GRADIENTS - JUNE 2018
ERCO WORLDWIDE

AECOM

Appendix B

March 2019 Analytical Data

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Canton

4101 Shuffel Street NW

North Canton, OH 44720

Tel: (330)497-9396

TestAmerica Job ID: 240-109226-1

Client Project/Site: 11129197, ERCO

For:

GHD Services Inc.

2055 Niagara Falls Blvd., Suite 3

Niagara Falls, New York 14304

Attn: Mr. Don Pope



Authorized for release by:

3/18/2019 3:22:33 PM

Denise Heckler, Project Manager II

(330)966-9477

denise.heckler@testamericainc.com

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Definitions/Glossary

Client: GHD Services Inc.
Project/Site: 11129197, ERCO

TestAmerica Job ID: 240-109226-1

Qualifiers

GC Semi VOA

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
U	Indicates the analyte was analyzed for but not detected.

Metals

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
U	Indicates the analyte was analyzed for but not detected.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Case Narrative

Client: GHD Services Inc.
Project/Site: 11129197, ERCO

TestAmerica Job ID: 240-109226-1

Job ID: 240-109226-1

Laboratory: TestAmerica Canton

Narrative

Job Narrative
240-109226-1

Comments

No additional comments.

Receipt

The samples were received on 3/12/2019 9:45 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 2.0° C.

Metals

Method(s) 1630: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 240-371561 and analytical batch 240-371578.

Method(s) 1630: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 240-371930 and analytical batch 240-371937.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Method Summary

Client: GHD Services Inc.
Project/Site: 11129197, ERCO

TestAmerica Job ID: 240-109226-1

Method	Method Description	Protocol	Laboratory
1630	Methyl Mercury (GC)	EPA	TAL CAN
7470A	Mercury (CVAA)	SW846	TAL CAN
1630	Preparation, Methyl Mercury	EPA	TAL CAN
7470A	Preparation, Mercury	SW846	TAL CAN

Protocol References:

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL CAN = TestAmerica Canton, 4101 Shuffel Street NW, North Canton, OH 44720, TEL (330)497-9396

Sample Summary

Client: GHD Services Inc.
Project/Site: 11129197, ERCO

TestAmerica Job ID: 240-109226-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
240-109226-1	W-190307-CA-01	Water	03/07/19 13:35	03/12/19 09:45
240-109226-2	W-190307-CA-02	Water	03/07/19 14:00	03/12/19 09:45

Detection Summary

Client: GHD Services Inc.
Project/Site: 11129197, ERCO

TestAmerica Job ID: 240-109226-1

Client Sample ID: W-190307-CA-01

Lab Sample ID: 240-109226-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Methyl Mercury	1.2	B	0.50	0.18	ng/L	10		1630	Total/NA
Mercury	0.19	J	0.20	0.13	ug/L	1		7470A	Total/NA

Client Sample ID: W-190307-CA-02

Lab Sample ID: 240-109226-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Methyl Mercury	1100		200	69	ng/L	3900		1630	Total/NA
Mercury	240		20	13	ug/L	100		7470A	Total/NA
Mercury	210		20	13	ug/L	100		7470A	Dissolved

This Detection Summary does not include radiochemical test results.

TestAmerica Canton

Client Sample Results

Client: GHD Services Inc.
Project/Site: 11129197, ERCO

TestAmerica Job ID: 240-109226-1

Method: 1630 - Methyl Mercury (GC)

Client Sample ID: W-190307-CA-01

Date Collected: 03/07/19 13:35

Date Received: 03/12/19 09:45

Lab Sample ID: 240-109226-1

Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methyl Mercury	1.2	B	0.50	0.18	ng/L	—	03/14/19 09:21	03/14/19 16:16	10
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
n-Propyl Mercury Chloride	90		36 - 133				03/14/19 09:21	03/14/19 16:16	10

Client Sample ID: W-190307-CA-02

Date Collected: 03/07/19 14:00

Date Received: 03/12/19 09:45

Lab Sample ID: 240-109226-2

Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methyl Mercury	1100		200	69	ng/L	—	03/18/19 08:03	03/18/19 11:34	3900
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
n-Propyl Mercury Chloride	54		36 - 133				03/18/19 08:03	03/18/19 11:34	3900

Client Sample Results

Client: GHD Services Inc.
Project/Site: 11129197, ERCO

TestAmerica Job ID: 240-109226-1

Method: 7470A - Mercury (CVAA)

Client Sample ID: W-190307-CA-01

Date Collected: 03/07/19 13:35

Date Received: 03/12/19 09:45

Lab Sample ID: 240-109226-1

Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.19	J	0.20	0.13	ug/L	—	03/13/19 12:00	03/14/19 08:00	1

Client Sample ID: W-190307-CA-02

Date Collected: 03/07/19 14:00

Date Received: 03/12/19 09:45

Lab Sample ID: 240-109226-2

Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	240		20	13	ug/L	—	03/13/19 12:00	03/14/19 08:31	100

Client Sample Results

Client: GHD Services Inc.
Project/Site: 11129197, ERCO

TestAmerica Job ID: 240-109226-1

Method: 7470A - Mercury (CVAA) - Dissolved

Client Sample ID: W-190307-CA-01

Date Collected: 03/07/19 13:35

Date Received: 03/12/19 09:45

Lab Sample ID: 240-109226-1

Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.13	U	0.20	0.13	ug/L	—	03/13/19 12:00	03/14/19 08:07	1

Client Sample ID: W-190307-CA-02

Date Collected: 03/07/19 14:00

Date Received: 03/12/19 09:45

Lab Sample ID: 240-109226-2

Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	210		20	13	ug/L	—	03/13/19 12:00	03/14/19 08:29	100

Surrogate Summary

Client: GHD Services Inc.
Project/Site: 11129197, ERCO

TestAmerica Job ID: 240-109226-1

Method: 1630 - Methyl Mercury (GC)

Matrix: Water

Prep Type: Total/NA

Percent Surrogate Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	nPMC (36-133)
240-109226-1	W-190307-CA-01	90
240-109226-2	W-190307-CA-02	54
LCS 240-371561/2-A	Lab Control Sample	106
LCS 240-371930/2-A	Lab Control Sample	105
MB 240-371561/1-A	Method Blank	105
MB 240-371930/1-A	Method Blank	102

Surrogate Legend

nPMC = n-Propyl Mercury Chloride

QC Sample Results

Client: GHD Services Inc.
Project/Site: 11129197, ERCO

TestAmerica Job ID: 240-109226-1

Method: 1630 - Methyl Mercury (GC)

Lab Sample ID: MB 240-371561/1-A

Matrix: Water

Analysis Batch: 371578

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 371561

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methyl Mercury	0.0283	J	0.050	0.018	ng/L	—	03/14/19 09:21	03/14/19 13:01	1
Surrogate	MB %Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
n-Propyl Mercury Chloride	105		36 - 133				03/14/19 09:21	03/14/19 13:01	1

Lab Sample ID: LCS 240-371561/2-A

Matrix: Water

Analysis Batch: 371578

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 371561

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Methyl Mercury	0.500	0.564		ng/L	—	113	67 - 138		
Surrogate	LCS %Recovery	LCS Qualifier	Limits						
n-Propyl Mercury Chloride	106		36 - 133						

Lab Sample ID: MB 240-371930/1-A

Matrix: Water

Analysis Batch: 371937

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 371930

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methyl Mercury	0.018	U	0.050	0.018	ng/L	—	03/18/19 08:03	03/18/19 10:51	1
Surrogate	MB %Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
n-Propyl Mercury Chloride	102		36 - 133				03/18/19 08:03	03/18/19 10:51	1

Lab Sample ID: LCS 240-371930/2-A

Matrix: Water

Analysis Batch: 371937

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 371930

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Methyl Mercury	0.500	0.502		ng/L	—	100	67 - 138		
Surrogate	LCS %Recovery	LCS Qualifier	Limits						
n-Propyl Mercury Chloride	105		36 - 133						

Method: 7470A - Mercury (CVAA)

Lab Sample ID: MB 240-371405/1-A

Matrix: Water

Analysis Batch: 371548

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 371405

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.13	U	0.20	0.13	ug/L	—	03/13/19 12:00	03/14/19 07:56	1

TestAmerica Canton

QC Sample Results

Client: GHD Services Inc.
Project/Site: 11129197, ERCO

TestAmerica Job ID: 240-109226-1

Method: 7470A - Mercury (CVAA) (Continued)

Lab Sample ID: LCS 240-371405/2-A

Matrix: Water

Analysis Batch: 371548

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 371405

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	5.00	4.59		ug/L		92	80 - 120

Lab Sample ID: 240-109226-1 MS

Matrix: Water

Analysis Batch: 371548

Client Sample ID: W-190307-CA-01

Prep Type: Total/NA

Prep Batch: 371405

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	0.19	J	1.00	1.36		ug/L		117	80 - 120

Lab Sample ID: 240-109226-1 MSD

Matrix: Water

Analysis Batch: 371548

Client Sample ID: W-190307-CA-01

Prep Type: Total/NA

Prep Batch: 371405

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Mercury	0.19	J	1.00	1.27		ug/L		108	80 - 120	6	20

TestAmerica Canton

QC Association Summary

Client: GHD Services Inc.
Project/Site: 11129197, ERCO

TestAmerica Job ID: 240-109226-1

GC Semi VOA

Prep Batch: 371561

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-109226-1	W-190307-CA-01	Total/NA	Water	1630	
MB 240-371561/1-A	Method Blank	Total/NA	Water	1630	
LCS 240-371561/2-A	Lab Control Sample	Total/NA	Water	1630	

Analysis Batch: 371578

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-109226-1	W-190307-CA-01	Total/NA	Water	1630	371561
MB 240-371561/1-A	Method Blank	Total/NA	Water	1630	371561
LCS 240-371561/2-A	Lab Control Sample	Total/NA	Water	1630	371561

Prep Batch: 371930

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-109226-2	W-190307-CA-02	Total/NA	Water	1630	
MB 240-371930/1-A	Method Blank	Total/NA	Water	1630	
LCS 240-371930/2-A	Lab Control Sample	Total/NA	Water	1630	

Analysis Batch: 371937

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-109226-2	W-190307-CA-02	Total/NA	Water	1630	371930
MB 240-371930/1-A	Method Blank	Total/NA	Water	1630	371930
LCS 240-371930/2-A	Lab Control Sample	Total/NA	Water	1630	371930

Metals

Prep Batch: 371405

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-109226-1	W-190307-CA-01	Dissolved	Water	7470A	
240-109226-1	W-190307-CA-01	Total/NA	Water	7470A	
240-109226-2	W-190307-CA-02	Dissolved	Water	7470A	
240-109226-2	W-190307-CA-02	Total/NA	Water	7470A	
MB 240-371405/1-A	Method Blank	Total/NA	Water	7470A	
LCS 240-371405/2-A	Lab Control Sample	Total/NA	Water	7470A	
240-109226-1 MS	W-190307-CA-01	Total/NA	Water	7470A	
240-109226-1 MSD	W-190307-CA-01	Total/NA	Water	7470A	

Analysis Batch: 371548

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-109226-1	W-190307-CA-01	Dissolved	Water	7470A	371405
240-109226-1	W-190307-CA-01	Total/NA	Water	7470A	371405
240-109226-2	W-190307-CA-02	Dissolved	Water	7470A	371405
240-109226-2	W-190307-CA-02	Total/NA	Water	7470A	371405
MB 240-371405/1-A	Method Blank	Total/NA	Water	7470A	371405
LCS 240-371405/2-A	Lab Control Sample	Total/NA	Water	7470A	371405
240-109226-1 MS	W-190307-CA-01	Total/NA	Water	7470A	371405
240-109226-1 MSD	W-190307-CA-01	Total/NA	Water	7470A	371405

TestAmerica Canton

Lab Chronicle

Client: GHD Services Inc.
Project/Site: 11129197, ERCO

TestAmerica Job ID: 240-109226-1

Client Sample ID: W-190307-CA-01

Date Collected: 03/07/19 13:35

Date Received: 03/12/19 09:45

Lab Sample ID: 240-109226-1

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	1630			371561	03/14/19 09:21	SEM	TAL CAN
Total/NA	Analysis	1630		10	371578	03/14/19 16:16	SEM	TAL CAN
Dissolved	Prep	7470A			371405	03/13/19 12:00	MBB	TAL CAN
Dissolved	Analysis	7470A		1	371548	03/14/19 08:07	AJC	TAL CAN
Total/NA	Prep	7470A			371405	03/13/19 12:00	MBB	TAL CAN
Total/NA	Analysis	7470A		1	371548	03/14/19 08:00	AJC	TAL CAN

Client Sample ID: W-190307-CA-02

Date Collected: 03/07/19 14:00

Date Received: 03/12/19 09:45

Lab Sample ID: 240-109226-2

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	1630			371930	03/18/19 08:03	SEM	TAL CAN
Total/NA	Analysis	1630		3900	371937	03/18/19 11:34	SEM	TAL CAN
Dissolved	Prep	7470A			371405	03/13/19 12:00	MBB	TAL CAN
Dissolved	Analysis	7470A		100	371548	03/14/19 08:29	AJC	TAL CAN
Total/NA	Prep	7470A			371405	03/13/19 12:00	MBB	TAL CAN
Total/NA	Analysis	7470A		100	371548	03/14/19 08:31	AJC	TAL CAN

Laboratory References:

TAL CAN = TestAmerica Canton, 4101 Shuffel Street NW, North Canton, OH 44720, TEL (330)497-9396

Accreditation/Certification Summary

Client: GHD Services Inc.
Project/Site: 11129197, ERCO

TestAmerica Job ID: 240-109226-1

Laboratory: TestAmerica Canton

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	EPA Region	Identification Number	Expiration Date
New York	NELAP	2	10975	03-31-19 *

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte
1630	1630	Water	Methyl Mercury

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

TestAmerica Canton

TestAmerica Canton Sample Receipt Form/Narrative

Login #: 109226

Canton Facility

Client 6HD Site Name 3/12/14 Cooler unpacked by: 87
 Cooler Received on 3/12/14 Opened on 3/12/14
 FedEx: 1st Grd Exp UPS FAS Clipper Client Drop Off TestAmerica Courier Other

Receipt After-hours: Drop-off Date/Time

Storage Location

TestAmerica Cooler # 76 Foam Box Client Cooler Box Other
 Packing material used: Bubble Wrap Foam Plastic Bag None Other
 COOLANT: Wet Ice Blue Ice Dry Ice Water None

1. Cooler temperature upon receipt ☐ See Multiple Cooler Form
 IR GUN# IR-8 (CF -0.2 °C) Observed Cooler Temp. 2.2 °C Corrected Cooler Temp. 2.0 °C
 IR GUN #36 (CF +0.7 °C) Observed Cooler Temp. °C Corrected Cooler Temp. °C
2. Were tamper/custody seals on the outside of the cooler(s)? If Yes Quantity 1 Yes No
 -Were the seals on the outside of the cooler(s) signed & dated? Yes No NA
 -Were tamper/custody seals on the bottle(s) or bottle kits (LLHg/MeHg)? Yes No
 -Were tamper/custody seals intact and uncompromised? Yes No NA
3. Shippers' packing slip attached to the cooler(s)? Yes No
 4. Did custody papers accompany the sample(s)? Yes No
 5. Were the custody papers relinquished & signed in the appropriate place? Yes No
 6. Was/were the person(s) who collected the samples clearly identified on the COC? Yes No
 7. Did all bottles arrive in good condition (Unbroken)? Yes No
 8. Could all bottle labels be reconciled with the COC? Yes No
 9. Were correct bottle(s) used for the test(s) indicated? Yes No
 10. Sufficient quantity received to perform indicated analyses? Yes No
 11. Are these work share samples? Yes No
 If yes, Questions 12-16 have been checked at the originating laboratory.
12. Were all preserved sample(s) at the correct pH upon receipt? Yes No NA pH Strip Lot# HC861525
 13. Were VOAs on the COC? Yes No
 14. Were air bubbles >6 mm in any VOA vials?  Larger than this. Yes No NA
 15. Was a VOA trip blank present in the cooler(s)? Trip Blank Lot # Yes No
 16. Was a LL Hg or Me Hg trip blank present? Yes No

Tests that are not
checked for pH by
Receiving:

VOAs
Oil and Grease
TOC

Contacted PM _____ Date _____ by _____ via Verbal Voice Mail Other

Concerning _____

17. CHAIN OF CUSTODY & SAMPLE DISCREPANCIES

Samples processed by: 87/M.S.

18. SAMPLE CONDITION

Sample(s) _____ were received after the recommended holding time had expired.
 Sample(s) _____ were received in a broken container.
 Sample(s) _____ were received with bubble >6 mm in diameter. (Notify PM)

19. SAMPLE PRESERVATION

Sample(s) _____ were further preserved in the laboratory.
 Time preserved: _____ Preservative(s) added/Lot number(s): _____

VOA Sample Preservation - Date/Time VOAs Frozen: _____

WI-NC-099

Temperature readings: _____

<u>Client Sample ID</u>	<u>Lab ID</u>	<u>Container Type</u>	<u>Container</u> <u>pH</u>	<u>Preservative</u> <u>Added (mls)</u>	<u>Lot #</u>
W-190307-CA-01	240-109226-D-1	Plastic 250ml - with Nitric Acid	<2	_____	_____
W-190307-CA-01	240-109226-E-1	Plastic 250ml - w/nitric - dis	<2	_____	_____
W-190307-CA-02	240-109226-D-2	Plastic 250ml - with Nitric Acid	<2	_____	_____
W-190307-CA-02	240-109226-E-2	Plastic 250ml - w/nitric - dis	<2	_____	_____

Appendix C

Remedial Options Preliminary Cost Estimate Tables

Table C1

**Cost Estimate
Monitored Natural Attenuation
Remedial Action Options Report
ERCO Worldwide (USA) Inc
Port Edwards Plant
Nekoosa, Wisconsin**

Description	Units	Unit Price	Quantity	Total
Capital and Construction Costs				
Work Plan	LS	\$ 20,000	1	<u>\$ 20,000</u>
Total Construction Cost				<u>\$ 20,000</u>
Annual O&M Cost				
Sampling Equipment	event	\$ 2,500	4	\$ 10,000
Labor	Hr	\$ 125	240	\$ 30,000
Analytical	Sample	\$ 250	36	\$ 9,000
Reporting/Project Management	LS	\$ 40,000	1	<u>\$ 40,000</u>
Subtotal				\$ 89,000
10-Year O&M Cost	Yr	\$ 89,000	10	<u>\$ 890,000</u>
Total Treatment Cost				\$ 910,000
Contingency (20%)				<u>\$ 182,000</u>
TOTAL (Rounded)				<u><u>\$ 1,090,000</u></u>

Notes:

Cost estimate is conceptual, for comparison purposes only.

Table C2

Cost Estimate
Downgradient Barrier with Groundwater Extraction
Remedial Action Options Report
ERCO Worldwide (USA) Inc
Port Edwards Plant
Nekoosa, Wisconsin

Description	Units	Price	Quantity	Total
Capital and Construction Costs				
Work Plan	LS	\$ 30,000	1	\$ 30,000
Slurry Wall	Sq foot	\$ 20	6300	\$ 126,000
Slurry Wall Compatibility Testing	each	\$ 30,000	1	\$ 30,000
Extraction Well installation	each	\$ 10,000	2	\$ 20,000
GW Treatment System Upgrade (provisional)	LS	\$ 50,000	1	\$ 50,000
System Instrumentation/Electrical	each	\$ 10,000	1	\$ 10,000
Electrical Service (Meter, Pole)	each	\$ 3,000	1	\$ 3,000
Mechanical Installation/Contractor (hookup, piping)	LS	\$ 15,000	1	\$ 15,000
Well pumps/appurtenances	each	\$ 10,000	2	\$ 20,000
Well Collection/Distribution Piping	LS	\$ 10,000	1	\$ 10,000
Oversight	Hr	\$ 150	360	\$ 54,000
Subtotal				\$ 368,000
Engineering	Percent	20%		\$ 73,600
Bonds and Insurance	Percent	3%		\$ 11,040
Mob/Demob	LS	\$ 50,000	1	\$ 50,000
Permits (provisional)	LS	\$ 10,000	1	\$ 10,000
Health and Safety	LS	\$ 25,000	1	\$ 25,000
Construction Facilities and Temporary Controls	LS	\$ 20,000	1	\$ 20,000
Subtotal				\$ 189,640
Total Construction Cost				\$ 557,640
Annual O&M Cost				
Equipment	LS	\$ 2,500	4	\$ 10,000
Labor	Hr	\$ 125	240	\$ 30,000
Analytical	Sample	\$ 250	36	\$ 9,000
Electrical	LS	\$ 5,000	1	\$ 5,000
Well Maintenance	event	\$ 5,000	4	\$ 20,000
Operator Labor (part time)	Hr	\$ 125	500	\$ 62,500
Waste Disposal	LS	\$ 5,000	1	\$ 5,000
Media replacement (provisional, existing system)	LS	\$ 10,000	1	\$ 10,000
Reporting	LS	\$ 20,000	1	\$ 20,000
Subtotal				\$ 171,500
10-Year O&M Cost	Yr	\$ 171,500	10	\$ 1,715,000
Total Treatment Cost				\$ 2,272,640
Contingency (20%)				\$ 454,528
TOTAL (Rounded)				\$ 2,730,000

Notes:

Cost estimate is conceptual, for comparison purposes only.

Table C3

Cost Estimate
Chemical Stabilization
Remedial Action Options Report
ERCO Worldwide (USA) Inc
Port Edwards Plant
Nekoosa, Wisconsin

Description	Units	Unit Price	Quantity	Total
Capital and Construction Costs				
Work Plan	Hr	\$ 30,000	1	\$ 30,000
Treatability Study	LS	\$ 10,000	1	\$ 10,000
Pilot Study/Phase 1 Study	LS	\$ 25,000	1	\$ 25,000
Drilling and Injection Well Installation	Well	\$ 5,000	40	\$ 200,000
Cement Cutting and repair	Well	\$ 500	40	\$ 20,000
Angled Drilling if required	LS	\$ 10,000	10	\$ 100,000
Waste Disposal (Non Hazardous)	LS	\$ 15,000	1	\$ 15,000
Oversight	Hr	\$ 140	280	\$ 39,200
Subtotal				\$ 439,200
Engineering	Percent	20%		\$ 87,840
Bonds and Insurance	Percent	3%		\$ 13,176
Mob/Demob	LS	\$ 10,000	1	\$ 10,000
Permits (provisional)	LS	\$ 15,000	1	\$ 15,000
Health and Safety	LS	\$ 25,000	1	\$ 25,000
Temporary Controls	Percent	5%		\$ 21,960
Subtotal				\$ 172,976
Total Construction Cost				\$ 612,176
Annual O&M Cost (2 Injections, 2 Years Monitoring)				
Equipment	LS	\$ 15,000	1	\$ 15,000
Sodium sulfide	Well	\$ 750	40	\$ 30,000
Sampling Equipment	event	\$ 2,500	4	\$ 10,000
Labor	Hr	\$ 125	620	\$ 77,500
Analytical	Sample	\$ 250	36	\$ 9,000
Reporting	LS	\$ 30,000	1	\$ 30,000
Subtotal				\$ 171,500
2-Year O&M Cost	Yr	\$ 171,500	2	\$ 343,000
Total Treatment Cost				\$ 955,176
Contingency (20%)				\$ 191,035
TOTAL (Rounded)				\$ 1,150,000

Notes:

Cost estimate is conceptual, for comparison purposes only.

Table C4

**Cost Estimate
Groundwater Extraction
Remedial Action Options Report
ERCO Worldwide (USA) Inc
Port Edwards Plant
Nekoosa, Wisconsin**

Description	Units	Price	Quantity	Total
Capital and Construction Costs				
Work Plan	Hr	\$ 30,000	1	\$ 30,000
Extraction Well installation	LS	\$ 10,000	3	\$ 30,000
GW Treatment System Upgrade (provisional)	LS	\$ 50,000	1	\$ 50,000
System Instrumentation/Electrical (provisional)	LS	\$ 10,000	1	\$ 10,000
Electrical Service (Meter, Pole)	LS	\$ 3,000	1	\$ 3,000
Mechanical Installation/Contractor (hookup, piping)	LS	\$ 15,000	1	\$ 15,000
Well pumps/appurtenances	each	\$ 10,000	3	\$ 30,000
Well Collection/Distribution Piping	LS	\$ 15,000	1	\$ 15,000
Oversight	Hr	\$ 150	240	\$ 36,000
Subtotal				\$ 219,000
Engineering	Percent	20%		\$ 43,800
Bonds and Insurance	Percent	3%		\$ 6,570
Mob/Demob	LS	\$ 40,000	1	\$ 40,000
Permits (provisional)	LS	\$ 10,000	1	\$ 10,000
Health and Safety	LS	\$ 25,000	1	\$ 25,000
Construction Facilities and Temporary Controls	LS	\$ 20,000	1	\$ 20,000
Subtotal				\$ 145,370
Total Construction Cost				<u>\$ 364,370</u>
Annual O&M Cost				
Sampling Equipment	LS	\$ 2,500	4	\$ 10,000
Labor	Hr	\$ 125	240	\$ 30,000
Analytical	Sample	\$ 250	36	\$ 9,000
Electrical/Utilities	LS	\$ 5,000	1	\$ 5,000
Well Maintenance	event	\$ 7,500	4	\$ 30,000
Operator Labor (part time)	Hr	\$ 125	500	\$ 62,500
Waste Disposal	LS	\$ 10,000	1	\$ 10,000
Media replacement (provisional, existing system)	LS	\$ 10,000	1	\$ 10,000
Reporting	LS	\$ 20,000	1	\$ 20,000
Subtotal				\$ 186,500
10-Year O&M Cost	Yr	\$ 186,500	10	<u>\$ 1,865,000</u>
Total Treatment Cost				\$ 2,229,370
Contingency (20%)				<u>\$ 445,874</u>
TOTAL (Rounded)				<u>\$ 2,680,000</u>

Notes:

Cost estimate is conceptual, for comparison purposes only.

Table C5

**Cost Estimate
ZVI Barrier
Remedial Action Options Report
ERCO Worldwide (USA) Inc
Port Edwards Plant
Nekoosa, Wisconsin**

Capital and Construction Cost

Description	Units	Price	Quantity	Total
Work Plan	LS	\$ 30,000	1	\$ 30,000
Waste Disposal	LS	\$ 10,000	1	\$ 10,000
Tank/Equipment Allowance	LS	\$ 5,000	1	\$ 5,000
Mob/Demob of Trenching Machinery	LS	\$ 40,000	1	\$ 40,000
Slurry Wall Compatibility Testing	each	\$ 30,000	1	\$ 30,000
Slurry Wall	Sq foot	\$ 20	3600	\$ 72,000
One Pass Trenching	Foot	\$ 400	150	\$ 60,000
Trench Fill (ZVI/Sand 20%:90%)	LS	\$200,000	1	\$ 200,000
Labor for Oversight	LS	\$ 140	320	\$ 44,800

SUBTOTAL \$ 491,800

Engineering	Percent	20%		\$ 98,360
Bonds and Insurance	Percent	3%		\$ 14,754
Mob/Demob	LS	\$ 50,000	1	\$ 50,000
Permits (provisional)	LS	\$ 10,000	1	\$ 10,000
Health and Safety	LS	\$ 25,000	1	\$ 25,000
Construction Facilities and Temporary Controls	LS	\$ 20,000	1	\$ 20,000

SUBTOTAL \$ 218,114

TOTAL CONSTRUCTION COST **\$ 709,914**

O&M COST

Sampling Equipment	LS	\$ 2,500	4	\$ 10,000
Labor	Hr	\$ 125	240	\$ 30,000
Analytical	Sample	\$ 250	36	\$ 9,000
Reporting	LS	\$ 20,000	1	\$ 20,000

SUBTOTAL \$ 69,000

10 YEARS O&M Yr \$ 69,000 10 \$ 690,000

Total Treatment Cost **\$ 1,399,914**
Contingency (20%) **\$ 279,983**

TOTAL (Rounded) **\$ 1,680,000**

Notes:

Cost estimate is conceptual, for comparison purposes only.



about GHD

GHD is one of the world's leading professional services companies operating in the global markets of water, energy and resources, environment, property and buildings, and transportation. We provide engineering, environmental, and construction services to private and public sector clients.

Denise Quigley
Denise.Quigley@ghd.com
519.340.4196

Ian Richardson
Ian.Richardson@ghd.com
519.340.4251

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The Bank of Nova Scotia, NY Agency

Trade Services Center,
250 Vesey Street (24th Floor)
New York, NY 10281
Tel: 212 225 5000
Fax: 212 225 6464
SWIFT: NOSCUS33TPS

ORIGINAL
THE BANK OF NOVA SCOTIA
NEW YORK AGENCY
TRADE SERVICES CENTER

**Irrevocable
Standby Letter of Credit
No. 97045/80085**

Amendment no. 11
Dated October 06, 2025

Beneficiary:

State of Wisconsin
Department of Natural Resources
101 S. Webster St., P.O. Box 7921
Madison, WI 53707-7621 United States

Applicant:

ERCO Worldwide LP
5050 Satellite Drive, Suite 600
Mississauga, ON L4W 0G1 CANADA Canada

We amend our Standby Letter of Credit subject to the following terms and conditions. This amendment forms an integral part of the original instrument. All other terms and conditions remain unchanged.

Amended Terms:

The amount of the Standby Letter of Credit is increased by: USD 16,310.36 to USD 690,292.36

Unless otherwise instructed herein, all correspondence or enquiries regarding this transaction should be directed to our Customer Service Centre at the above address. Please indicate our reference number 97045/80085 in all correspondence or enquiries.

Regards,

Nancy Mastro
Analyst

Sahar Mahbob
Manager



The Bank of Nova Scotia, NY Agency

Trade Services Center,
250 Vesey Street (24th Floor)
New York, NY 10281
Tel: 212 225 5000
Fax: 212 225 6464
SWIFT: NOSCUS33TPS

ORIGINAL
THE BANK OF NOVA SCOTIA
NEW YORK AGENCY
TRADE SERVICES CENTER

**Irrevocable
Standby Letter of Credit
No. 97046/80085**

Amendment no. 11
Dated October 06, 2025

Beneficiary:

State of Wisconsin
Department of Natural Resources
101 S. Webster St., P.O. Box 7921
Madison, WI 53707-7621 United States

Applicant:

ERCO Worldwide LP
5050 Satellite Drive, Suite 600
Mississauga, ON L4W 0G1 CANADA Canada

We amend our Standby Letter of Credit subject to the following terms and conditions. This amendment forms an integral part of the original instrument. All other terms and conditions remain unchanged.

Amended Terms:

The amount of the Standby Letter of Credit is increased by: USD 64,138.57 to USD 2,714,492.57

Unless otherwise instructed herein, all correspondence or enquiries regarding this transaction should be directed to our Customer Service Centre at the above address. Please indicate our reference number 97046/80085 in all correspondence or enquiries.

Regards,

Nancy Mastro
Analyst

Sahar Mahbob
Manager

Appendix I – Endangered Resources

Endangered Resources Documents

1. 4/14/2025, WDNR, *Endangered Resources Review Verification*.

State of Wisconsin
Department of Natural Resources
Bureau of Natural Heritage Conservation
Endangered Resources Review Program
PO Box 7921, Madison WI 53707-7921
<https://dnr.wi.gov/topic/ERReview/>
DNRERReview@wisconsin.gov

**Endangered Resources (ER) Review Verification
Broad Incidental Take Permit/Authorization
for No/Low Impact Activities**

Form 1700-079 (R 05/2024)

Notice: This form is authorized by s. 29.604, Wis. Stats. This completed signed form, once submitted to DNRERReview@wi.gov using the Submit by Email button at the bottom of the form, fulfills the requirement of an Endangered Resources Review and should be attached to other permits requiring an ER Review to show that Endangered Resources requirements have been met. Personal information collected on this form will be used for administrative purposes and may be provided to requesters to the extent required by Wisconsin's Public Records law [ss. 19.31-19.39, Wis. Stats.].

Instructions: Complete this form if your project is covered under the Broad Incidental Take Permit/Authorization for No/Low Impact Activities and therefore does not require an Endangered Resources Review.

Section 1: Applicant and Project Information

Requester Name Kevin Hansen		Organization or Agency Name ERCO Worldwide			
Project Name LTC Permit Renewal		County Wood	Township N	Range ☐ E ☐ W	Section
DPS Project # (if applicable)	Telephone Number (715) 590-2158	Email Address kevinhansen774@gmail.com			

Project Description
Project address: 101 Highway 73 South, Nekoosa

Continuing operations with no changes in facility footprint.

Indicate who you are completing this form as:

- ☒ DNR Staff
☐ Certified Reviewer
☐ Other:

Section 2: Broad Incidental Take Permit/Authorization Coverage Information

How is your project covered under the Broad Incidental Take Permit/Authorization for No/Low Impact Activities?

- ☒ It is included in the list of activities in Table 1 – No/Low Impact Table for All Species at All Times of the Year.
☐ It is included in the list of activities in Table 2 – No/Low Impact Table by Taxa Group for DNR Staff and ER Certified Reviewers Only and the Taxa groups for the species of concern are covered.
☐ It is included in the list of activities in Table 2 – No/Low Impact Table by Taxa Group for DNR Staff ER Certified Reviewers Only and the species of concern are covered by the Avoidance Measures document.

Activity Number(s)
1-A13, continuing operations

Section 3: Applicant Certification

By my signature below, I certify that to the best of my knowledge, the information stated above is complete and accurate.

Melissa Tumbleson
Signature

4/14/2025
Date Signed

Melissa Tumbleson
Requester/Submitter Name (please print)

Leave Blank – DNR Use Only

Approve/Deny Form ☐

☒ Approved ☐ Denied

DNR Reviewer Name
Angela White

DNR Reviewer Date
04/14/2025

Appendix J – Drawings

Drawing List

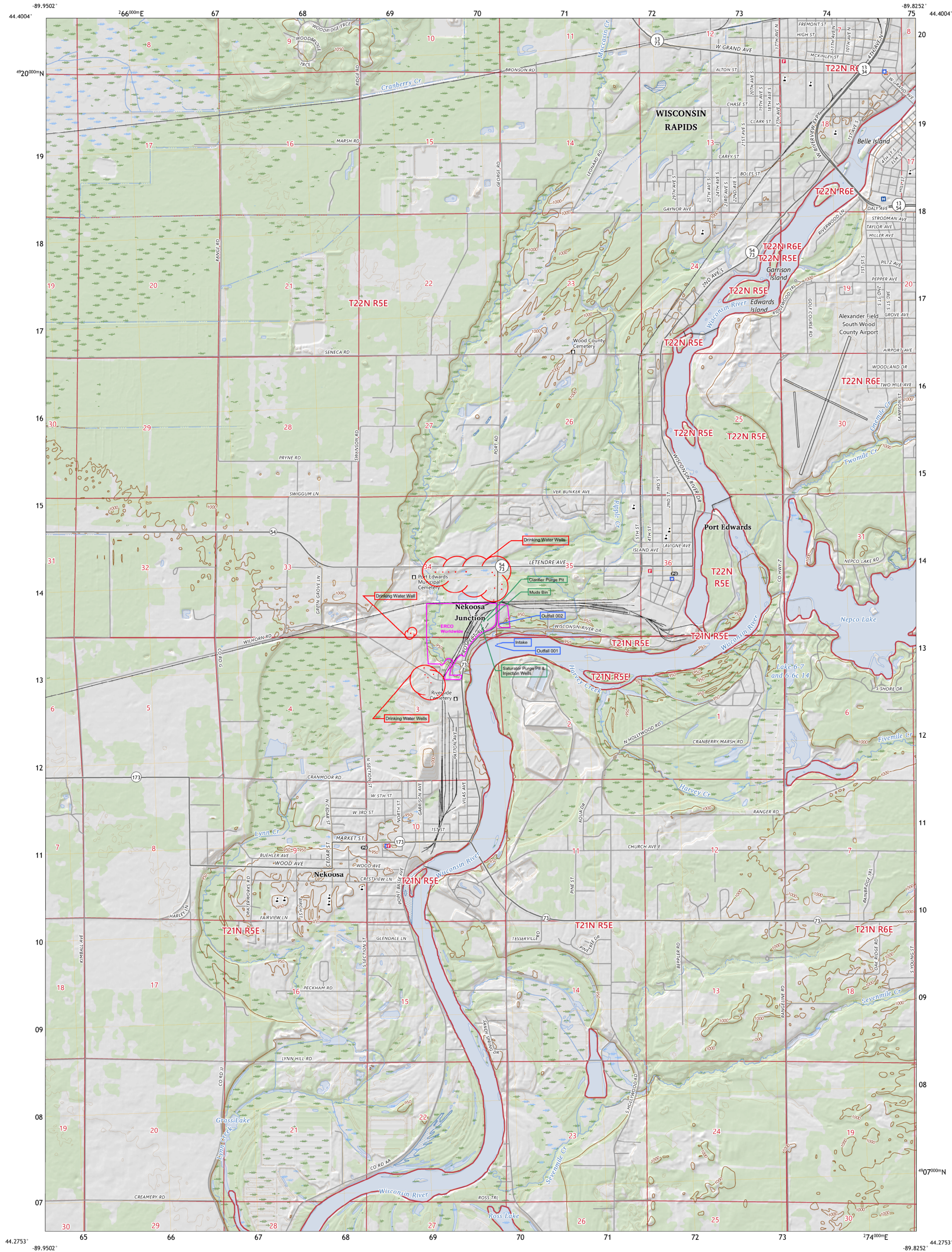
1. 9/20/2024, USGS, *7.5-Minute Topo WI Custom Extent*.
2. 2/17/2010, FEMA, *Flood Insurance Rate Map 55141C0509G*.
3. 12/09/2025, ERCO, *D-EE06005-27-220004r10 Plant and Forested Area - Legal and Parcel ID*.
4. 6/16/2020, ERCO, *D-EE06005-27-220007r6 PE Site Plan*.
5. 11/11/2020, ERCO, *D-EE06005-27-220035r1 Storm Water Drainage Areas*.
6. 6/23/2024, ERCO, *D-EE06005-27-220036r2 Storm Water Drainage and Exterior Secondary Containment*.
7. 4/7/1997, CH2M Hill, *Site Map, Topography and AOCs*.
8. 3/24/2022, GHD, *Site Plan (Monitoring Well Locations)*.
9. 11/19/2024, GHD, *Site Plan (Injection Well Locations)*.
10. 9/24/2024, MRCC cli-MATE, *Wisconsin Rapids Alexander Field (WI) Wind Rose*.
11. 5/1/2025, GHD, *Wetlands and Surface Water Features*.
12. 12/21/1995, CH2M Hill, *Vulcan Chemicals Vicinity Map*.
13. 2/17/2000, CH2M Hill, *Sanitary Drainfield Investigation Analytical Results*.



U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY



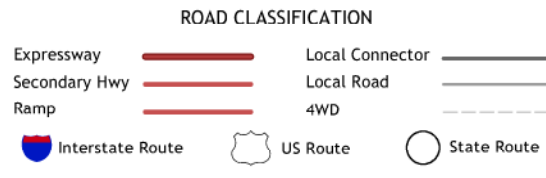
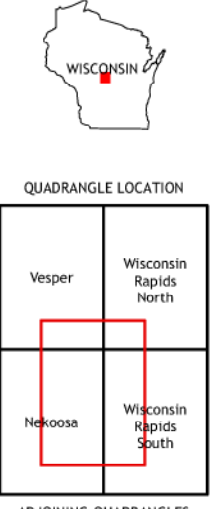
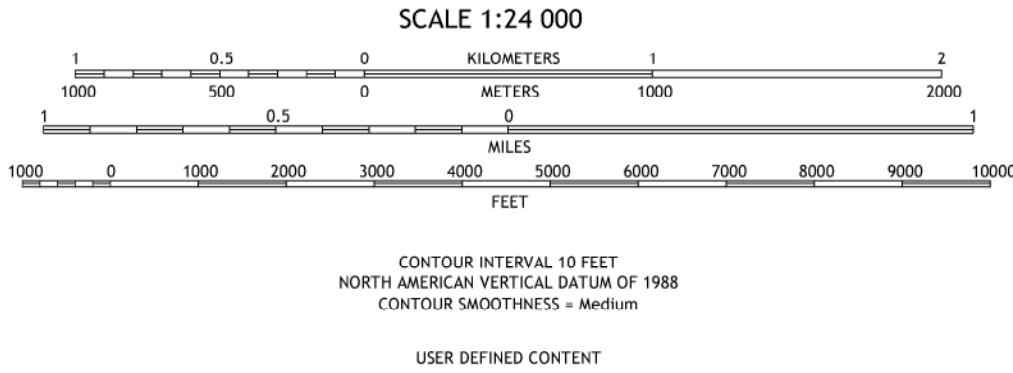
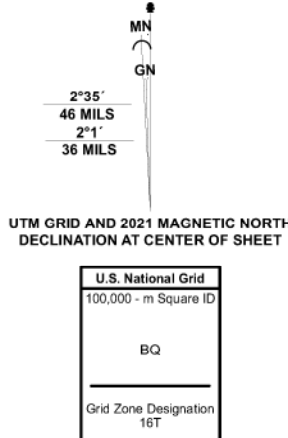
7.5-MINUTE TOPO QUADRANGLE
Custom Extent
7.5-MINUTE TOPO



Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and
1 000-meter grid/Universal Transverse Mercator, Zone 16T
Data is provided by The National Map (TNM), is the best available at the time of map
generation, and includes data content from supporting themes of Elevation,
Hydrography, Geographic Names, Boundaries, Transportation, Structures, Land Cover,
and Orthomaps. Refer to associated Federal Geographic Data Committee (FGDC)
Metadata for additional source data information.

This map is not a legal document. Boundaries may be generalized for this map scale.
Private lands within government reservations may not be shown. Obtain permission
before entering private lands. Temporal changes may have occurred since these data
were collected and some data may no longer represent actual surface conditions.

Learn About The National Map: <https://nationalmap.gov>



7.5-MINUTE TOPO, WI
2024

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations (BFEs)** and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) Report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS Report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study Report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study Report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 16. The **horizontal datum** was NAD 83, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at <http://www.ngs.noaa.gov> or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA/NWGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at <http://www.ngs.noaa.gov>.

Base map information shown on the FIRM was provided by Wood County Planning and Zoning Department. This information was derived from digital orthophotos meeting National Mapping and Accuracy Standards from photography dated April 2005.

The **profile baselines** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the **profile baseline**, in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

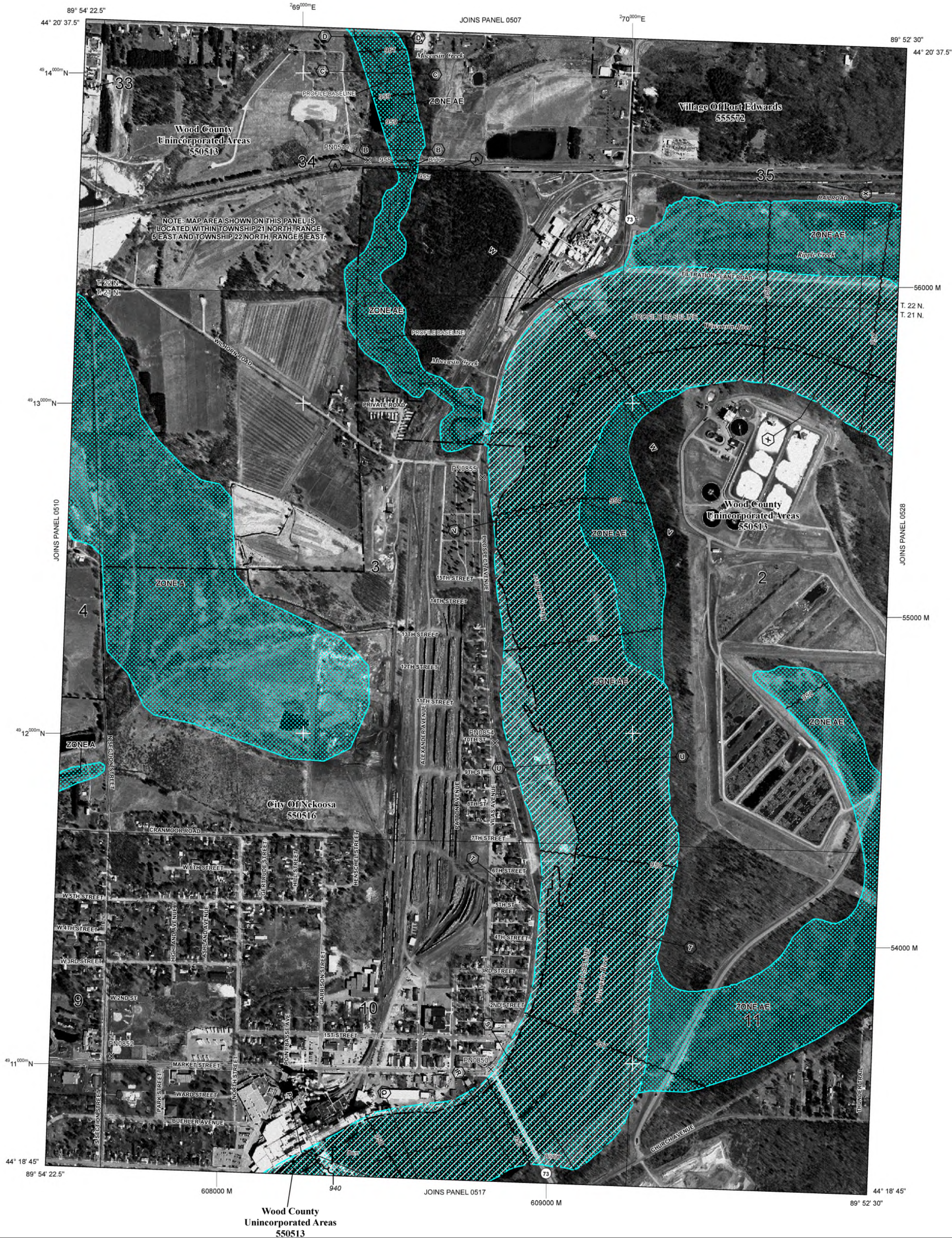
Based on updated topographic information, this map reflects more detailed and up-to-date **stream channel configurations** and **floodplain delineations** than those shown on the previous FIRM for this jurisdiction. As a result the Flood Profiles and Floodway Data tables for multiple streams in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on the map. Also, the road to floodplain relationships for unrevised streams may differ from what is shown on previous maps.

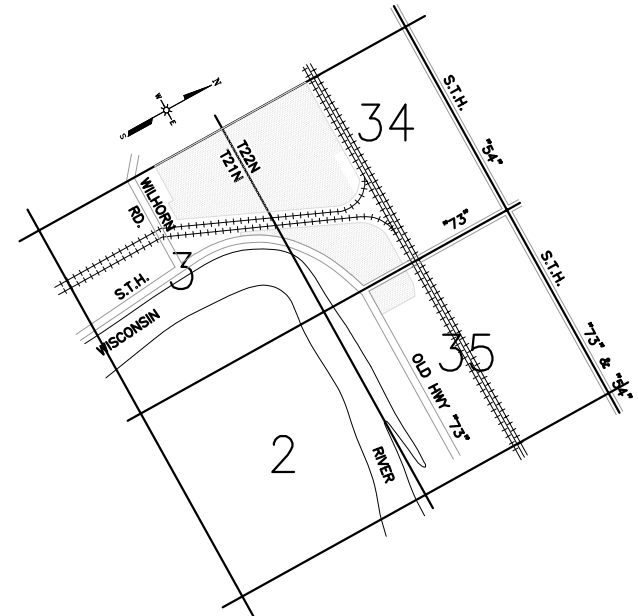
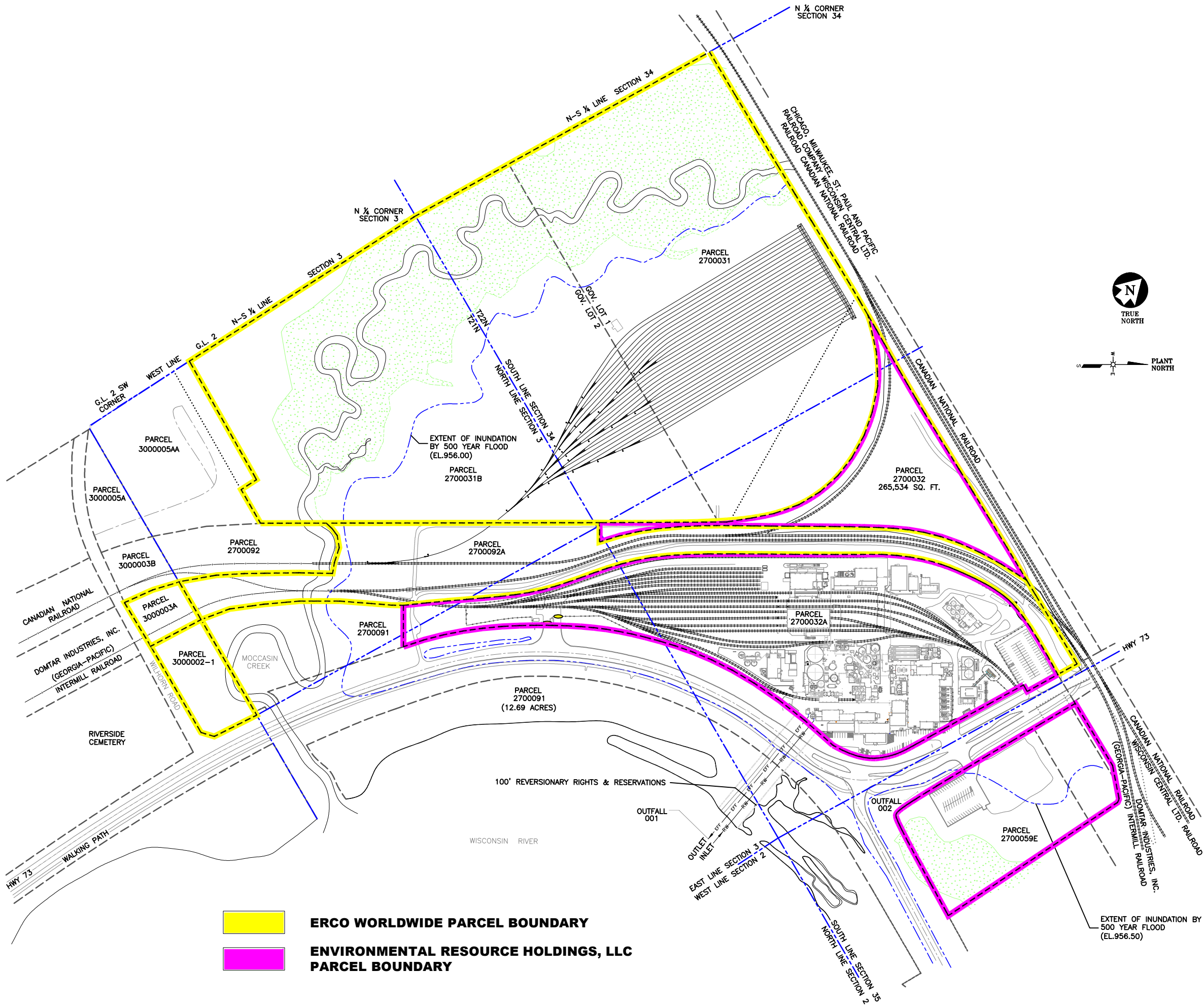
Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels, community map repository addresses, and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at <http://msc.fema.gov>.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at <http://www.fema.gov/business/nfip/>.





LOCATION SKETCH

PART OF SECTIONS 2 & 3, T21N, R5E, & PART OF SECTIONS 34 & 35, T22N, R5E CITY OF NEKOOSA, VILLAGE OF PORT EDWARDS, TOWN OF SARATOGA & TOWN OF PORT EDWARDS NOT TO SCALE

LEGAL & PARCEL ID

SEE DRAWING D-EE06005-27-220005 FOR PLANT AREA - LEGAL & PARCEL ID

SEE DRAWING D-EE06005-27-220006 FOR FORESTED AREA - LEGAL & PARCEL ID

ERCO WORLDWIDE
101 STATE HWY 73 S NEKOOSA WI 54457
2700031 - ACRES 29.38
2700031B - ACRES 35.15
2700092A - ACRES 12.02
3000003A - ACRES 0.80
3000002-1 - ACRES 2.00
TOTAL : 79.35 ACRES

ENVIRONMENTAL RESOURCE HOLDINGS, LLC
LEASED TO ERCO WORLDWIDE
2700032 - ACRES 6.10
2700032A - ACRES 20.21
2700059E - ACRES 7.28
TOTAL : 33.59 ACRES

TOTAL FACILITY : 112.94 ACRES

DOMTAR WIS DAM CORP
301 POINT BASSE AVE NEKOOSA WI 54457
2700091 - ACRES 12.69

WI CEN LTD C/O CN PROPERTY TAX
DOWNTOWN STATION
MONTREAL QUEBE C C 3N4
2700092 - ACRES 2.74
3000003B - ACRES 0.93

MOCCASIN MHP LLC
3210 STATE RD LACROSSE WI 54601
610 WILHORN RD
3000005A - ACRES 1.08
3000005AA - ACRES 5.72

10	WORDING CHANGE	TCK	TRR
9	RAIL YARD ADDITION	TCK	TRR
8	JUNE 2025 UPDATE	TCK	KLH
7	APRIL 2025 UPDATE	TCK	KLH
6	ACQUIRED 2700092A, 3000003A, 3000002-1	WAR	KLH
5	EXTEND PROPERTY LIMITS	WAR	KLH
4	EE12131, EE10094 & EE12095 UPDATES	R.F.	KLH
3	AUGUST 2014 HCI NO.2 UPDATE	R.F.	KLH
2	MAY 2014 SITE PLAN UPDATE	JME	KLH
No.	REVISION	own.	app'd.
		date	date

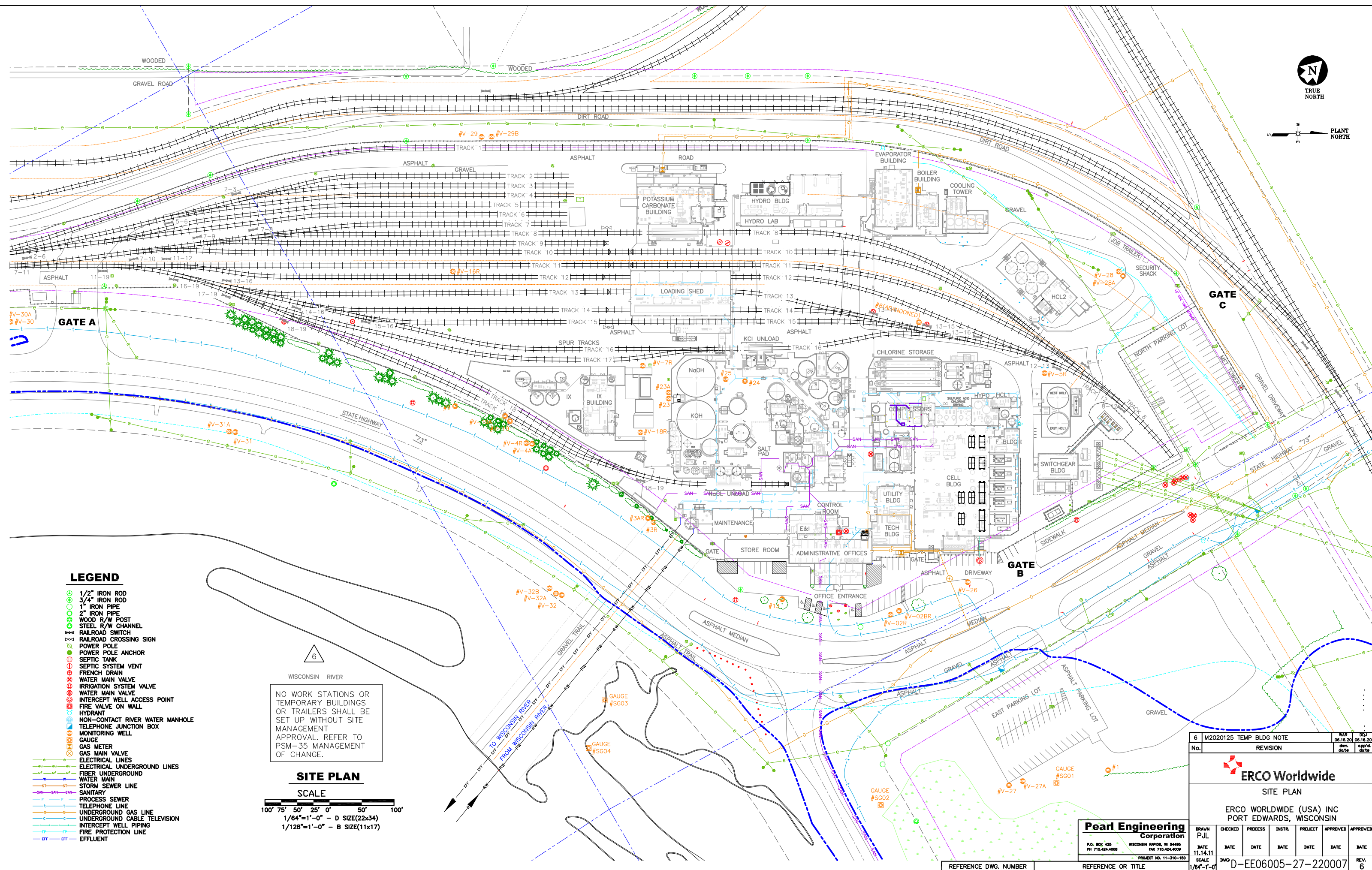


PLANT & FORESTED AREAS
LEGAL & PARCEL ID
ERCO WORLDWIDE (USA) INC
PORT EDWARDS, WISCONSIN

DRAWN	CHECKED	PROCESS	INSTR.	PROJECT	APPROVED	APPROVED
P.J.L.						
DATE	DATE	DATE	DATE	DATE	DATE	DATE
11.14.11						
SCALE	DWG					
NONE	D-EE06005-27-220004					
						REV. 10

CONFIDENTIAL

THIS DRAWING IS THE PROPERTY OF ERCO WORLDWIDE AND MUST NOT BE REPRODUCED IN WHOLE OR IN PART WITHOUT WRITTEN PERMISSION.

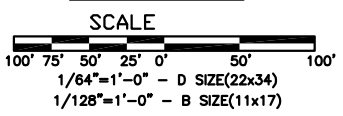


LEGEND

- 1/2" IRON ROD
- 3/4" IRON ROD
- 1" IRON PIPE
- 2" IRON PIPE
- WOOD R/W POST
- STEEL R/W CHANNEL
- RAILROAD SWITCH
- RAILROAD CROSSING SIGN
- POWER POLE
- POWER POLE ANCHOR
- SEPTIC TANK
- SEPTIC SYSTEM VENT
- FRENCH DRAIN
- WATER MAIN VALVE
- IRRIGATION SYSTEM VALVE
- WATER MAIN VALVE
- INTERCEPT WELL ACCESS POINT
- FIRE VALVE ON WALL
- HYDRANT
- NON-CONTACT RIVER WATER MANHOLE
- TELEPHONE JUNCTION BOX
- MONITORING WELL
- GAUGE
- GAS METER
- GAS MAIN VALVE
- ELECTRICAL LINES
- ELECTRICAL UNDERGROUND LINES
- FIBER UNDERGROUND
- WATER MAIN
- STORM SEWER LINE
- SANITARY
- PROCESS SEWER
- TELEPHONE LINE
- UNDERGROUND GAS LINE
- UNDERGROUND CABLE TELEVISION
- INTERCEPT WELL PIPING
- FIRE PROTECTION LINE
- EFFLUENT

NO WORK STATIONS OR TEMPORARY BUILDINGS OR TRAILERS SHALL BE SET UP WITHOUT SITE MANAGEMENT APPROVAL. REFER TO PSM-35 MANAGEMENT OF CHANGE.

SITE PLAN



6	M2020125 TEMP BLDG NOTE	WAR	DOJ
No.	REVISION	date	date
SITE PLAN			
ERCO WORLDWIDE (USA) INC PORT EDWARDS, WISCONSIN			
DRAWN P.J.L.	CHECKED	PROCESS	INSTR.
DATE 11.14.11	DATE	DATE	DATE
SCALE 1/64\"=1'-0\"	DWG D-EE06005-27-220007	PROJECT D-EE06005-27-220007	APPROVED REV. 6

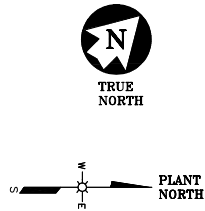
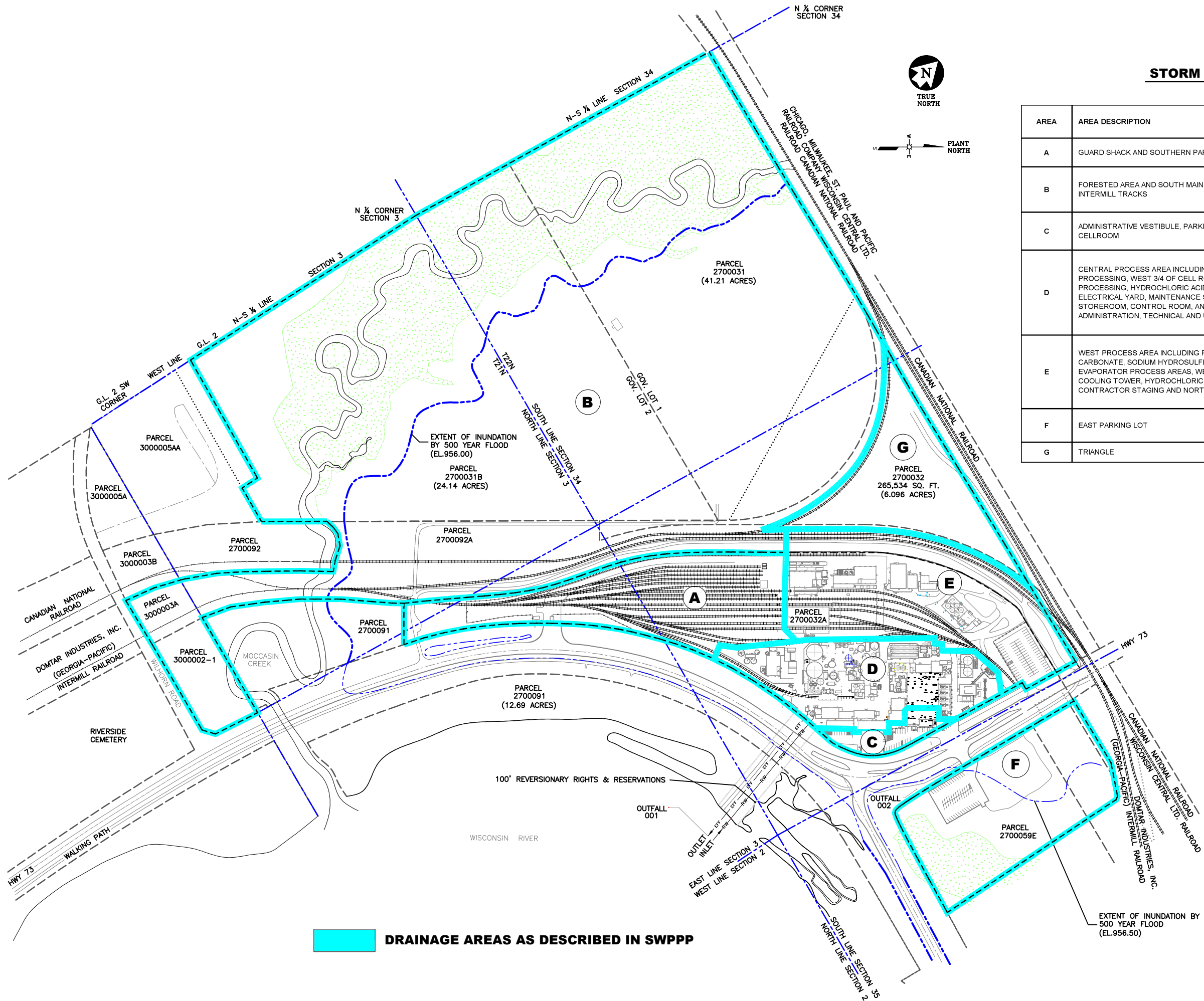
Pearl Engineering Corporation
P.O. BOX 425 WISCONSIN RAPIDS, WI 54486
PH 715.424.4008 FAX 715.424.4009
PROJECT NO. 11-310-150

REFERENCE DWG. NUMBER

REFERENCE OR TITLE

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STORM WATER DRAINAGE AREAS

AREA	AREA DESCRIPTION	PARCEL NUMBER(S)	DRAINAGE	AREA (ACRES)	PERCENT SEALED SURFACE
A	GUARD SHACK AND SOUTHERN PART OF RAIL YARD	2700032A	TO GROUND	7.2	25
B	FORESTED AREA AND SOUTH MAIN LINE AND INTERMILL TRACKS	2700031, 2700092A, 3000003A, 3000002-1	TO GROUND WITH EXCESS TO WETLAND AND MOCCASIN CREEK	77.5	0
C	ADMINISTRATIVE VESTIBULE, PARKING LOT, EAST 1/4 CELLROOM	2700032A	TO GROUND WITH EXCESS TO HIGHWAY 73 DRAINAGE SYSTEM	0.9	85
D	CENTRAL PROCESS AREA INCLUDING BRINE PROCESSING, WEST 3/4 OF CELL ROOM, CHLORINE PROCESSING, HYDROCHLORIC ACID PLANT #1, ELECTRICAL YARD, MAINTENANCE SHOP, STOREROOM, CONTROL ROOM, AND THE ADMINISTRATION, TECHNICAL AND UTILITY BUILDINGS	2700032A	CONTAINED AREAS TO ON-SITE WASTEWATER TREATMENT PLANT. UNCONTAINED AREAS (E.G. ROADWAY) TO OUTFALL 001	5.7	100
E	WEST PROCESS AREA INCLUDING POTASSIUM CARBONATE, SODIUM HYDROSULFITE, AND EVAPORATOR PROCESS AREAS, WEST BOILER, COOLING TOWER, HYDROCHLORIC ACID PLANT #2, CONTRACTOR STAGING AND NORTH PARKING LOT	2700032A, 2700092A	TO GROUND WITH EXCESS TO HIGHWAY 73 DRAINAGE SYSTEM AND OUTFALL 002	8.7	80
F	EAST PARKING LOT	2700059E	TO GROUND WITH EXCESS TO WETLAND	7.3	30
G	TRIANGLE	2700032	TO GROUND	5.2	0

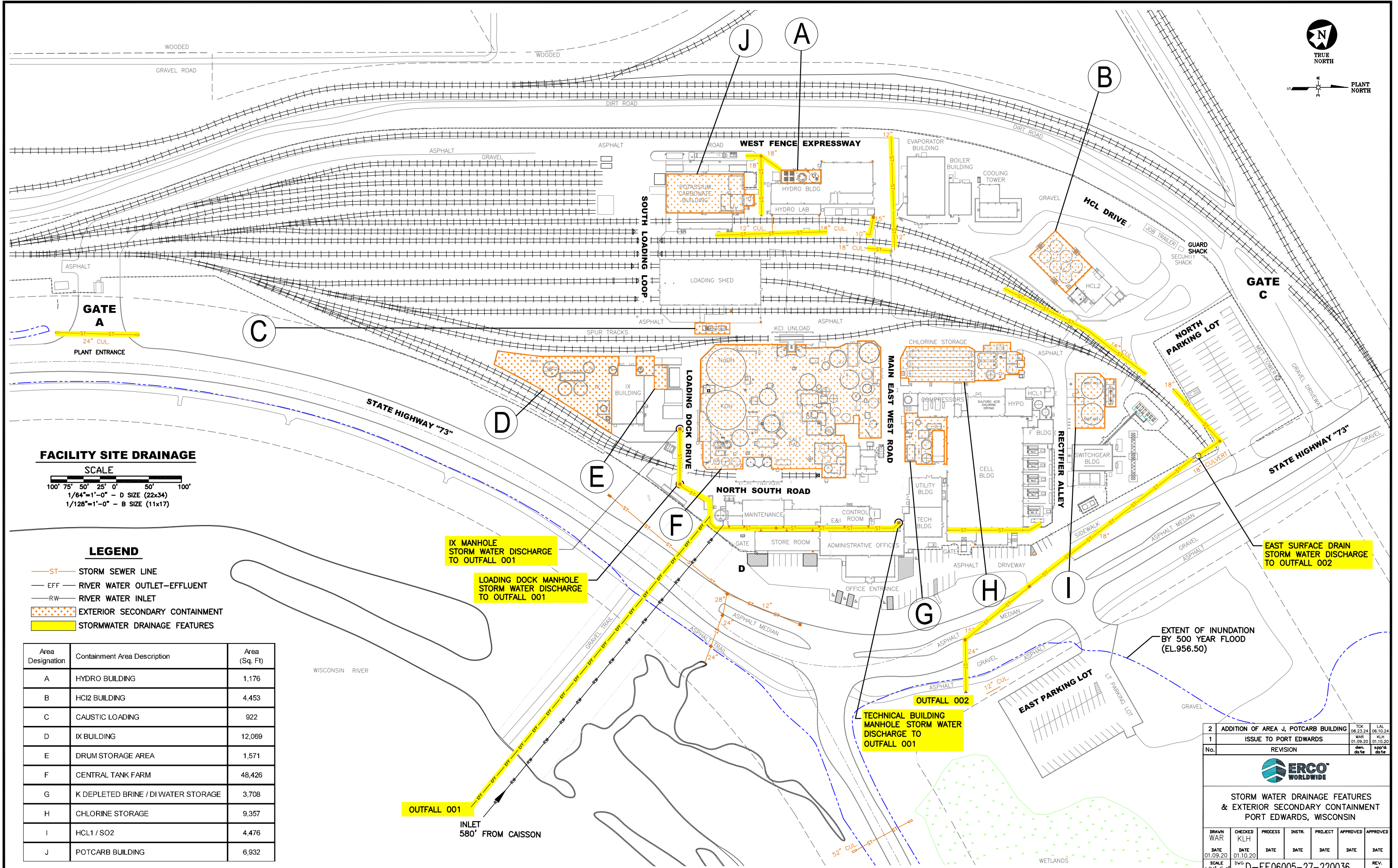
LEGAL & PARCEL ID

ERCO WORLDWIDE
101 STATE HWY 73 S NEKOOSA WI 54457
2700031 - Acres 29.38
2700031B - Acres 35.15
2700032 - Acres 6.10
2700032A - Acres 20.21
2700059E - Acres 7.28
2700092A - Acres 12.02
3000003A - Acres 0.80
3000002-1 - Acres 2.00
TOTAL : 112.94 ACRES

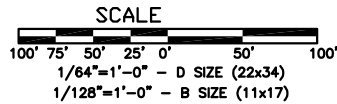
1	ACQUIRED 2700092A, 3000003A, 3000002-1	WAR	11.11.20	KLH	11.11.20
0	ISSUE TO PORT EDWARDS	WAR	01.20.20	KLH	01.20.20
No.	REVISION	des.	date	app'd	date
STORM WATER DRAINAGE AREAS OVERALL PORT EDWARDS, WISCONSIN					
DRAWN WAR	CHECKED	PROCESS	INSTR.	PROJECT	APPROVED
DATE 01.20.20	DATE	DATE	DATE	DATE	DATE
SCALE NONE	DWG D-EE06005-27-220035	REV. 1			

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FACILITY SITE DRAINAGE



LEGEND

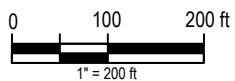
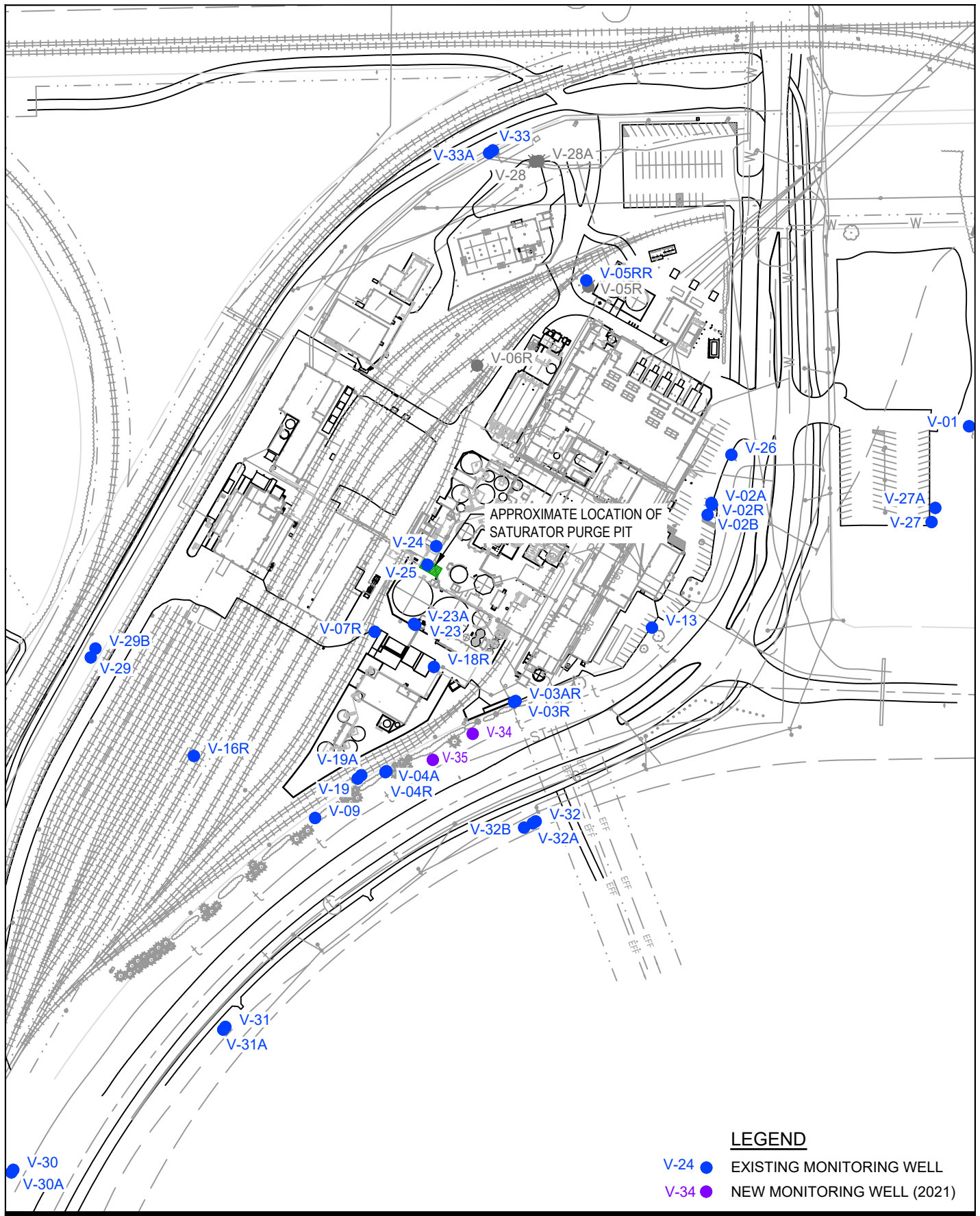
- ST STORM SEWER LINE
- EFF RIVER WATER OUTLET-EFFLUENT
- RW RIVER WATER INLET
- EXTERIOR SECONDARY CONTAINMENT
- STORMWATER DRAINAGE FEATURES

Area Designation	Containment Area Description	Area (Sq. Ft)
A	HYDRO BUILDING	1,176
B	HCL2 BUILDING	4,453
C	CAUSTIC LOADING	922
D	IX BUILDING	12,069
E	DRUM STORAGE AREA	1,571
F	CENTRAL TANK FARM	48,426
G	K DEPLETED BRINE / DI WATER STORAGE	3,708
H	CHLORINE STORAGE	9,357
I	HCL1 / SO2	4,476
J	POTCARB BUILDING	6,932

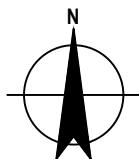
2	ADDITION OF AREA J, POTCARB BUILDING	TOK 08.23.24	LAL 06.10.24
1	ISSUE TO PORT EDWARDS	WAR 01.09.20	KLI 01.10.20
No.	REVISION	dwn. date	app'd. date
STORM WATER DRAINAGE FEATURES & EXTERIOR SECONDARY CONTAINMENT PORT EDWARDS, WISCONSIN			
DRAWN WAR	CHECKED KLI	PROCESS	INSTR.
DATE 01.09.20	DATE 01.10.20	DATE	DATE
SCALE 1/64"=1'-0"	DWG	D-EE06005-27-220036	REV. 2

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Coordinate System:
NAD87 - WISCONSIN
CENTRAL

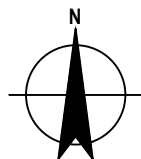
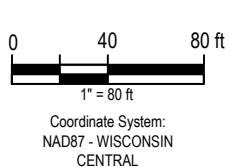
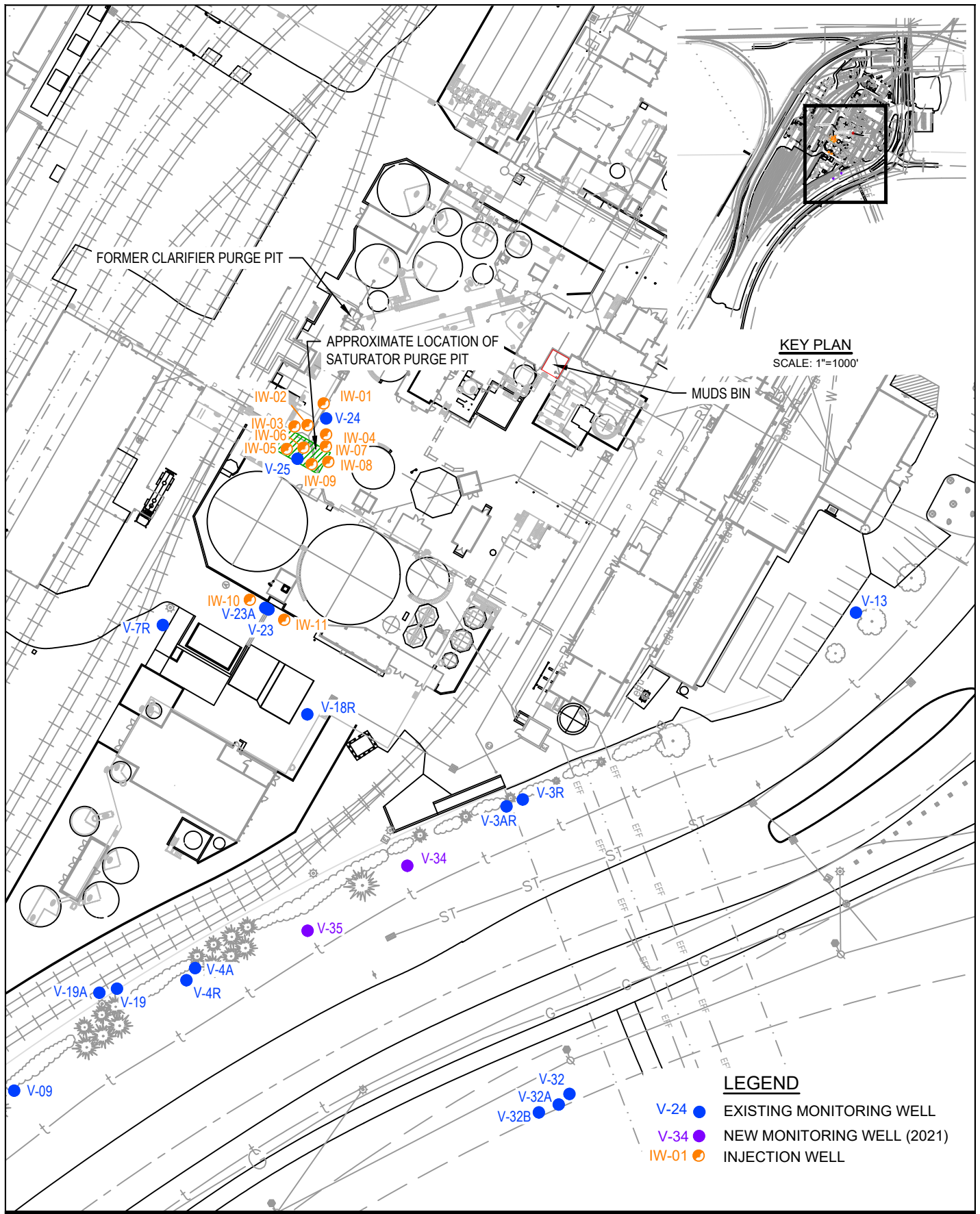


ERCO WORLDWIDE
PORT EDWARDS PLANT
NEKOOSA, WISCONSIN

Project No. 11192391
Date March 2022

SITE PLAN

FIGURE 1



ERCO WORLDWIDE
PORT EDWARDS PLANT
NEKOOSA, WISCONSIN

Project No. 17721
Date November 2024

SITE PLAN

FIGURE 1

Data Selector

See Data Values

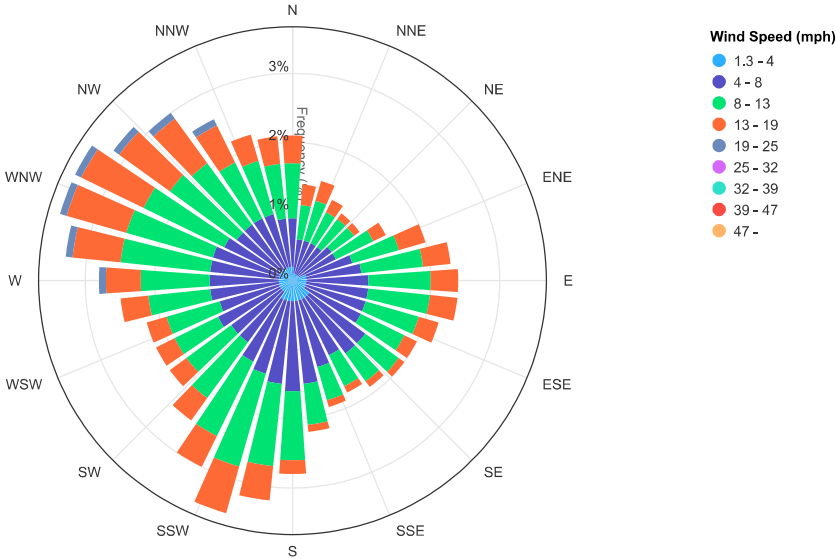
Data CSV Version

Product Description

Send Feedback

WISCONSIN RAPIDS ALEXANDER FIELD (WI) Wind Rose

July 01, 1996 - September 24, 2024
Sub-Interval: January 1 - December 31, 0 - 24



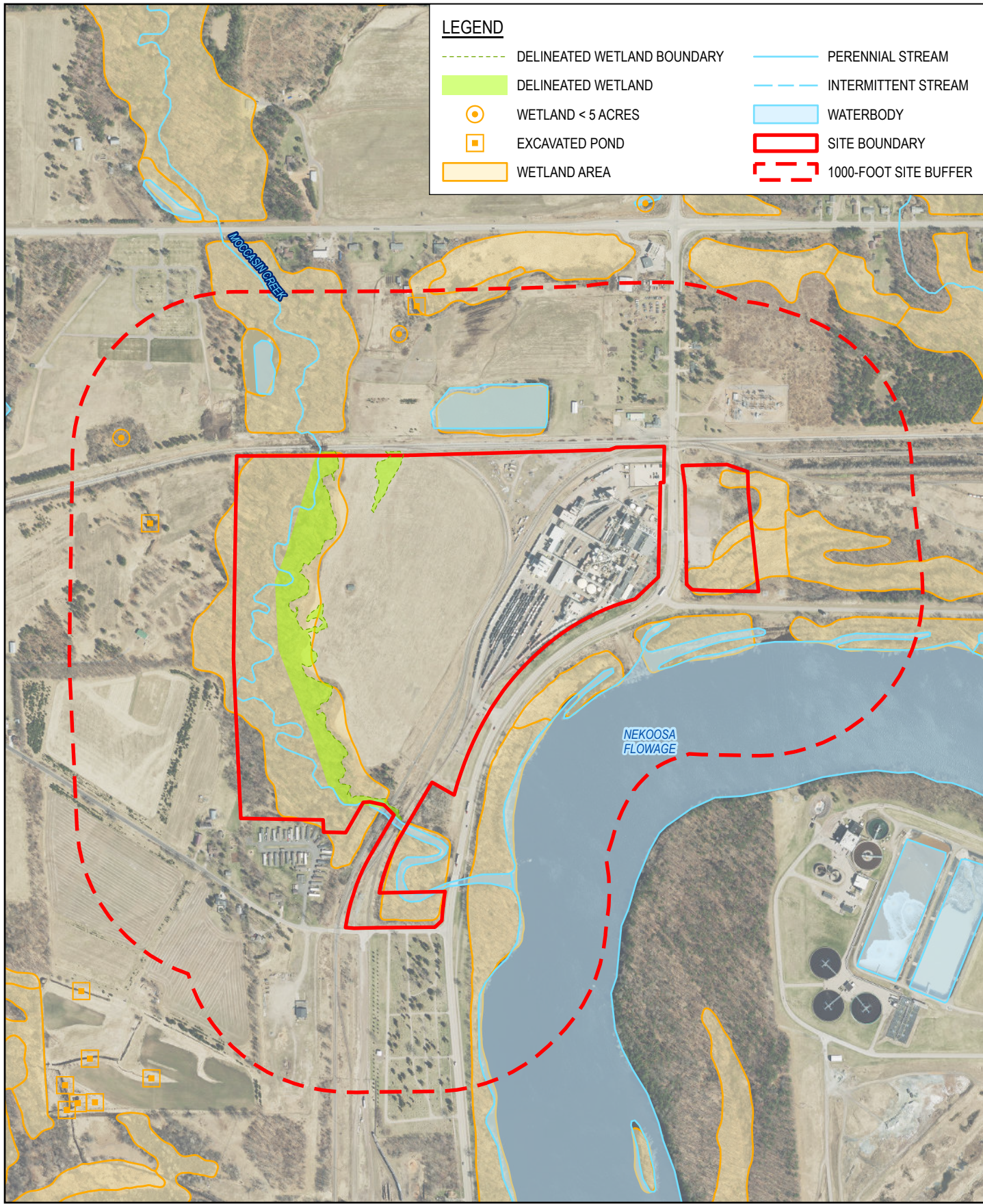
Click and drag to zoom

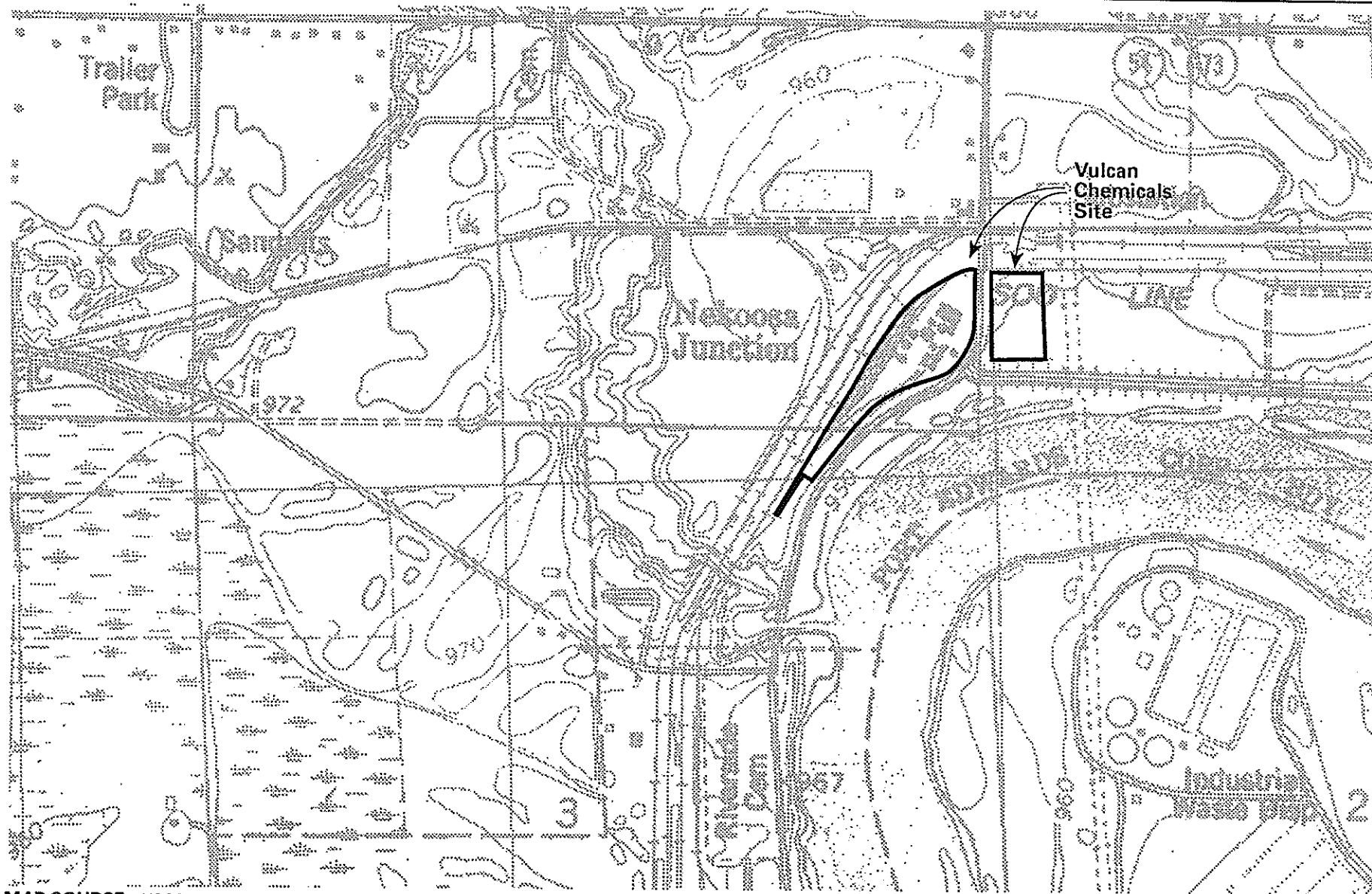
WISCONSIN RAPIDS ALEXANDER FIELD (WI)- Wind Frequency Table (percentage)

Latitude : 44.3590 Start Date : July 01, 1996 Sub Interval Windows
Longitude : -89.8370 End Date : September 24, 2024 Start End
Elevation : 1015 ft. # of Days : 10313 of 10313 Date January 1 December 31
Element : Mean Wind Speed # obs : poss : 241326 of 247512 Hour 0 24

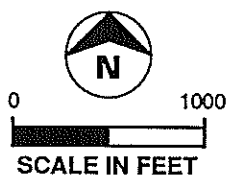
(Greater than or equal to initial interval value and Less than ending interval value.)																																								
Range (mph)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350	Total			
1,3 - 4	0,2	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,2	0,2	0,2	0,2	0,2	0,2	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	7,6			
4 - 8	0,7	0,5	0,5	0,5	0,5	0,6	0,6	0,7	0,8	0,9	0,9	0,9	0,9	0,9	1,0	1,0	0,9	1,0	1,2	1,3	1,2	1,1	1,0	0,9	0,9	1,0	0,9	1,0	1,0	1,0	0,9	0,8	0,8	0,8	0,8	0,7	31,2			
8 - 13	0,8	0,5	0,6	0,5	0,5	0,4	0,6	0,7	0,9	0,9	0,9	0,9	0,8	0,7	0,6	0,5	0,5	0,5	0,6	1,0	1,2	1,4	1,2	1,0	0,8	0,7	0,8	0,9	1,0	1,3	1,3	1,3	1,2	1,1	0,9	0,8	0,8	30,4		
13 - 19	0,4	0,3	0,3	0,2	0,1	0,1	0,2	0,4	0,4	0,4	0,4	0,3	0,2	0,1	0,1	0,1	0,1	0,1	0,2	0,5	0,7	0,5	0,4	0,3	0,3	0,3	0,4	0,5	0,7	0,9	1,0	0,9	0,8	0,6	0,4	0,4	14,1			
19 - 25	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,0	0,0	1,4		
25 - 32	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,1		
32 - 39	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0		
39 - 47	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0		
47 -	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0		
Total	2,0	1,5	1,5	1,4	1,2	1,3	1,6	1,9	2,3	2,5	2,4	2,2	2,1	2,1	1,9	1,8	1,9	2,3	2,8	3,2	3,6	3,0	2,6	2,3	2,3	2,3	2,6	2,8	3,3	3,6	3,5	3,2	2,9	2,6	2,2	2,1	84,9			
Calm (<1.3)																																					15,1			
Ave Speed	8,9	8,9	8,7	8,2	7,8	7,8	8,5	8,9	9,0	8,9	8,6	8,1	7,7	7,1	6,8	6,8	6,9	6,9	7,5	8,4	9,0	8,9	8,8	8,5	8,2	8,5	8,8	9,0	9,5	9,9	10,3	10,4	10,2	9,6	9,1	8,8	7,4			

This tool uses standard hourly observations based on raw (non-quality controlled) decoded metar data from the ACIS-hourly database. Sub-hourly data (one-minute data, five-minute data, and special observations) are not included but are available from NCEI.
Midwestern Regional Climate Center cli-MATE: MRCC Application Tools Environment Generated at: 9/24/2024 12:19:44 PM EDT





MAP SOURCE: USGS 7.5 min. Quadrangle for NEKOOSA, WIS., 1984.



LEGEND

— Vulcan Chemicals
Facility Boundary



Quadrangle Location

Figure 1-1
Vicinity Map
VULCAN CHEMICALS
Draft RFI Report



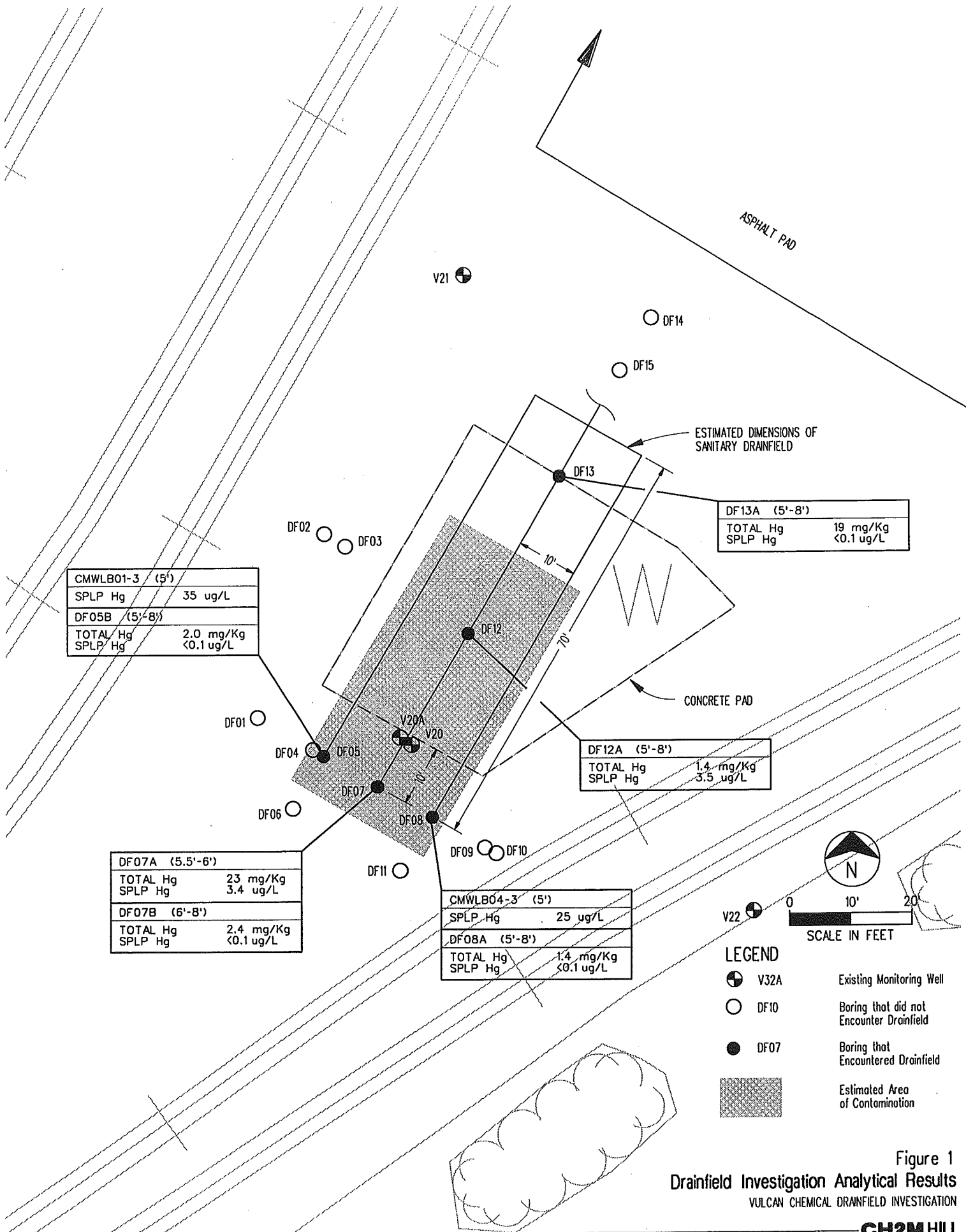


Figure 1
Drainfield Investigation Analytical Results
VULCAN CHEMICAL DRAINFIELD INVESTIGATION

CH2M HILL

Appendix K – References

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