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CITY OF PENDLETON

WWTRRF Facility Plan Update

Volume 2: Appendices

June 2020

WWTRRF Facility Plan Update

City of Pendleton

June 2020

RENEWS: 12/31/22

Murraysmith

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Acknowledgements

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City of Pendleton

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APPENDIX A
NOAA CLIMATE DATA

APPENDIX A

PENDLETON WWTRRF FACILITY PLAN UPDATE
17-2019
Station: NOAA: PENDLETON E OR REGIONAL AIRPORT, OR US (USW00024155)
Last Edit: PMD

STATION	DATE	PRCP (in)	SNOW (in)	AVE TEMP (°F)	MAX TEMP (°F)	MIN TEMP (°F)	
USW00024155	1971-01	0.84	4	40	47.4	32.6	
USW00024155	1971-02	0.69	0.6	39.8	48.8	30.8	
USW00024155	1971-03	1.11	4.9	40.5	49.9	31.1	
USW00024155	1971-04	1.15	0	49.4	61.7	37	
USW00024155	1971-05	1.42	0	60.5	73.6	47.4	
USW00024155	1971-06	1.73	0	63.3	74.9	51.7	
USW00024155	1971-07	0.32	0	76	92.2	59.9	
USW00024155	1971-08	0.14	0	76.8	92.3	61.3	
USW00024155	1971-09	1.03	0	59.1	71.8	46.4	
USW00024155	1971-10	0.7	1.9	51.3	62.9	39.8	YEARLY TOTAL
USW00024155	1971-11	2.74	0	43.7	51.8	35.5	PRCP (in) SNOW (in)
USW00024155	1971-12	2.59	11.8	36.9	43.3	30.4	14.46 23.2
USW00024155	1972-01	0.96	3.6	33.9	41.3	26.6	
USW00024155	1972-02	1.09	6.2	37.4	44.4	30.4	
USW00024155	1972-03	1.48	0.1	47.7	57.5	38	
USW00024155	1972-04	0.68	1.1	47.6	58.7	36.5	
USW00024155	1972-05	1.97	0	60.8	73.8	47.8	
USW00024155	1972-06	0.8	0	68.3	81.5	55.1	
USW00024155	1972-07	0.58	0	74.7	89.8	59.6	
USW00024155	1972-08	0.36	0	76.2	91.3	61.1	
USW00024155	1972-09	0.16	0	61	74.8	47.3	
USW00024155	1972-10	0.58	0	51.1	62.2	39.9	YEARLY TOTAL
USW00024155	1972-11	0.7	0	42.6	50.1	35.1	PRCP (in) SNOW (in)
USW00024155	1972-12	2.31	12.6	27	34.5	19.6	11.67 23.6
USW00024155	1973-01	0.5	2.2	31.2	38.9	23.6	
USW00024155	1973-02	1.09	5.9	38.4	45.6	31.2	
USW00024155	1973-03	0.43	0	45.7	55.6	35.9	
USW00024155	1973-04	0.27	0.1	50.3	62.8	37.7	
USW00024155	1973-05	0.68	0	61.3	75.5	47	
USW00024155	1973-06	0.15	0	66.9	81.2	52.6	
USW00024155	1973-07	0.01	0	75.3	91.7	58.9	
USW00024155	1973-08	0.08	0	71.7	86.7	56.6	
USW00024155	1973-09	1.34	0	63.9	76.8	51.1	
USW00024155	1973-10	1.7	3.2	52.8	63.5	42	YEARLY TOTAL
USW00024155	1973-11	3.76	9.1	42.5	48.5	36.6	PRCP (in) SNOW (in)

STATION	DATE	PRCP (in)	SNOW (in)	AVE TEMP (°F)	MAX TEMP (°F)	MIN TEMP (°F)		
USW00024155	1973-12	4.69	5.3	41.5	47.8	35.2	14.7	25.8
USW00024155	1974-01	0.8	2.6	30.4	36.9	24		
USW00024155	1974-02	1.57	0.5	43.8	51.8	35.7		
USW00024155	1974-03	0.81	0	46.3	55.7	36.9		
USW00024155	1974-04	2.13	0	51.7	61.3	42.1		
USW00024155	1974-05	0.26	0	57.2	68.1	46.4		
USW00024155	1974-06	0.19	0	71.1	86.5	55.7		
USW00024155	1974-07	0.9	0	73.3	87.9	58.7		
USW00024155	1974-08	0	0	75.5	90.4	60.6		
USW00024155	1974-09	0	0	67.5	83.7	51.2		
USW00024155	1974-10	0.29	0	54.8	67.4	42.1	YEARLY TOTAL	
USW00024155	1974-11	1	0	44.7	51.9	37.6	PRCP (in)	SNOW (in)
USW00024155	1974-12	1.59	0	40.5	47.8	33.3	9.54	3.1
USW00024155	1975-01	3.53	16.6	37.1	43.4	30.8		
USW00024155	1975-02	1.31	3.3	39	46.1	31.9		
USW00024155	1975-03	0.65	0	45.2	53.9	36.4		
USW00024155	1975-04	0.97	2.2	47.5	57.4	37.5		
USW00024155	1975-05	0.3	0	59.3	71.8	46.8		
USW00024155	1975-06	0.28	0	65.7	78.7	52.8		
USW00024155	1975-07	0.73	0	78.3	93	63.7		
USW00024155	1975-08	0.67	0	70	84.3	55.8		
USW00024155	1975-09	0	0	66.9	83.3	50.6		
USW00024155	1975-10	1.81	0	54.2	63.7	44.8	YEARLY TOTAL	
USW00024155	1975-11	0.84	5.2	42.3	51	33.5	PRCP (in)	SNOW (in)
USW00024155	1975-12	1.99	3	40.5	46.8	34.1	13.08	30.3
USW00024155	1976-01	1.78	0.3	39.2	45.6	32.8		
USW00024155	1976-02	1.01	0.3	37.9	45.7	30		
USW00024155	1976-03	1.65	0.1	42.8	52.7	32.9		
USW00024155	1976-04	1.09	0	50.2	61	39.3		
USW00024155	1976-05	0.92	0	58.7	72.5	45		
USW00024155	1976-06	0.33	0	63.7	77.1	50.3		
USW00024155	1976-07	0.16	0	73.3	88.2	58.5		
USW00024155	1976-08	1.78	0	67.7	79.8	55.6		
USW00024155	1976-09	0.18	0	67.2	81.7	52.8		
USW00024155	1976-10	0.54	0	53.1	65.8	40.4	YEARLY TOTAL	
USW00024155	1976-11	0.19	0	42.7	49.3	36.1	PRCP (in)	SNOW (in)
USW00024155	1976-12	0.44	1	35.9	43.8	27.9	10.07	1.7
USW00024155	1977-01	0.48	3.1	26.3	30.9	21.7		
USW00024155	1977-02	0.64	0.5	41.4	49.4	33.5		
USW00024155	1977-03	1.51	0.4	44.2	52.7	35.7		
USW00024155	1977-04	0.18	0	55.3	69.3	41.3		
USW00024155	1977-05	1.87	0	55.1	66	44.1		
USW00024155	1977-06	0.37	0	69.1	83.5	54.6		

STATION	DATE	PRCP (in)	SNOW (in)	AVE TEMP (°F)	MAX TEMP (°F)	MIN TEMP (°F)		
USW00024155	1977-07	0.06	0	70.2	84.8	55.7		
USW00024155	1977-08	2.58	0	74.9	89.3	60.4		
USW00024155	1977-09	1.17	0	58.5	69	48		
USW00024155	1977-10	0.51	0	49.9	60.7	39.2	YEARLY TOTAL	
USW00024155	1977-11	2	8.5	38.3	46.4	30.2	PRCP (in)	SNOW (in)
USW00024155	1977-12	2.42	11.5	34.8	39.8	29.8	13.79	24
USW00024155	1978-01	2.82	6.1	32.2	36.6	27.7		
USW00024155	1978-02	1.61	0	39.3	45.2	33.4		
USW00024155	1978-03	1.03	3.9	45.6	55.2	36.1		
USW00024155	1978-04	2.79	0	48	57.2	38.8		
USW00024155	1978-05	0.63	0	54.4	65.6	43.1		
USW00024155	1978-06	0.76	0	66.3	80.3	52.3		
USW00024155	1978-07	0.77	0	72.2	86.8	57.5		
USW00024155	1978-08	2.2	0	69.4	81.8	56.9		
USW00024155	1978-09	0.92	0	60.4	71.4	49.5		
USW00024155	1978-10	0	0	51.7	65.1	38.3	YEARLY TOTAL	
USW00024155	1978-11	2.37	9	33.5	41.7	25.3	PRCP (in)	SNOW (in)
USW00024155	1978-12	1.86	7.4	29.5	36.4	22.6	17.76	26.4
USW00024155	1979-01	1.43	14.8	15.3	20.5	10.1		
USW00024155	1979-02	1.73	2.2	37.7	45.2	30.1		
USW00024155	1979-03	1.18	0	45.9	55.5	36.4		
USW00024155	1979-04	1.17	0	50.4	60.3	40.4		
USW00024155	1979-05	0.39	0	59.5	72.1	46.9		
USW00024155	1979-06	0.21	0	66.6	81	52.2		
USW00024155	1979-07	0.09	0	72.8	89.1	56.5		
USW00024155	1979-08	1.4	0	70.6	83.5	57.7		
USW00024155	1979-09	0.3	0	65.5	79.9	51		
USW00024155	1979-10	1.69	0	54.3	64.9	43.7	YEARLY TOTAL	
USW00024155	1979-11	1.83	4.3	34.7	39.8	29.6	PRCP (in)	SNOW (in)
USW00024155	1979-12	0.63	0	38.2	45.9	30.5	12.05	21.3
USW00024155	1980-01	2.48	16.5	25.6	31.5	19.7		
USW00024155	1980-02	1.4	0.9	36.1	42.2	30		
USW00024155	1980-03	1.6	3.9	41.3	49.4	33.2		
USW00024155	1980-04	0.59	0	51.9	63.6	40.2		
USW00024155	1980-05	2.14	0	56.3	67.3	45.4		
USW00024155	1980-06	1.12	0	60.4	72	48.7		
USW00024155	1980-07	0.77	0	72.1	87	57.2		
USW00024155	1980-08	0.03	0	66.9	81.2	52.5		
USW00024155	1980-09	0.59	0	63.3	76.4	50.3		
USW00024155	1980-10	1.22	0	51.3	62	40.6	YEARLY TOTAL	
USW00024155	1980-11	0.84	2	42	48.6	35.4	PRCP (in)	SNOW (in)
USW00024155	1980-12	1.2	2.7	39.1	45.9	32.3	13.98	26

STATION	DATE	PRCP (in)	SNOW (in)	AVE TEMP (°F)	MAX TEMP (°F)	MIN TEMP (°F)
USW00024155	1981-01	0.89	3.6	36.1	39.8	32.4
USW00024155	1981-02	1.35	1.2	38.8	46.2	31.4
USW00024155	1981-03	1.44	0	45.6	54.9	36.4
USW00024155	1981-04	1.2	0	50.4	60.5	40.4
USW00024155	1981-05	1.59	0	56	65.9	46.1
USW00024155	1981-06	1.53	0	61.5	72.3	50.8
USW00024155	1981-07	0.94	0	69.2	83.6	54.7
USW00024155	1981-08	0.03	0	74.2	90	58.5
USW00024155	1981-09	1.31	0	63.8	77.1	50.5
USW00024155	1981-10	0.86	0	50.6	61.2	39.9
USW00024155	1981-11	1.91	0.6	44.2	53	35.4
USW00024155	1981-12	2.31	5.1	37.2	43.4	31
USW00024155	1982-01	1.54	5.7	35	42.3	27.8
USW00024155	1982-02	0.78	1.5	38	46.5	29.6
USW00024155	1982-03	1.23	1.9	43.5	52.6	34.3
USW00024155	1982-04	0.84	0	47.6	59	36.1
USW00024155	1982-05	0.31	0	56.8	68.7	44.9
USW00024155	1982-06	0.63	0	67.5	79.3	55.8
USW00024155	1982-07	0.51	0	71.1	84.8	57.4
USW00024155	1982-08	0.24	0	71.5	84.6	58.3
USW00024155	1982-09	1.47	0	60.7	72.6	48.7
USW00024155	1982-10	2.68	0	50.8	60.7	40.7
USW00024155	1982-11	0.35	0	37.3	43.8	30.8
USW00024155	1982-12	2.2	1.6	35.7	40.2	31.1
USW00024155	1983-01	0.87	0.2	40.8	47.8	33.8
USW00024155	1983-02	1.57	0.9	43.7	51.1	36.4
USW00024155	1983-03	2.82	0	47.8	55.9	39.7
USW00024155	1983-04	0.7	0	49	59.7	38.3
USW00024155	1983-05	0.73	0	58.9	70.8	47.1
USW00024155	1983-06	1.44	0	62.7	74.7	50.6
USW00024155	1983-07	0.52	0	68.4	81.7	55.1
USW00024155	1983-08	0.56	0	72.7	86.1	59.3
USW00024155	1983-09	0.46	0	58.9	71.1	46.6
USW00024155	1983-10	0.84	0	52.4	63	41.8
USW00024155	1983-11	1.68	0	45.9	52.9	38.8
USW00024155	1983-12	3.43	26.7	23.2	29.2	17.1
USW00024155	1984-01	0.53	1	34.6	41.4	27.7
USW00024155	1984-02	1.74	1.2	39.6	46.6	32.6
USW00024155	1984-03	1.84	0	46.7	55.4	38.1
USW00024155	1984-04	1.7	0	48.2	57.8	38.5
USW00024155	1984-05	1.03	0	54.7	65.5	43.9
USW00024155	1984-06	1.13	0	62.1	72.9	51.2
USW00024155	1984-07	0.06	0	72.9	88.5	57.2

YEARLY TOTAL	
PRCP (in)	SNOW (in)
15.36	10.5

YEARLY TOTAL	
PRCP (in)	SNOW (in)
12.78	10.7

YEARLY TOTAL	
PRCP (in)	SNOW (in)
15.62	27.8

STATION	DATE	PRCP (in)	SNOW (in)	AVE TEMP (°F)	MAX TEMP (°F)	MIN TEMP (°F)	
USW00024155	1984-08	0.44	0	72.2	85.7	58.7	
USW00024155	1984-09	0.39	0	60.4	72.2	48.6	
USW00024155	1984-10	1.02	0	49.1	59.2	39	YEARLY TOTAL
USW00024155	1984-11	2.15	0	41.8	48	35.6	PRCP (in) SNOW (in)
USW00024155	1984-12	0.93	6.3	30.4	36.4	24.3	12.96 8.5
USW00024155	1985-01	0.44	0.8	26.2	28.8	23.7	
USW00024155	1985-02	1.34	12.7	33.5	41.6	25.4	
USW00024155	1985-03	1.14	0.6	43.2	52.6	33.9	
USW00024155	1985-04	0.37	0	53.1	64.3	41.8	
USW00024155	1985-05	0.44	0	58.4	70.6	46.3	
USW00024155	1985-06	0.69	0	65.6	79.4	51.9	
USW00024155	1985-07	0.34	0	77.3	92.5	62.1	
USW00024155	1985-08	0.26	0	68.1	81.5	54.8	
USW00024155	1985-09	2.1	0	57	68	46	
USW00024155	1985-10	0.89	0	50.2	60.8	39.6	YEARLY TOTAL
USW00024155	1985-11	2.11	14.9	26.4	33.5	19.4	PRCP (in) SNOW (in)
USW00024155	1985-12	1.27	9.1	19.5	23.4	15.6	11.39 38.1
USW00024155	1986-01	1.66	0	35.8	42.2	29.5	
USW00024155	1986-02	2.59	7.6	39	45.3	32.7	
USW00024155	1986-03	1.13	0	48.8	57.8	39.7	
USW00024155	1986-04	0.43	0	50	60.6	39.4	
USW00024155	1986-05	1.18	0	58.6	70	47.2	
USW00024155	1986-06	0.03	0	70	83.9	56.1	
USW00024155	1986-07	0.48	0	67.5	80.2	54.9	
USW00024155	1986-08	0.02	0	75.7	90.2	61.2	
USW00024155	1986-09	1.28	0	58.8	68.8	48.9	
USW00024155	1986-10	0.8	0	54	66.1	41.9	YEARLY TOTAL
USW00024155	1986-11	2.13	1.2	42.2	48.6	35.8	PRCP (in) SNOW (in)
USW00024155	1986-12	0.82	6.8	31.5	35.6	27.4	12.55 15.6
USW00024155	1987-01	1.48	5.9	30.4	37.1	23.7	
USW00024155	1987-02	0.64	0	39.1	46.2	31.9	
USW00024155	1987-03	1.39	0	46.4	55.1	37.7	
USW00024155	1987-04	0.47	0	53.9	65.9	41.9	
USW00024155	1987-05	0.85	0	59.6	71.4	47.9	
USW00024155	1987-06	0.39	0	67.2	82.2	52.2	
USW00024155	1987-07	0.34	0	68.8	82.2	55.5	
USW00024155	1987-08	0.05	0	70.5	85.9	55.1	
USW00024155	1987-09	0.03	0	66.1	81	51.3	
USW00024155	1987-10	0	0	54.1	68.7	39.5	YEARLY TOTAL
USW00024155	1987-11	0.76	0.3	42.6	50.9	34.3	PRCP (in) SNOW (in)
USW00024155	1987-12	1.24	2.3	32.7	39.6	25.8	7.64 8.5
USW00024155	1988-01	1.87	10.6	32.3	38.5	26.2	

STATION	DATE	PRCP (in)	SNOW (in)	AVE TEMP (°F)	MAX TEMP (°F)	MIN TEMP (°F)
USW00024155	1988-02	0.12	0	41	51.3	30.8
USW00024155	1988-03	0.95	1.5	44.1	54.6	33.7
USW00024155	1988-04	2.47	0	51.9	62.5	41.2
USW00024155	1988-05	1.57	0	56.8	69	44.5
USW00024155	1988-06	0.31	0	63.9	75.9	51.9
USW00024155	1988-07	0.01	0	72	86.7	57.3
USW00024155	1988-08	0	0	70	84.9	55.1
USW00024155	1988-09	0.31	0	63.3	76.9	49.8
USW00024155	1988-10	0.1	0	58.4	71.1	45.6
USW00024155	1988-11	2.17	0	44.3	51.3	37.3
USW00024155	1988-12	0.37	0	33.9	39.7	28
USW00024155	1989-01	1.87	4.3	38.2	45	31.5
USW00024155	1989-02	1.37	4.9	25	32.8	17.2
USW00024155	1989-03	1.72	4	42.4	50.8	34.1
USW00024155	1989-04	1.57	0	52.9	63.5	42.3
USW00024155	1989-05	1.47	0	55.9	67.2	44.5
USW00024155	1989-06	0.57	0	65.9	79.8	52
USW00024155	1989-07	0.09	0	70.3	85	55.6
USW00024155	1989-08	1.25	0	68.8	81.3	56.2
USW00024155	1989-09	0.12	0	63.6	77.9	49.3
USW00024155	1989-10	0.84	0	51.8	63.2	40.3
USW00024155	1989-11	1.28	0	44.5	53	36.1
USW00024155	1989-12	0.21	1	33.2	39.1	27.2
USW00024155	1990-01	0.78	0	39.6	45.3	33.8
USW00024155	1990-02	0.28	2	37.8	46.5	29.2
USW00024155	1990-03	1.14	1.3	45.7	56.5	34.9
USW00024155	1990-04	1.54	0	54.8	66.2	43.4
USW00024155	1990-05	1.83	0	56.3	67.1	45.6
USW00024155	1990-06	0.58	0	64.7	77.4	52
USW00024155	1990-07	0.18	0	75.2	90.3	60.1
USW00024155	1990-08	0.62	0	72.2	84.7	59.6
USW00024155	1990-09	0	0	68.2	82.9	53.5
USW00024155	1990-10	0.78	0	51.2	61.7	40.7
USW00024155	1990-11	0.87	0	45.4	53.4	37.3
USW00024155	1990-12	0.84	6.4	25.5	34.5	16.4
USW00024155	1991-01	0.98	1.6	31.2	38.3	24.1
USW00024155	1991-02	0.57	0	44.7	52.9	36.6
USW00024155	1991-03	1.01	0.6	42.6	51.9	33.3
USW00024155	1991-04	0.71	0	49.6	60.2	38.9
USW00024155	1991-05	3.19	0	53.9	63.8	43.9
USW00024155	1991-06	2.14	0	59.6	70.8	48.3
USW00024155	1991-07	0.24	0	71.5	86.5	56.5
USW00024155	1991-08	0.42	0	73.3	87.9	58.7

YEARLY TOTAL	
PRCP (in)	SNOW (in)
10.25	12.1

YEARLY TOTAL	
PRCP (in)	SNOW (in)
12.36	14.2

YEARLY TOTAL	
PRCP (in)	SNOW (in)
9.44	9.7

STATION	DATE	PRCP (in)	SNOW (in)	AVE TEMP (°F)	MAX TEMP (°F)	MIN TEMP (°F)
USW00024155	1991-09	0	0	64.8	79.7	50
USW00024155	1991-10	0.92	2.3	51.6	63.4	39.7
USW00024155	1991-11	2.69	1	41.2	47.6	34.8
USW00024155	1991-12	0.67	0	36.9	42.2	31.5
USW00024155	1992-01	0.41	0.8	38.6	45	32.3
USW00024155	1992-02	1.04	0	42.4	49.4	35.3
USW00024155	1992-03	0.26	0	47.7	58.7	36.8
USW00024155	1992-04	1.22	0	52.7	63.5	42
USW00024155	1992-05	0.07	0	62.3	77.1	47.6
USW00024155	1992-06	0.94	0	70.4	83.9	56.8
USW00024155	1992-07	0.7	0	71.9	84.7	59
USW00024155	1992-08	0.43	0	72.6	86.9	58.3
USW00024155	1992-09	0.42	0	61.8	74.5	49.2
USW00024155	1992-10	1.31	0	54.2	65.4	42.9
USW00024155	1992-11	1.14	0.2	39.7	45.4	34.1
USW00024155	1992-12	0.74	7.6	32	38.3	25.7
USW00024155	1993-01	1.8	25.1	25	31.7	18.4
USW00024155	1993-02	0.8	14.8	28.1	34.8	21.5
USW00024155	1993-03	1.49	1.8	41.9	50.5	33.3
USW00024155	1993-04	1.85	0	50.3	59.9	40.7
USW00024155	1993-05	1.51	0	61.8	73.6	50
USW00024155	1993-06	0.71	0	62.9	74.7	51
USW00024155	1993-07	1.44	0	65.4	76.7	54
USW00024155	1993-08	2.19	0	68	81.8	54.1
USW00024155	1993-09	0	0	64.3	79.1	49.5
USW00024155	1993-10	0.22	0	54.6	66.6	42.5
USW00024155	1993-11	0.94	0.7	34.6	45	24.1
USW00024155	1993-12	0.92	0.4	35.6	41	30.2
USW00024155	1994-01	1.57	0	41	48.6	33.3
USW00024155	1994-02	1.71	16.8	34.8	42	27.7
USW00024155	1994-03	0.56	0.2	46.7	58.7	34.7
USW00024155	1994-04	0.45	0	54.3	65.5	43.2
USW00024155	1994-05	2.56	0	60.1	71.8	48.4
USW00024155	1994-06	0.78	0	64.4	78	50.7
USW00024155	1994-07	0.38	0	75.3	90.6	60
USW00024155	1994-08	0	0	71.7	85.8	57.5
USW00024155	1994-09	0.36	0	67.2	81.1	53.3
USW00024155	1994-10	1.28	0	51.6	62.7	40.5
USW00024155	1994-11	1.98	0.6	40.4	47.1	33.7
USW00024155	1994-12	0.85	3.9	35.3	41.6	28.9
USW00024155	1995-01	2.53	2	34.9	41.1	28.7
USW00024155	1995-02	1.07	7.2	41.7	49.9	33.5

YEARLY TOTAL	
PRCP (in)	SNOW (in)
13.54	5.5

YEARLY TOTAL	
PRCP (in)	SNOW (in)
8.68	8.6

YEARLY TOTAL	
PRCP (in)	SNOW (in)
13.87	42.8

YEARLY TOTAL	
PRCP (in)	SNOW (in)
12.48	21.5

STATION	DATE	PRCP (in)	SNOW (in)	AVE TEMP (°F)	MAX TEMP (°F)	MIN TEMP (°F)
USW00024155	1995-03	1.93	0	45.2	55.7	34.8
USW00024155	1995-04	2.28	0	48.9	58.7	39.2
USW00024155	1995-05	0.98	0	57.7	69.9	45.5
USW00024155	1995-06	2.31	0	62	74.6	49.5
USW00024155	1995-07	0.24	0	72	87	57
USW00024155	1995-08	0.29	0	67.4	82.5	52.2
USW00024155	1995-09	0.55	0	66	80.6	51.4
USW00024155	1995-10	1.2	0	50.2	61	39.4
USW00024155	1995-11	2.18	0	46.1	53.9	38.2
USW00024155	1995-12	1.74	0	34.4	40	28.9
USW00024155	1996-01	1.89	0	34.4	41.9	27
USW00024155	1996-02	1.8	-	35.4	45.7	25.1
USW00024155	1996-03	1	-	43.3	52.6	34
USW00024155	1996-04	1.09	-	51.9	63.7	40.2
USW00024155	1996-05	1.99	-	54.5	65.5	43.5
USW00024155	1996-06	0.47	-	64	78.4	49.5
USW00024155	1996-07	0.06	-	74.6	91.4	57.9
USW00024155	1996-08	0.05	-	72	87.9	56.3
USW00024155	1996-09	0.61	-	61	74.3	47.7
USW00024155	1996-10	1.22	-	51.1	62	40.1
USW00024155	1996-11	1.96	-	40.3	47.9	32.7
USW00024155	1996-12	2.33	10.1	35.4	42.6	28.1
USW00024155	1997-01	1.85	3.2	32.6	39.3	25.9
USW00024155	1997-02	0.39	-	38.6	45.2	32
USW00024155	1997-03	1.17	-	45.4	54.9	35.9
USW00024155	1997-04	1.56	0	48.6	58.9	38.3
USW00024155	1997-05	0.33	-	59.8	73	46.6
USW00024155	1997-06	0.76	-	63.1	76	50.1
USW00024155	1997-07	0.66	-	70.4	86.3	54.5
USW00024155	1997-08	0.07	-	73.1	89	57.2
USW00024155	1997-09	0.77	-	64.9	79	50.7
USW00024155	1997-10	1.43	-	51.4	63.3	39.5
USW00024155	1997-11	1.64	-	42.6	50.4	34.9
USW00024155	1997-12	1.06	4.2	34.9	40.4	29.3
USW00024155	1998-01	2.62	-	37.9	46.3	29.6
USW00024155	1998-02	1.2	0	42.9	51.5	34.2
USW00024155	1998-03	1.02	-	45.8	56.2	35.5
USW00024155	1998-04	1.28	-	50.3	62.1	38.4
USW00024155	1998-05	1.53	-	56.2	66.5	45.9
USW00024155	1998-06	0.76	-	65.4	78.8	51.9
USW00024155	1998-07	0.68	-	77.3	93.1	61.5
USW00024155	1998-08	0	-	74.6	91.1	58
USW00024155	1998-09	1.11	0	67.7	81.5	54

YEARLY TOTAL	
PRCP (in)	SNOW (in)
17.3	9.2

YEARLY TOTAL	
PRCP (in)	SNOW (in)
14.47	10.1

YEARLY TOTAL	
PRCP (in)	SNOW (in)
11.69	7.4

STATION	DATE	PRCP (in)	SNOW (in)	AVE TEMP (°F)	MAX TEMP (°F)	MIN TEMP (°F)		
USW00024155	1998-10	0.6	0	50.9	63.1	38.6	YEARLY TOTAL	
USW00024155	1998-11	2.31	-	45.5	52.2	38.7	PRCP (in)	SNOW (in)
USW00024155	1998-12	1.37	0.8	36.1	43.1	29.2	14.48	0.8
USW00024155	1999-01	0.81	0	40.9	47.6	34.3		
USW00024155	1999-02	1.23	2.4	42.3	50.5	34.1		
USW00024155	1999-03	0.74	0	43.4	53.6	33.2		
USW00024155	1999-04	0.51	0	47.3	59.9	34.7		
USW00024155	1999-05	1.27	0	54.1	66.7	41.5		
USW00024155	1999-06	0.51	0	63.7	77.4	50		
USW00024155	1999-07	0	0	70	86.5	53.5		
USW00024155	1999-08	0.55	0	72.5	87.2	57.8		
USW00024155	1999-09	0.01	0	62.5	78.7	46.3		
USW00024155	1999-10	1.5	0	50.8	64.6	37	YEARLY TOTAL	
USW00024155	1999-11	1.24	0	46	54.4	37.6	PRCP (in)	SNOW (in)
USW00024155	1999-12	1.02	0.5	38	43.6	32.4	9.39	2.9
USW00024155	2000-01	1.99	5.7	35.5	40.8	30.2		
USW00024155	2000-02	2.98	4.5	39.2	45.7	32.7		
USW00024155	2000-03	2.43	1	44.1	54	34.2		
USW00024155	2000-04	0.69	0	54	67.1	40.9		
USW00024155	2000-05	1.6	0	58.2	70.1	46.4		
USW00024155	2000-06	0.72	0	65.9	80.7	51		
USW00024155	2000-07	0.07	0	71.6	87.5	55.7		
USW00024155	2000-08	0	0	70.7	87.1	54.2		
USW00024155	2000-09	2.01	0	61.5	74.6	48.5		
USW00024155	2000-10	2.07	0	49.7	59.6	39.7	YEARLY TOTAL	
USW00024155	2000-11	1.22	0.7	35	41.4	28.7	PRCP (in)	SNOW (in)
USW00024155	2000-12	0.58	2.6	31	35.2	26.8	16.36	14.5
USW00024155	2001-01	0.96	3.1	32.7	36.8	28.6		
USW00024155	2001-02	0.62	0.5	35.5	42.2	28.8		
USW00024155	2001-03	1.33	0	44.4	55	33.7		
USW00024155	2001-04	1.9	0	47.3	57.5	37.1		
USW00024155	2001-05	0.45	0	58.6	73.6	43.7		
USW00024155	2001-06	1.12	0	62.1	75.4	48.7		
USW00024155	2001-07	0.52	0	70.5	85.8	55.2		
USW00024155	2001-08	0.08	0	73.2	89.5	56.9		
USW00024155	2001-09	0.09	0	66.2	82	50.4		
USW00024155	2001-10	1.54	0	51.2	62.6	39.8	YEARLY TOTAL	
USW00024155	2001-11	1.15	0	42.2	49.5	34.9	PRCP (in)	SNOW (in)
USW00024155	2001-12	0.7	3	36.6	42.2	30.9	10.46	6.6
USW00024155	2002-01	0.59	1.5	37	43.2	30.7		
USW00024155	2002-02	0.76	0	38.8	48.9	28.7		
USW00024155	2002-03	0.82	0.3	40.9	49.9	32		

STATION	DATE	PRCP (in)	SNOW (in)	AVE TEMP (°F)	MAX TEMP (°F)	MIN TEMP (°F)		
USW00024155	2002-04	1.48	0	49.9	62.1	37.7		
USW00024155	2002-05	1.1	0	56.3	69	43.6		
USW00024155	2002-06	1.3	0	66.9	80.4	53.3		
USW00024155	2002-07	0.02	0	75	91	59.1		
USW00024155	2002-08	0.03	0	70.1	85.4	54.9		
USW00024155	2002-09	0.2	0	63.5	78	49		
USW00024155	2002-10	0.73	0	48.5	61.3	35.8	YEARLY TOTAL	
USW00024155	2002-11	0.55	0	40.9	49	32.9	PRCP (in)	SNOW (in)
USW00024155	2002-12	2.23	2.1	39.3	44.6	34.1	9.81	3.9
USW00024155	2003-01	2.93	0.3	40.6	45.3	35.9		
USW00024155	2003-02	1.07	0	38.7	46.5	30.8		
USW00024155	2003-03	1.52	0	48.6	57.6	39.6		
USW00024155	2003-04	1.63	0	49.8	60.4	39.3		
USW00024155	2003-05	0.78	0	57.2	69.3	45.1		
USW00024155	2003-06	0	0	67.7	83.3	52		
USW00024155	2003-07	0.01	0	76.2	93.5	58.9		
USW00024155	2003-08	0.09	0	73	88.7	57.3		
USW00024155	2003-09	0.63	0	65.8	80.2	51.4		
USW00024155	2003-10	0.42	0	55.6	68.7	42.6	YEARLY TOTAL	
USW00024155	2003-11	1	0.1	38.7	47.7	29.8	PRCP (in)	SNOW (in)
USW00024155	2003-12	2.72	14	35.5	41.6	29.4	12.8	14.4
USW00024155	2004-01	2.33	10	28.5	33.7	23.3		
USW00024155	2004-02	1.76	2.2	39.6	47.1	32		
USW00024155	2004-03	0.72	0	49.1	61.1	37.2		
USW00024155	2004-04	1.29	0	52.4	65.4	39.5		
USW00024155	2004-05	1.81	0	58.6	69.6	47.6		
USW00024155	2004-06	1.47	0	67	80.7	53.3		
USW00024155	2004-07	0.48	0	75.5	91.2	59.9		
USW00024155	2004-08	0.98	0	74.4	88.3	60.5		
USW00024155	2004-09	0.45	0	62.5	75.1	49.9		
USW00024155	2004-10	0.78	0	55.4	66.8	44	YEARLY TOTAL	
USW00024155	2004-11	0.88	0.4	42.8	51.5	34.1	PRCP (in)	SNOW (in)
USW00024155	2004-12	0.65	0.8	39.4	46.7	32.2	13.6	13.4
USW00024155	2005-01	0.49	2.7	35.5	42.2	28.9		
USW00024155	2005-02	0.27	1.2	37.5	48.9	26		
USW00024155	2005-03	1.07	0	46.8	58.3	35.3		
USW00024155	2005-04	0.94	0	50.4	61.9	38.9		
USW00024155	2005-05	2.61	0	59	70.4	47.5		
USW00024155	2005-06	0.81	0	63	76.9	49		
USW00024155	2005-07	0.2	0	73.4	90	56.8		
USW00024155	2005-08	0.02	0	72.6	89.2	55.9		
USW00024155	2005-09	0.28	0	61	75.6	46.5		
USW00024155	2005-10	1.33	0	52.9	64.7	41.1	YEARLY TOTAL	

STATION	DATE	PRCP (in)	SNOW (in)	AVE TEMP (°F)	MAX TEMP (°F)	MIN TEMP (°F)		
USW00024155	2005-11	1.11	0.2	38.7	45.6	31.8	PRCP (in)	SNOW (in)
USW00024155	2005-12	2.57	1.7	30	36.8	23.2	11.7	5.8
USW00024155	2006-01	2.19	0	42.2	49.7	34.6		
USW00024155	2006-02	0.37	0	35.9	45.9	26		
USW00024155	2006-03	1.88	0	43.9	53.6	34.1		
USW00024155	2006-04	1.57	0	50.5	62.3	38.7		
USW00024155	2006-05	1.17	0	58.9	72.5	45.3		
USW00024155	2006-06	1.96	0	65.5	78.5	52.4		
USW00024155	2006-07	0.07	0	75.5	92.6	58.4		
USW00024155	2006-08	0.02	0	71	87.4	54.6		
USW00024155	2006-09	0.37	0	63.9	78.8	48.9		
USW00024155	2006-10	0.5	0	50.1	62.1	38	YEARLY TOTAL	
USW00024155	2006-11	2.06	0.8	42.3	50.4	34.2	PRCP (in)	SNOW (in)
USW00024155	2006-12	1.67	0	32.9	38.4	27.3	13.83	0.8
USW00024155	2007-01	0.45	1.2	30.7	36.9	24.4		
USW00024155	2007-02	1.63	2.5	38.3	45.5	31.2		
USW00024155	2007-03	1.22	0.3	46.4	57	35.9		
USW00024155	2007-04	0.87	0	49.4	60.9	38		
USW00024155	2007-05	0.65	0	58.2	72.5	43.8		
USW00024155	2007-06	0.88	0	64.8	78.5	51.1		
USW00024155	2007-07	0.21	0	75.8	92.1	59.6		
USW00024155	2007-08	0.44	0	69.3	84.9	53.8		
USW00024155	2007-09	0.6	0	61	75.3	46.7		
USW00024155	2007-10	0.96	0	49.6	61.7	37.5	YEARLY TOTAL	
USW00024155	2007-11	2.05	8.7	39.5	48.5	30.6	PRCP (in)	SNOW (in)
USW00024155	2007-12	1.57	8.1	35.6	42.4	28.7	11.53	20.8
USW00024155	2008-01	1.82	10.7	31.5	39.6	23.4		
USW00024155	2008-02	0.44	4.3	40.7	49.6	31.9		
USW00024155	2008-03	1.13	2.8	41.7	52.2	31.2		
USW00024155	2008-04	0.23	0	46.2	58.5	33.9		
USW00024155	2008-05	1.62	0	58.9	71.6	46.3		
USW00024155	2008-06	1.37	0	63.4	77.7	49		
USW00024155	2008-07	0	0	71.7	87.9	55.5		
USW00024155	2008-08	0.76	0	70.8	85.7	55.9		
USW00024155	2008-09	0.13	0	62.3	78.3	46.3		
USW00024155	2008-10	0.32	0	50.7	64	37.3	YEARLY TOTAL	
USW00024155	2008-11	1.39	0	43.6	52.2	35.1	PRCP (in)	SNOW (in)
USW00024155	2008-12	2.58	32.6	28.8	36.8	20.7	11.79	50.4
USW00024155	2009-01	1.39	6.6	33.5	39.8	27.2		
USW00024155	2009-02	0.99	4.7	35.8	43.2	28.5		
USW00024155	2009-03	2.62	1.5	40.3	49.4	31.2		
USW00024155	2009-04	0.96	0.5	48.9	61	36.9		
USW00024155	2009-05	1.17	0	58.6	72.2	45.1		

STATION	DATE	PRCP (in)	SNOW (in)	AVE TEMP (°F)	MAX TEMP (°F)	MIN TEMP (°F)	
USW00024155	2009-06	1.06	0	65.7	78.7	52.6	
USW00024155	2009-07	0	0	74.8	91.8	57.7	
USW00024155	2009-08	1.04	0	72.2	86.9	57.5	
USW00024155	2009-09	0.04	0	64.8	80.4	49.3	
USW00024155	2009-10	1.5	0	47.8	58.5	37.2	YEARLY TOTAL
USW00024155	2009-11	0.91	0	41.9	51.7	32.1	PRCP (in) SNOW (in)
USW00024155	2009-12	1.52	6.7	27.1	33.7	20.6	13.2 20
USW00024155	2010-01	1.75	0	39.6	46	33.2	
USW00024155	2010-02	0.78	0	42.5	51.4	33.5	
USW00024155	2010-03	0.91	0	45.3	57.8	32.8	
USW00024155	2010-04	2.05	0	49.1	60.9	37.3	
USW00024155	2010-05	2.97	0	53.9	65	42.8	
USW00024155	2010-06	2.05	0	62.1	73.5	50.7	
USW00024155	2010-07	0.08	0	71.4	87.8	55	
USW00024155	2010-08	0.49	0	70.2	86	54.4	
USW00024155	2010-09	1	0	63.2	76	50.5	
USW00024155	2010-10	1.75	0	52.2	63.1	41.2	YEARLY TOTAL
USW00024155	2010-11	1.86	8.6	37.2	45.5	28.8	PRCP (in) SNOW (in)
USW00024155	2010-12	3.13	9.8	34.4	41.1	27.8	18.82 18.4
USW00024155	2011-01	1.41	4	35.4	42.6	28.2	
USW00024155	2011-02	1.32	1.3	36.4	44.9	27.9	
USW00024155	2011-03	1.7	0	43.9	53.7	34.1	
USW00024155	2011-04	0.94	0	45.1	55.7	34.6	
USW00024155	2011-05	2.76	0	53.3	64.8	41.9	
USW00024155	2011-06	1.46	0	60.3	72.4	48.3	
USW00024155	2011-07	0.25	0	67.8	83.7	51.9	
USW00024155	2011-08	0.08	0	71.7	88.8	54.6	
USW00024155	2011-09	0.03	0	66.4	83.2	49.6	
USW00024155	2011-10	0.85	0	51.6	63	40.3	YEARLY TOTAL
USW00024155	2011-11	0.83	1.6	41	51	31	PRCP (in) SNOW (in)
USW00024155	2011-12	0.41	0.1	32.1	40.5	23.6	12.04 7
USW00024155	2012-01	1.55	2.7	35.8	46.2	25.4	
USW00024155	2012-02	1.39	0.9	36.8	45	28.6	
USW00024155	2012-03	1.93	2.3	43.6	54.8	32.5	
USW00024155	2012-04	2.5	0	51.6	64.1	39.2	
USW00024155	2012-05	0.67	0	56.7	70.1	43.2	
USW00024155	2012-06	1.55	0	61.8	74.8	48.8	
USW00024155	2012-07	0.42	0	72.4	89.1	55.7	
USW00024155	2012-08	0	0	72.7	90.6	54.8	
USW00024155	2012-09	0	0	64.8	81.6	48.1	
USW00024155	2012-10	1.59	0	51.6	63.8	39.3	YEARLY TOTAL
USW00024155	2012-11	1.67	0	42.7	50	35.5	PRCP (in) SNOW (in)

STATION	DATE	PRCP (in)	SNOW (in)	AVE TEMP (°F)	MAX TEMP (°F)	MIN TEMP (°F)		
USW00024155	2012-12	1.19	1.9	37.7	43.9	31.6	14.46	7.8
USW00024155	2013-01	0.98	0.1	31.2	36.6	25.8		
USW00024155	2013-02	0.39	0	39.3	48.5	30.1		
USW00024155	2013-03	0.53	0.1	45.7	56.9	34.4		
USW00024155	2013-04	0.96	0	49.4	61.1	37.6		
USW00024155	2013-05	1.18	0	58.1	72.1	44		
USW00024155	2013-06	0.88	0	65.3	79.4	51.1		
USW00024155	2013-07	0.06	0	75.3	93.3	57.4		
USW00024155	2013-08	0.32	0	72.9	89.3	56.5		
USW00024155	2013-09	2.21	0	65.2	77.9	52.4		
USW00024155	2013-10	0.32	0	49	61.7	36.3	YEARLY TOTAL	
USW00024155	2013-11	0.67	0	38.6	47.5	29.8	PRCP (in)	SNOW (in)
USW00024155	2013-12	0.8	6.5	30.1	39.3	20.8	9.3	6.7
USW00024155	2014-01	0.73	0	35	41.3	28.7		
USW00024155	2014-02	1.63	14.2	33.3	39.2	27.5		
USW00024155	2014-03	2.26	1	45.4	57.1	33.7		
USW00024155	2014-04	1.02	0	51.1	63.5	38.6		
USW00024155	2014-05	0.83	0	60.2	74.6	45.7		
USW00024155	2014-06	1.02	0	65.3	79	51.6		
USW00024155	2014-07	0.22	0	77.6	94.5	60.8		
USW00024155	2014-08	0.61	0	73.7	89.1	58.3		
USW00024155	2014-09	0.22	0	64.9	79.5	50.2		
USW00024155	2014-10	0.61	0	57.7	70.1	45.3	YEARLY TOTAL	
USW00024155	2014-11	1.3	4.6	36.9	45.1	28.8	PRCP (in)	SNOW (in)
USW00024155	2014-12	2.8	2.2	36.1	42	30.2	13.25	22
USW00024155	2015-01	0.72	0.4	36.1	42.2	30		
USW00024155	2015-02	0.84	0	44	53.6	34.4		
USW00024155	2015-03	1.19	0	49.5	61.6	37.5		
USW00024155	2015-04	0.4	0	49	61.7	36.2		
USW00024155	2015-05	1.81	0	60.5	73.8	47.2		
USW00024155	2015-06	0.06	0	72.8	89.3	56.3		
USW00024155	2015-07	0	0	76.1	91.6	60.7		
USW00024155	2015-08	0.01	0	72.4	87.8	56.9		
USW00024155	2015-09	0.81	0	61.3	75.2	47.4		
USW00024155	2015-10	0.82	0	56.2	69	43.5	YEARLY TOTAL	
USW00024155	2015-11	1.19	1.6	38.5	45.6	31.3	PRCP (in)	SNOW (in)
USW00024155	2015-12	2.28	2.5	37.1	43.5	30.6	10.13	4.5
USW00024155	2016-01	1.51	0	35.6	41.9	29.3		
USW00024155	2016-02	0.87	0	43.1	53	33.2		
USW00024155	2016-03	1.63	0	46.6	57.7	35.5		
USW00024155	2016-04	0.42	0	56.2	69.4	43		
USW00024155	2016-05	1.19	0	60.2	73.7	46.8		
USW00024155	2016-06	0.93	0	67.1	82.1	52.1		

STATION	DATE	PRCP (in)	SNOW (in)	AVE TEMP (°F)	MAX TEMP (°F)	MIN TEMP (°F)
USW00024155	2016-07	0.8	0	71.4	86	56.8
USW00024155	2016-08	0.07	0	72	88.3	55.7
USW00024155	2016-09	0.69	0	61.4	74.6	48.2
USW00024155	2016-10	2.33	0	52.7	61.8	43.6
USW00024155	2016-11	0.91	0	46.9	55.7	38.1
USW00024155	2016-12	2.29	18.5	28.2	35.4	20.9
USW00024155	2017-01	1.65	18.6	22.6	29.2	16.1
USW00024155	2017-02	2.28	7.1	35.2	42.8	27.6
USW00024155	2017-03	2.35	0.3	45.8	54.6	37
USW00024155	2017-04	1.94	0	49.4	59.8	38.9
USW00024155	2017-05	0.95	0	57.7	70.8	44.5
USW00024155	2017-06	2.15	0	65.6	79.4	51.7
Global Averages		12.67	13.71	52.10	63.00	41.19

YEARLY TOTAL	
PRCP (in)	SNOW (in)
13.64	18.5

YEARLY TOTAL	
PRCP (in)	SNOW (in)
11.32	26

PENDLETON WWTRRF FACILITY PLAN UPDATE
17-2019
Station: NOAA:PENDLETON DOWNTOWN, OR US (USC00356541)
Last Edit: PMD
Last Save: 7/19/2017

STATION	DATE	PRCP (IN)	SNOW (IN)	AVE TEMP (°F)	MAX TEMP (°F)	MIN TEMP (°F)	
USC00356541	1987-05	1.58	0	61.9	75.5	48.4	
USC00356541	1987-06	0.88	0	67.2	83.2	51.3	
USC00356541	1987-07	0.62	0	70.2	84.8	55.6	
USC00356541	1987-09	0.02	0	64.8	83.9	45.6	
USC00356541	1987-11	1.03	0	43.2	54.4	32	
USC00356541	1987-12	1.68	0	34.2	42.2	26.2	
USC00356541	1988-01	1.88	0	33.3	40.6	26	
USC00356541	1988-02	0.15	0	-	51.9	-	
USC00356541	1988-03	1.58	0	45	57	33.1	
USC00356541	1988-04	2.6	0	52.8	65.6	40	
USC00356541	1988-05	1.11	0	57.9	70.9	45	
USC00356541	1988-06	0.78	0	65	78.2	51.9	
USC00356541	1988-07	0	0	-	88.8		
USC00356541	1988-08	0	0	69.6	87.5	51.8	
USC00356541	1988-09	0.41	0	-	79.7	-	
USC00356541	1988-10	0.01	0	-	75	-	YEARLY TOTAL
USC00356541	1988-11	2.7	0	45.4	54.2	36.6	PRCP SNOW
USC00356541	1988-12	0.41	0	-	40.7	-	11.63 0
USC00356541	1989-01	1.89	0	-	47.4	-	
USC00356541	1989-02	1.46	-	-	34.9	-	
USC00356541	1989-03	1.85	0	44.1	54.1	34	
USC00356541	1989-04	1.95	0	53.5	66.1	40.8	
USC00356541	1989-05	1.94	0	57.8	70.5	45	
USC00356541	1989-06	0.39	0	67.3	82.6	51.9	
USC00356541	1989-07	0	0	70.1	86.7	53.5	
USC00356541	1989-08	0.97	0	69.4	83.8	54.9	
USC00356541	1989-09	0.17	0	62	80.2	43.7	
USC00356541	1989-10	0.8	0	-	65.7	-	YEARLY TOTAL
USC00356541	1989-11	1.56	0	-	-	-	PRCP SNOW
USC00356541	1989-12	0.26	0	-	-	-	13.24 0
USC00356541	1990-01	1.17	0	-	46.7	-	
USC00356541	1990-03	1.57	0	46	59.2	32.8	
USC00356541	1990-05	2.73	0	58.2	70.1	46.3	
USC00356541	1990-06	0.54	0	65.2	77.6	52.7	
USC00356541	1990-07	0.19	0	74.7	91.7	57.8	
USC00356541	1990-08	0.77	0	-	-	-	
USC00356541	1990-09	0	0	66.9	85.6	48.3	YEARLY TOTAL

STATION	DATE	PRCP (IN)	SNOW (IN)	AVE TEMP (°F)	MAX TEMP (°F)	MIN TEMP (°F)
USC00356541	1990-11	1.28	0	-	55.6	-
USC00356541	1990-12	0.96	4	-	35.5	-
USC00356541	1991-01	0.62	0	-	40.3	-
USC00356541	1991-02	0.69	0	45.1	56.1	34.2
USC00356541	1991-03	1.37	0.5	43.1	54.3	31.9
USC00356541	1991-04	0.88	0	51	64.1	37.8
USC00356541	1991-05	4.19	0	56.2	68.2	44.1
USC00356541	1991-06	2.1	0	61.6	74.2	49.1
USC00356541	1991-07	0.18	0	72.3	89.3	55.2
USC00356541	1991-08	0.54	0	73.3	90.7	55.9
USC00356541	1991-09	0	0	63.4	82.7	44.2
USC00356541	1991-10	1.07	0	50.5	66.9	34.2
USC00356541	1991-11	2.61	0	41.4	49.3	33.5
USC00356541	1991-12	0.71	0	-	43.9	-
USC00356541	1992-01	0.6	0.5	-	48.2	-
USC00356541	1992-02	1.02	0	43.2	51.8	34.7
USC00356541	1992-03	0.54	0	47.3	62	32.6
USC00356541	1992-04	1.47	0	-	65.9	-
USC00356541	1992-05	0.18	0	62	79.3	44.6
USC00356541	1992-06	0.85	0	69.8	85.9	53.7
USC00356541	1992-07	0.83	0	72.2	87.3	57
USC00356541	1992-08	0.71	0	71.4	89.1	53.7
USC00356541	1992-09	0.55	0	-	76.7	-
USC00356541	1992-10	1.69	0	-	67.5	-
USC00356541	1992-11	2.1	0	41	47.9	34
USC00356541	1992-12	0.67	8.1	-	40.4	-
USC00356541	1993-01	1.61	-	-	34.4	-
USC00356541	1993-02	0.83	11	29.6	37.8	21.3
USC00356541	1993-03	1.19	0	43	52.9	33.2
USC00356541	1993-04	2.23	0	51.2	62.2	40.2
USC00356541	1993-05	2.52	0	62.8	76	49.7
USC00356541	1993-06	1.61	0	64.7	77.3	52.1
USC00356541	1993-07	1.52	0	66.8	79.3	54.3
USC00356541	1993-08	2.82	0	-	-	-
USC00356541	1993-09	0	0	62.8	81	44.7
USC00356541	1993-10	0.25	0	-	68	-
USC00356541	1993-11	0.39	1	34.5	48.2	20.9
USC00356541	1993-12	1.44	0	-	42.7	
USC00356541	1994-01	2.17	0	41.1	51.2	31
USC00356541	1994-02	1.53	10	-	-	27.3
USC00356541	1994-03	0.2	0	45.8	59.7	31.9
USC00356541	1994-04	2.19	0	54.9	68	41.8
USC00356541	1994-05	3.92	0	61.6	75.3	47.9

PRCP	SNOW
9.21	4

YEARLY TOTAL	
PRCP	SNOW
14.96	0.5

YEARLY TOTAL	
PRCP	SNOW
11.21	8.6

YEARLY TOTAL	
PRCP	SNOW
16.41	12

STATION	DATE	PRCP (IN)	SNOW (IN)	AVE TEMP (°F)	MAX TEMP (°F)	MIN TEMP (°F)	
USC00356541	1994-06	1.08	0	-	-	50.1	
USC00356541	1994-07	0.43	0	74.8	92.9	56.8	
USC00356541	1994-08	0	0	-	-	-	
USC00356541	1994-09	0.7	0	66.1	84.1	48	
USC00356541	1994-10	1	0	52	65.7	38.3	YEARLY TOTAL
USC00356541	1994-11	3.36	0	-	50.7	-	PRCP SNOW
USC00356541	1994-12	-	-	37	45.7	28.4	16.58 10
USC00356541	1995-01	3.6	0	35.5	42.7	28.3	
USC00356541	1995-02	1.19	0	-	54.1	-	
USC00356541	1995-03	1.96	0	44.9	56.6	33.2	
USC00356541	1995-04	3	0	50.4	62.1	38.7	
USC00356541	1995-05	1.29	0	58.3	72.8	43.9	
USC00356541	1995-06	2.71	0	62.9	76.2	49.6	
USC00356541	1995-07	0.47	0	72	87.7	56.3	
USC00356541	1995-08	0.43	0	67.5	84	51	
USC00356541	1995-09	1.04	0	66.1	83.1	49.2	
USC00356541	1995-10	2.05	0	51.1	63.9	38.4	YEARLY TOTAL
USC00356541	1995-11	2.16	0.1	46.3	55.1	37.6	PRCP SNOW
USC00356541	1995-12	1.45	0	37.2	44.2	30.2	21.35 0.1
USC00356541	1996-01	2.6	0	37.2	45.5	28.8	
USC00356541	1996-02	2.2	0	34.7	44.9	24.5	
USC00356541	1996-03	0.92	0	44.7	54.9	34.4	
USC00356541	1996-04	1.57	0	53.1	65.2	41.1	
USC00356541	1996-05	2.99	0	55.9	67.6	44.3	
USC00356541	1996-06	0.78	0	64.3	79.3	49.2	
USC00356541	1996-07	0	0	74.5	92.7	56.3	
USC00356541	1996-08	0	0	71.5	90.5	52.4	
USC00356541	1996-09	0.3	0	61.4	77.6	45.2	
USC00356541	1996-10	0.8	0	51.9	64	39.8	YEARLY TOTAL
USC00356541	1996-11	-	0	40.9	50.5	31.3	PRCP SNOW
USC00356541	1996-12	-	-	35.9	44.1	27.7	12.16 0
USC00356541	1997-01	-	0	32.3	40.7	23.8	
USC00356541	1997-02	0.91	0	39.7	49.1	30.3	
USC00356541	1997-03	2.06	0	46.8	58.6	35.1	
USC00356541	1997-04	3.22	0	49.7	61.8	37.5	
USC00356541	1997-05	0.35	0	60	75.4	44.6	
USC00356541	1997-06	0.68	0	63.5	77.6	49.4	
USC00356541	1997-07	0.69	0	68.9	85.4	52.3	
USC00356541	1997-08	0	0	71.8	89.3	54.2	
USC00356541	1997-09	0.71	0	62.4	78.8	46	
USC00356541	1997-10	1.4	0	51.7	66.7	36.7	YEARLY TOTAL
USC00356541	1997-11	1.54	0	43.4	53.8	33.1	PRCP SNOW

STATION	DATE	PRCP (IN)	SNOW (IN)	AVE TEMP (°F)	MAX TEMP (°F)	MIN TEMP (°F)		
USC00356541	1997-12	1.22	0	35.7	42.7	28.7	12.78	0
USC00356541	1998-01	1.6	0	37.6	47.9	27.3		
USC00356541	1998-02	0.83	0	42.6	53.5	31.6		
USC00356541	1998-03	1	0	45.7	58	33.4		
USC00356541	1998-04	0.58	0	49.9	62.7	37.1		
USC00356541	1998-05	2.02	0	56.2	68.5	43.9		
USC00356541	1998-08	0.01	0	71.6	91.5	51.8	YEARLY TOTAL	
USC00356541	1998-09	0.89	0	66.9	84.3	49.6	PRCP	SNOW
USC00356541	1998-10	0.58	0	50.6	66.8	34.4	7.51	0
USC00356541	1999-05	1.18	0	57.1	71.4	42.8		
USC00356541	1999-06	0.61	0	65.3	79.3	51.3		
USC00356541	1999-07	0	0	70.6	87.7	53.4		
USC00356541	1999-08	0.65	0	73.9	89.8	58		
USC00356541	1999-09	0	0	61.4	80.3	42.6		
USC00356541	1999-10	1.77	0	51.3	67.8	34.9	YEARLY TOTAL	
USC00356541	1999-11	1.56	0	46.3	55.6	37	PRCP	SNOW
USC00356541	1999-12	0.8	0	39.3	46.2	32.5	6.57	0
USC00356541	2000-01	1.97	0	36.5	43.3	29.8		
USC00356541	2000-02	3.29	0	40.5	49	32		
USC00356541	2000-03	2.65	0	45.8	58	33.6		
USC00356541	2000-04	0.64	0	54.2	68.8	39.6		
USC00356541	2000-05	1.59	0	60.8	73.1	48.5		
USC00356541	2000-07	0.09	0	71.6	88.1	55.2		
USC00356541	2000-08	0	0	70.1	88.8	51.5		
USC00356541	2000-09	1.65	0	61.7	76.5	46.9		
USC00356541	2000-10	2.07	0	50.8	63.8	37.7	YEARLY TOTAL	
USC00356541	2000-11	1.26	0	36.9	45.3	28.5	PRCP	SNOW
USC00356541	2000-12	0.52	0	33.6	39.4	27.8	15.73	0
USC00356541	2001-01	1.17	0	34.3	39.6	28.9		
USC00356541	2001-02	0.56	0	36.9	45.5	28.2		
USC00356541	2001-03	1.19	0	46.2	59.5	32.8		
USC00356541	2001-04	2.49	0	50.1	62.3	37.8		
USC00356541	2001-05	0.61	0	60.7	76.2	45.2		
USC00356541	2001-07	1.69	0	72.1	87.9	56.4		
USC00356541	2001-08	0.25	0	72.2	90	54.5		
USC00356541	2001-09	0.16	0	65.6	83.5	47.7		
USC00356541	2001-10	1.1	0	-	65.4	-	YEARLY TOTAL	
USC00356541	2001-11	1.14	0	43.7	53.8	33.7	PRCP	SNOW
USC00356541	2001-12	0.49	0	39.2	47.3	31.1	10.85	0
USC00356541	2002-01	0.72	0	-	-	-		
USC00356541	2002-02	0.68	0	39.9	52.5	27.2		
USC00356541	2002-03	0.87	0	42.4	52.4	32.4		

STATION	DATE	PRCP (IN)	SNOW (IN)	AVE TEMP (°F)	MAX TEMP (°F)	MIN TEMP (°F)	
USC00356541	2002-04	1.26	0	51.4	65.1	37.7	
USC00356541	2002-05	1.3	0	57.6	71	44.2	
USC00356541	2002-06	1.61	0	67.4	81.6	53.3	
USC00356541	2002-07	0.14	0	75.2	92.5	57.9	
USC00356541	2002-08	0.04	0	70.3	88.1	52.5	
USC00356541	2002-09	0.3	0	63.3	81	45.6	YEARLY TOTAL
USC00356541	2002-10	0.5	0	48.2	64.8	31.5	PRCP SNOW
USC00356541	2002-12	1.7	0	40.7	48.2	33.2	9.12 0
USC00356541	2003-01	2.35	0	40.8	46.7	34.9	
USC00356541	2003-02	1.86	0	40	51.1	28.8	
USC00356541	2003-03	1.44	0	49.1	60.3	37.8	
USC00356541	2003-04	1.62	0	51.3	63.1	39.5	
USC00356541	2003-05	0.89	0	57.7	70.8	44.5	
USC00356541	2003-06	0.22	0	67.4	83.2	51.5	
USC00356541	2003-07	0	0	76.4	94.6	58.1	
USC00356541	2003-08	0.19	0	73.2	90	56.3	
USC00356541	2003-09	1.12	0	66.1	83	49.2	
USC00356541	2003-10	0.78	0	56.4	72.3	40.5	YEARLY TOTAL
USC00356541	2003-11	1.04	0	39.2	50.4	28.1	PRCP SNOW
USC00356541	2003-12	2.34	0	36.7	44.3	29.1	13.85 0
USC00356541	2004-02	1.39	0	40.4	49.4	31.3	
USC00356541	2004-03	0.49	0	50.7	64.8	36.6	
USC00356541	2004-04	1.31	0	52.8	67	38.6	
USC00356541	2004-05	3.09	0	59.6	71.4	47.9	
USC00356541	2004-06	1.58	0	66.8	80.8	52.7	
USC00356541	2004-07	0.8	0	74	90.9	57.1	
USC00356541	2004-08	3.22	0	74.1	89.6	58.7	
USC00356541	2004-09	1.58	0	62.5	77.3	47.7	
USC00356541	2004-10	1.23	0	54.1	67.7	40.4	YEARLY TOTAL
USC00356541	2004-11	1.18	0	42.4	53.5	31.3	PRCP SNOW
USC00356541	2004-12	0.92	0	38.9	47.8	30	16.79 0
USC00356541	2005-01	0.21	0	36	44.8	27.1	
USC00356541	2005-02	0.2	0	38	53.5	22.5	
USC00356541	2005-03	1.03	0	49.2	63.3	35	
USC00356541	2005-04	0.74	-	53.6	66.2	41	
USC00356541	2005-05	3.87	0	62.3	75.8	48.7	
USC00356541	2005-06	0.96	0	64.6	79	50.2	
USC00356541	2005-07	0.39	0	74.4	92.4	56.4	
USC00356541	2005-08	0	0	74	93.8	54.1	
USC00356541	2005-09	0.53	0	62.1	80.6	43.5	
USC00356541	2005-10	1.48	0	54.3	69.6	39	YEARLY TOTAL
USC00356541	2005-11	1.74	0	40.2	49.4	31.1	PRCP SNOW

STATION	DATE	PRCP (IN)	SNOW (IN)	AVE TEMP (°F)	MAX TEMP (°F)	MIN TEMP (°F)		
USC00356541	2005-12	1.87	0	30.9	38.8	23	13.02	0
USC00356541	2006-01	2.82	0	43.1	52.6	33.5		
USC00356541	2006-02	0.4	0	37.3	49.6	25.1		
USC00356541	2006-03	1.91	0	45.8	57.7	33.8		
USC00356541	2006-04	1.87	0	52.8	66.2	39.4		
USC00356541	2006-05	1.76	0	60.3	75.2	45.4		
USC00356541	2006-06	1.94	0	66.7	80.9	52.4		
USC00356541	2006-07	0.06	0	76.4	95.6	57.3		
USC00356541	2006-08	0	0	-	-	-		
USC00356541	2006-09	0.43	0	63.9	81.8	46		
USC00356541	2006-10	0.18	0	51.8	67.7	35.9	YEARLY TOTAL	
USC00356541	2006-11	1.95	0	43.2	53.4	33	PRCP	SNOW
USC00356541	2006-12	1.42	0	34.6	42	27.3	14.74	0
USC00356541	2007-01	0.4	0	32.8	42.3	23.3		
USC00356541	2007-02	1.62	0	39.9	49.2	30.5		
USC00356541	2007-03	1.28	0	48.4	61.5	35.2		
USC00356541	2007-04	1.37	0	51.2	65.3	37.1		
USC00356541	2007-05	0.93	-	59.4	75	43.8		
USC00356541	2007-06	1.41	0	66.8	81.3	52.3		
USC00356541	2007-07	0.19	0	76.3	93.8	58.7		
USC00356541	2007-08	0.31	0	70.5	88.1	53		
USC00356541	2007-09	0.1	0	62.6	79.9	45.3		
USC00356541	2007-10	1.46	0	51.5	65.5	37.5	YEARLY TOTAL	
USC00356541	2007-11	1.94	0	41.5	53.1	29.8	PRCP	SNOW
USC00356541	2007-12	1.74	1.3	37.4	45	29.8	12.75	1.3
USC00356541	2008-01	1.92	15	33.7	43.1	24.2		
USC00356541	2008-02	0.19	0	42.7	53.5	31.9		
USC00356541	2008-03	-	0.1	-	-	-		
USC00356541	2008-04	0.52	0	-	-	-		
USC00356541	2008-05	1.07	0	59.6	73.3	45.9		
USC00356541	2008-06	1.49	0	63	78	48.1		
USC00356541	2008-07	0.01	0	72.7	90.3	55		
USC00356541	2008-08	0.63	0	71.9	88.8	54.9		
USC00356541	2008-09	0.37	0	62.2	81.2	43.2		
USC00356541	2008-10	0.95	-	51.3	68.1	34.5	YEARLY TOTAL	
USC00356541	2008-11	0.57	0	-	-	-	PRCP	SNOW
USC00356541	2008-12	1.44	-	32.4	41.9	22.9	9.16	15.1
USC00356541	2009-01	0.73	4	-	-	-		
USC00356541	2009-02	0.99	0	37.4	46.8	28		
USC00356541	2009-03	1.7	0	41.5	52.6	30.4		
USC00356541	2009-04	1.14	0	50.2	63.6	36.8		
USC00356541	2009-05		0	59.1	73.8	44.3		
USC00356541	2009-06	0.3	0	67	80.6	53.3		

STATION	DATE	PRCP (IN)	SNOW (IN)	AVE TEMP (°F)	MAX TEMP (°F)	MIN TEMP (°F)
USC00356541	2009-07	0	0	-	-	-
USC00356541	2009-08	0.42	0	-	-	-
USC00356541	2009-09	0.01	0	-	-	-
USC00356541	2009-10	1.07	0	48	60.6	35.4
USC00356541	2009-11	1	0	-	-	-
USC00356541	2009-12	1.14	2.7	28.6	36.8	20.5
USC00356541	2010-01	1.53	0	40.3	48	32.5
USC00356541	2010-02	0.61	0	43.3	55	31.6
USC00356541	2010-03	0.49	0	46.6	61.9	31.4
USC00356541	2010-04	2.46	0	50.8	63.2	38.3
USC00356541	2010-05	2.28	0	55.2	66.9	43.6
USC00356541	2010-06	2.22	0	62.5	74.9	50.1
USC00356541	2010-07	0.06	0	71.4	88.7	54.1
USC00356541	2010-08	0.41	0	-	-	-
USC00356541	2010-09	1.06	0	63.7	78.3	49.1
USC00356541	2010-10	1.78	0	53.5	66.5	40.6
USC00356541	2010-11	1.26	0	40.7	51.4	30
USC00356541	2010-12	1.42	2	36.9	45.2	28.6
USC00356541	2011-01	1.13	-	37.5	47	28
USC00356541	2011-02	0.63	-	37.9	48	27.8
USC00356541	2011-03	2.23	-	46	58.1	33.9
USC00356541	2011-04	1.13	-	48.4	60.9	36
USC00356541	2011-05	3.95	-	54.4	66.5	42.2
USC00356541	2011-06	2.17	-	62.5	74.9	50.1
USC00356541	2011-07	0.59	-	68.4	84.4	52.4
USC00356541	2011-08	0.22	-	72.3	90.2	54.3
USC00356541	2011-09	0.06	-	65.9	84.8	47.1
USC00356541	2011-10	1.04	-	53	65.7	40.3
USC00356541	2011-11	0.7	-	43.5	55.4	31.6
USC00356541	2011-12	0.32	-	33.6	43.1	24.1
USC00356541	2012-01	1.71	-	37	48.8	25.3
USC00356541	2012-02	1.15	-	37.7	48	27.4
USC00356541	2012-03	1.59	-	45.5	57.5	33.4
USC00356541	2012-04	2.19	-	51.6	64.7	38.6
USC00356541	2012-05	0.71	-	57.4	71.5	43.3
USC00356541	2012-06	-	-	62.8	75.8	49.9
USC00356541	2012-07	0.36	-	72	88.2	55.8
USC00356541	2012-08	0.02	-	71.7	90.9	52.4
USC00356541	2012-09	0.01	-	63.2	82.5	43.8
USC00356541	2012-10	1.44	-	51.2	66.6	35.8
USC00356541	2012-12	1.11	-	39.1	47.2	31
USC00356541	2013-01	1.26	-	30.9	37.7	24.1

YEARLY TOTAL	
PRCP	SNOW
8.5	6.7

YEARLY TOTAL	
PRCP	SNOW
15.58	2

YEARLY TOTAL	
PRCP	SNOW
14.17	0

YEARLY TOTAL	
PRCP	SNOW
10.61	0

STATION	DATE	PRCP (IN)	SNOW (IN)	AVE TEMP (°F)	MAX TEMP (°F)	MIN TEMP (°F)
USC00356541	2013-02	0.3	-	40.1	52	28.1
USC00356541	2013-03	0.76	-	46.8	59.8	33.9
USC00356541	2013-04	1.35	-	50.5	64.4	36.6
USC00356541	2013-06	1.96	-	65.1	78.2	51.9
USC00356541	2013-07	0.41	-	73.9	92.4	55.5
USC00356541	2013-08	0.69	-	72.3	88.6	56
USC00356541	2013-09	3.76	-	64.7	78.1	51.3
USC00356541	2013-10	0.23	-	48.5	63	33.9
USC00356541	2013-11	0.39	-	40.1	50.4	29.8
USC00356541	2013-12	0.89	-	29.7	41.4	18.1
USC00356541	2014-01	0.85	-	35.8	43.7	27.9
USC00356541	2014-02	1.72	-	34.4	40.9	28
USC00356541	2014-04	0.8	-	51	64.6	37.3
USC00356541	2014-11	1.09	-	38.5	49.7	27.4
USC00356541	2015-11	1.52	-	39.8	50	29.5
USC00356541	2016-01	1.53	-	37.1	45.6	28.6
USC00356541	2016-04	0.65	-	57.6	73.3	41.9
USC00356541	2016-05	2.16	-	59.7	74.3	45.1
USC00356541	2016-06	0.76	-	66.7	83.7	49.6
USC00356541	2016-08	0.12	-	72.1	91.6	52.7
USC00356541	2016-09	0.82	-	61.6	78	45.1
USC00356541	2016-10	2.32	-	53.8	65.2	42.4
USC00356541	2016-11	0.87	-	47.9	58.6	37.1
USC00356541	2016-12	-	-	29.2	37.7	20.8
USC00356541	2017-04	1.95	-	50.7	63.3	38
USC00356541	2017-05	0.99	-	59.1	73.3	44.9
USC00356541	2017-06	1.72	-	66.6	81.3	51.8
Global Averages		12.07	2.62	53.54	65.77	40.36

YEARLY TOTAL	
PRCP	SNOW
13.11	0

YEARLY TOTAL	
PRCP	SNOW
4.46	0

YEARLY TOTAL	
PRCP	SNOW
9.23	0

YEARLY TOTAL	
PRCP	SNOW
4.66	0

PENDLETON WWTRRF FACILITY PLAN UPDATE
17-2019
Station: NOAA: PENDLETON BRANCH EXPERIMENTAL STATION, OR US (USC00356540)
Last Edit: PMD
Last Save: 7/19/2017

STATION	DATE	PRCP (IN)	SNOW (IN)	AVE TEMP (°F)	MAX TEMP (°F)	MIN TEMP (°F)	
USC00356540	1971-01	1.44	5.1	37.9	46.3	29.6	
USC00356540	1971-02	0.77	0	39.5	50.6	28.3	
USC00356540	1971-03	1.28	3	39.9	49.9	29.8	
USC00356540	1971-04	1.65	0	46.8	59.5	34.1	
USC00356540	1971-05	1.66	0	56.2	70.6	41.9	
USC00356540	1971-06	3.15	0	58.3	70.5	46.1	
USC00356540	1971-07	0.63	0	69.9	89.7	50	
USC00356540	1971-08	0.33	0	73.7	94.2	53.1	
USC00356540	1971-09	1.42	0	55.9	72.8	39	
USC00356540	1971-10	1.72	3	46.7	62.2	31.2	YEARLY TOTAL
USC00356540	1971-11	3.15	0	41.4	51.1	31.7	PRCP SNOW
USC00356540	1971-12	3.94	16.6	35	42.9	27.1	21.14 27.7
USC00356540	1972-01	1.15	6.8	33	40.6	25.4	
USC00356540	1972-02	1.7	5.8	35.1	43.6	26.5	
USC00356540	1972-03	2.11	0	45.6	56.4	34.8	
USC00356540	1972-04	1.35	1	45.7	58.5	32.9	
USC00356540	1972-05	1.5	0	57.3	72.4	42.2	
USC00356540	1972-06	0.91	0	64.3	79.7	48.8	
USC00356540	1972-07	0.76	0	69.4	87	51.7	
USC00356540	1972-08	0.35	0	70.7	89.4	51.9	
USC00356540	1972-09	0.49	0	56.6	73.5	39.7	
USC00356540	1972-10	0.66	0	47.7	63.3	32	YEARLY TOTAL
USC00356540	1972-11	1.14	0	41.2	50.7	31.8	PRCP SNOW
USC00356540	1972-12	2.47	-	-	35.2		14.59 13.6
USC00356540	1973-01	0.89		30.1	39.1	21	
USC00356540	1973-02	0.91	6	37.5	45.5	29.4	
USC00356540	1973-03	1.28	0	44.2	55.1	33.3	
USC00356540	1973-04	0.58	0	47.8	62	33.5	
USC00356540	1973-05	1.03	0	57.4	73.2	41.6	
USC00356540	1973-06	0.12	0	63.1	79.3	47	
USC00356540	1973-07	0	0	70.2	89.7	50.8	
USC00356540	1973-08	0.09	0	67.7	87.1	48.3	
USC00356540	1973-09	1.77	0	59.9	75.4	44.4	
USC00356540	1973-10	1.24	0	49.6	63.5	35.8	YEARLY TOTAL
USC00356540	1973-11	-	11.5	40.4	47.1	33.6	PRCP SNOW
USC00356540	1973-12	-	5	39.9	47.6	32.2	7.91 22.5
USC00356540	1974-01	1.3	2.1	27.2	35.9	18.5	

STATION	DATE	PRCP (IN)	SNOW (IN)	AVE TEMP (°F)	MAX TEMP (°F)	MIN TEMP (°F)		
USC00356540	1974-02	2	0	41.5	50.4	32.5		
USC00356540	1974-03	1.5	0	43.6	54.7	32.4		
USC00356540	1974-04	3.65	0	48.2	58.5	37.9		
USC00356540	1974-05	0.38	0	53.5	66.7	40.4		
USC00356540	1974-06	0.33	0	65.2	82.9	47.5		
USC00356540	1974-07	1.3	0	68.9	86.3	51.5		
USC00356540	1974-08	0	0	69.3	87.9	50.8		
USC00356540	1974-09	0.02	0	61.3	82.4	40.3		
USC00356540	1974-10	0.35	0	49.4	67.2	31.5	YEARLY TOTAL	
USC00356540	1974-11	1.57	0.5	42.5	50.7	34.3	PRCP	SNOW
USC00356540	1974-12	1.76	0	38.5	46.4	30.5	14.16	2.6
USC00356540	1975-01	3.74	14.5	33.6	41.8	25.4		
USC00356540	1975-02	1.68	3.5	34.6	42.7	26.4		
USC00356540	1975-03	0.96	0	39.9	50.3	29.6		
USC00356540	1975-04	1.72	0.3	43.3	54.6	32		
USC00356540	1975-05	0.69	0	54.3	67.7	40.8		
USC00356540	1975-06	0.7	0	59.6	73.6	45.6		
USC00356540	1975-07	0.05	0	72.4	89.9	54.8		
USC00356540	1975-08	1.2	0	65.5	82.6	48.4		
USC00356540	1975-09	0	0	60	80.4	39.5		
USC00356540	1975-10	2.17	0	50.5	62.4	38.6	YEARLY TOTAL	
USC00356540	1975-11	1.47	5	40.4	50.6	30.2	PRCP	SNOW
USC00356540	1975-12	3.41	4.5	37.2	44.7	29.7	17.79	27.8
USC00356540	1976-01	2.14	0	37.4	45	29.7		
USC00356540	1976-02	1.1	0.8	36.6	45.2	28		
USC00356540	1976-03	1.69	0	40.7	51.1	30.2		
USC00356540	1976-04	1.38	0.3	47	58.6	35.3		
USC00356540	1976-05	1.21	0	55.6	71.6	39.6		
USC00356540	1976-06	0.58	0	59.2	74.4	43.9		
USC00356540	1976-07	0.04	0	69.2	87.7	50.6		
USC00356540	1976-08	2.58	0	65.7	79.6	51.8		
USC00356540	1976-09	0.44	0	63.4	81.7	45.2		
USC00356540	1976-10	0.54	0	49.3	67.2	31.4	YEARLY TOTAL	
USC00356540	1976-11	0.47	0	41.5	50.2	32.8	PRCP	SNOW
USC00356540	1976-12	0.59	1.5	34.1	44.8	23.5	12.76	2.6
USC00356540	1977-01	0.91	3.5	25.4	31.4	19.5		
USC00356540	1977-02	0.57	0	39	48.1	30		
USC00356540	1977-03	1.73	0	42	51.2	32.7		
USC00356540	1977-04	0.46	0	50.9	67.3	34.6		
USC00356540	1977-05	1.7	0	51.9	64.1	39.8		
USC00356540	1977-06	0.31	0	66.2	83.4	48.9		
USC00356540	1977-07	0.12	0	68.6	85.7	51.5		
USC00356540	1977-08	2.21	0	73.1	91.1	55.1		

STATION	DATE	PRCP (IN)	SNOW (IN)	AVE TEMP (°F)	MAX TEMP (°F)	MIN TEMP (°F)		
USC00356540	1977-09	1.54	0	57.8	71.2	44.3		
USC00356540	1977-10	0.69	0	48.4	63.2	33.7	YEARLY TOTAL	
USC00356540	1977-11	1.79	9.5	38.4	48.5	28.4	PRCP	SNOW
USC00356540	1977-12	3.2	12.7	35.3	41.6	29	15.23	25.7
USC00356540	1978-01	2.27	6.8	32.7	38.8	26.7		
USC00356540	1978-02	1.71	0	39.7	46.3	33.1		
USC00356540	1978-03	1.4	0	44.9	56.3	33.6		
USC00356540	1978-04	3.5	0	47.8	58.1	37.5		
USC00356540	1978-05	0.81	0	53.6	66	41.3		
USC00356540	1978-06	1.28	0	63.5	79.7	47.4		
USC00356540	1978-07	0.59	0	70	87.4	52.6		
USC00356540	1978-08	1.37	0	67.7	83.5	51.8		
USC00356540	1978-09	1.62	0	58.8	72.8	44.8		
USC00356540	1978-10	0	0	49	67.7	30.2	YEARLY TOTAL	
USC00356540	1978-11	1.69	8	32.6	43.6	21.7	PRCP	SNOW
USC00356540	1978-12	2.28	11.5	29.2	38.8	19.5	18.52	26.3
USC00356540	1979-01	1.31	11.9	15.3	23.6	7		
USC00356540	1979-02	1.55	4	37	44	29.9		
USC00356540	1979-03	1.74	0	44.5	55.5	33.5		
USC00356540	1979-04	1.83	0	48.9	59.8	38		
USC00356540	1979-05	1.15	0	57.1	71.2	43.1		
USC00356540	1979-06	0.18	0	63.7	81.6	45.8		
USC00356540	1979-07	0.13	0	70.8	89.5	52		
USC00356540	1979-08	2.08	0	69.3	85.3	53.3		
USC00356540	1979-09	0.17	0	63.4	81.5	45.3		
USC00356540	1979-10	2.56	0	53.7	67.7	39.7	YEARLY TOTAL	
USC00356540	1979-11	2.31	3	35.5	42.7	28.3	PRCP	SNOW
USC00356540	1979-12	1.06	1	38.5	46.9	30	16.07	19.9
USC00356540	1980-01	2.85	14.5	26.7	34.6	18.7		
USC00356540	1980-02	1.56	1	37.1	44	30.2		
USC00356540	1980-03	2.12	4	41.4	50.9	32		
USC00356540	1980-04	1.2	0	51.7	65.6	37.8		
USC00356540	1980-05	2.46	0	55.9	68.3	43.5		
USC00356540	1980-06	1.43	0	59.1	72.1	46.1		
USC00356540	1980-07	0.24	0	70.1	87.8	52.4		
USC00356540	1980-08	0.18	0	65.6	83.5	47.7		
USC00356540	1980-09	1.24	0	61	77.4	44.7		
USC00356540	1980-10	3.77	0	49.7	64.3	35.2	YEARLY TOTAL	
USC00356540	1980-11	1.81	1	42.1	50.3	33.8	PRCP	SNOW
USC00356540	1980-12	2	2	38	46.3	29.6	20.86	22.5
USC00356540	1981-01	1.27	2	36.9	42.7	31.1		
USC00356540	1981-02	2.31	1.3	38.5	47.6	29.4		

STATION	DATE	PRCP (IN)	SNOW (IN)	AVE TEMP (°F)	MAX TEMP (°F)	MIN TEMP (°F)		
USC00356540	1981-03	2.3	0	44.3	56.1	32.6		
USC00356540	1981-04	1.3	0	48.7	60.7	36.8		
USC00356540	1981-05	2.31	0	55	67.5	42.5		
USC00356540	1981-06	2.12	0	60.1	72.8	47.4		
USC00356540	1981-07	0.4	0	67	85.4	48.5		
USC00356540	1981-08	0.02	0	71.4	92.2	50.5		
USC00356540	1981-09	1.52	0	60.8	79	42.7		
USC00356540	1981-10	1.63	0	48.5	61.5	35.6	YEARLY TOTAL	
USC00356540	1981-11	2.41	0.3	44.1	54.7	33.6	PRCP	SNOW
USC00356540	1981-12	3.27	5.7	37	44.6	29.5	20.86	9.3
USC00356540	1982-01	2.61	8.5	33.4	41.6	25.2		
USC00356540	1982-02	1.86	1.8	37.7	46.3	29.1		
USC00356540	1982-03	1.99	3.5	42.5	52.5	32.6		
USC00356540	1982-04	1.55	0	46.1	59.3	32.9		
USC00356540	1982-05	0.48	0	54.4	68.8	40.1		
USC00356540	1982-06	1.12	0	66	80.5	51.5		
USC00356540	1982-07	1.02	0	69.7	86.4	52.9		
USC00356540	1982-08	0.5	0	69.7	87.5	52		
USC00356540	1982-09	1.69	0	59.5	75.3	43.7		
USC00356540	1982-10	2.74	0	49.3	62.6	36	YEARLY TOTAL	
USC00356540	1982-11	1.46	0	36.4	43.9	28.9	PRCP	SNOW
USC00356540	1982-12	2.7	2.3	35.3	41.3	29.4	19.72	16.1
USC00356540	1983-01	1.64	0	40.1	48	32.2		
USC00356540	1983-02	2.97	0	43.2	52	34.3		
USC00356540	1983-03	3.9	0	47	56.5	37.4		
USC00356540	1983-04	1.23	0	48	61.6	34.5		
USC00356540	1983-05	2.08	0	57.2	72.3	42		
USC00356540	1983-06	1.93	0	61.3	75.7	46.8		
USC00356540	1983-07	1	0	67	82.3	51.5		
USC00356540	1983-08	0.69	0	71.2	88.3	54.1		
USC00356540	1983-09	0.82	0	57.1	73.2	41		
USC00356540	1983-10	0.92	0	49.9	65	34.7	YEARLY TOTAL	
USC00356540	1983-11	2.79	0	45.3	53.3	37.3	PRCP	SNOW
USC00356540	1983-12	3.44	20.6	24.2	30.1	18.4	23.41	20.6
USC00356540	1984-01	1	2.4	33.5	41.7	25.2		
USC00356540	1984-02	2.56	0	39.1	46.8	31.5		
USC00356540	1984-03	3.24	0	45.4	55.2	35.6		
USC00356540	1984-04	2.37	0	47.2	58.2	36.2		
USC00356540	1984-05	2.11	0	53.3	65.4	41.3		
USC00356540	1984-06	2.05	0	59.6	73	46.2		
USC00356540	1984-07	0.05	0	70.4	89.8	50.9		
USC00356540	1984-08	1.26	0	70.2	88.4	52.2		
USC00356540	1984-09	0.98	0	58.9	74.5	43.2		

STATION	DATE	PRCP (IN)	SNOW (IN)	AVE TEMP (°F)	MAX TEMP (°F)	MIN TEMP (°F)		
USC00356540	1984-10	1.18	0	47.6	61.6	33.7	YEARLY TOTAL	
USC00356540	1984-11	3.44	0	41.5	49.9	33.1	PRCP	SNOW
USC00356540	1984-12	1.96	6.9	29.3	36.8	21.9	22.2	9.3
USC00356540	1985-01	0.7	2.3	25.4	29.8	21		
USC00356540	1985-02	1.5	12.8	33.2	42.7	23.6		
USC00356540	1985-03	1.34	0.8	42.1	53.3	30.8		
USC00356540	1985-04	0.65	0	52.2	66.2	38.2		
USC00356540	1985-05	0.89	0	57.2	72.2	42.3		
USC00356540	1985-06	1.42	0	63.5	80.4	46.6		
USC00356540	1985-07	0.05	0	74.5	95.3	53.8		
USC00356540	1985-08	0.98	0	66.1	83	49.2		
USC00356540	1985-09	1.54	0	54.7	69.6	39.8		
USC00356540	1985-10	1.34	0	48.3	62.3	34.3	YEARLY TOTAL	
USC00356540	1985-11	2.66	22.4	27.3	35.4	19.2	PRCP	SNOW
USC00356540	1985-12	1.28	11.9	19	25.5	12.6	14.35	50.2
USC00356540	1986-01	2.38	2	35.2	42.9	27.6		
USC00356540	1986-02	3.04	8.5	38.5	45.9	31		
USC00356540	1986-03	1.95	0	47.9	58.5	37.2		
USC00356540	1986-04	0.83	0	47.9	60.7	35.2		
USC00356540	1986-05	1.79	0	56.2	69.5	42.9		
USC00356540	1986-06	0.09	0	67.7	85.5	49.8		
USC00356540	1986-07	0.61	0	66	82.7	49.2		
USC00356540	1986-08	0.19	0	72.8	93	52.6		
USC00356540	1986-09	1.87	0	57.2	72.3	42.1		
USC00356540	1986-10	0.91	0	51.3	68.3	34.4	YEARLY TOTAL	
USC00356540	1986-11	3.42	2	41.9	49	34.7	PRCP	SNOW
USC00356540	1986-12	0.96	7.5	31.9	37.1	26.7	18.04	20
USC00356540	1987-01	2.08	9	29.2	37.5	20.8		
USC00356540	1987-02	1.31	0	39.2	47.3	31		
USC00356540	1987-03	1.85	0	45.3	55.7	34.9		
USC00356540	1987-04	0.83	0	53.3	68.2	38.4		
USC00356540	1987-05	1.63	0	59	73.6	44.3		
USC00356540	1987-06	0.62	0	64.8	82.4	47.3		
USC00356540	1987-07	0.48	0	68.8	85.1	52.4		
USC00356540	1987-08	0.06	0	67	87.2	46.9		
USC00356540	1987-09	0.04	0	62.9	83.2	42.6		
USC00356540	1987-10	0	0	50.5	71.5	29.5	YEARLY TOTAL	
USC00356540	1987-11	1.45	0	41.9	52	31.7	PRCP	SNOW
USC00356540	1987-12	1.61	2.5	32.9	40.8	25	11.96	11.5
USC00356540	1988-01	2.6	8.4	32	39.6	24.4		
USC00356540	1988-02	0.33	1	38.1	50.4	25.9		
USC00356540	1988-03	1.65	0.5	43.2	55.6	30.9		

STATION	DATE	PRCP (IN)	SNOW (IN)	AVE TEMP (°F)	MAX TEMP (°F)	MIN TEMP (°F)		
USC00356540	1988-04	2.59	0	51.4	63.8	39.1		
USC00356540	1988-05	1.8	0	55.6	69.2	42		
USC00356540	1988-06	0.91	0	62.5	76.6	48.5		
USC00356540	1988-07	0	0	70.2	89.5	50.9		
USC00356540	1988-08	0	0	67.5	88.4	46.5		
USC00356540	1988-09	0.4	0	60.5	78.9	42.1		
USC00356540	1988-10	0.08	0	56.1	73.6	38.6	YEARLY TOTAL	
USC00356540	1988-11	3.66	1	43.5	51.9	35.2	PRCP	SNOW
USC00356540	1988-12	1.1	0	33.9	41.2	26.5	15.12	10.9
USC00356540	1989-01	2.86	9.4	36.3	44.7	28		
USC00356540	1989-02	1.56	8.5	25.9	33.3	18.6		
USC00356540	1989-03	2.96	1	42.3	51.9	32.7		
USC00356540	1989-04	1.94	0	51.7	64.4	39.1		
USC00356540	1989-05	2.19	0	55.3	68.8	41.7		
USC00356540	1989-06	0.33	0	64.7	81.3	48.1		
USC00356540	1989-07	0.15	0	68.7	88	49.4		
USC00356540	1989-08	1.19	0	67.3	82.8	51.8		
USC00356540	1989-09	0.24	0	60.5	79.5	41.4		
USC00356540	1989-10	1	0	49.8	64.6	35	YEARLY TOTAL	
USC00356540	1989-11	1.65	0	43.5	53.9	33.2	PRCP	SNOW
USC00356540	1989-12	0.49	2	32.8	39.8	25.9	16.56	20.9
USC00356540	1990-01	1.43	0	37.8	44.5	31.1		
USC00356540	1990-03	1.89	2.5	44	56.7	31.3		
USC00356540	1990-04	1.78	0	52.6	67.6	37.5		
USC00356540	1990-05	2.15	0	54.9	68	41.9		
USC00356540	1990-06	0.7	0	63.5	77.8	49.2		
USC00356540	1990-07	0.37	0	72.8	92	53.7		
USC00356540	1990-08	0.76	0	70.4	87.5	53.4		
USC00356540	1990-09	0	0	65.2	85.1	45.4		
USC00356540	1990-10	1.38	0	49.6	63.7	35.4	YEARLY TOTAL	
USC00356540	1990-11	1.73	0	44.9	54.5	35.2	PRCP	SNOW
USC00356540	1990-12	1.18	13.5	26.9	35.1	18.7	13.86	18
USC00356540	1991-01	1.15	1.5	31.1	39.6	22.5		
USC00356540	1991-02	0.86	0	44.4	54.6	34.3		
USC00356540	1991-03	1.71	2	41.6	52.5	30.8		
USC00356540	1991-04	1.02	0	49	62.2	35.8		
USC00356540	1991-05	4.74	0	53.7	65.7	41.6		
USC00356540	1991-06	2.22	0	59.4	72.7	46		
USC00356540	1991-07	0.15	0	69.7	88.6	50.8		
USC00356540	1991-08	0.24	0	72.2	91.2	53.2		
USC00356540	1991-09	0.03	0	62	82	41.9		
USC00356540	1991-10	0.89	3.5	49.9	66.9	33	YEARLY TOTAL	
USC00356540	1991-11	4.18	1.5	40.8	47.7	33.9	PRCP	SNOW

STATION	DATE	PRCP (IN)	SNOW (IN)	AVE TEMP (°F)	MAX TEMP (°F)	MIN TEMP (°F)		
USC00356540	1991-12	0.97	0	36.5	43	30	18.16	8.5
USC00356540	1992-01	0.96	0	38.6	44.5	32.7		
USC00356540	1992-02	1.35	0	42.5	51	34.1		
USC00356540	1992-03	0.85	0	45.8	59.3	32.4		
USC00356540	1992-04	1.29	0	52.1	65.1	39		
USC00356540	1992-05	0.2	0	58.8	76.4	41.1		
USC00356540	1992-06	0.9	0	68.2	85.7	50.7		
USC00356540	1992-07	1.74	0	69.6	85.8	53.4		
USC00356540	1992-08	0.78	0	69.6	88	51.3		
USC00356540	1992-09	0.58	0	59.2	75.6	42.9		
USC00356540	1992-10	1.7	0	52.2	67.2	37.3	YEARLY TOTAL	
USC00356540	1992-11	2.61	0.3	40	46.5	33.6	PRCP	SNOW
USC00356540	1992-12	1.3	10	31.9	40	23.8	14.26	10.3
USC00356540	1993-01	2.44	21.6	24.3	32.9	15.8		
USC00356540	1993-02	1.04	13	29	36.4	21.6		
USC00356540	1993-03	2.32	1	40.7	50.1	31.2		
USC00356540	1993-04	3.1	0	49.5	60.9	38.2		
USC00356540	1993-05	1.58	0	60.1	73.5	46.6		
USC00356540	1993-06	2.01	0	62.5	75.9	49.1		
USC00356540	1993-07	0.47	0	65.2	79.1	51.3		
USC00356540	1993-08	2.6	0	66.3	83.4	49.3		
USC00356540	1993-09	0	0	61.3	80.6	42.1		
USC00356540	1993-10	0.3	0	52.7	68.4	37	YEARLY TOTAL	
USC00356540	1993-11	0.49	0.5	32.5	46.1	19	PRCP	SNOW
USC00356540	1993-12	1.91	0.5	35.4	40.5	30.2	18.26	36.6
USC00356540	1994-01	2.38	0	40.7	49.2	32.3		
USC00356540	1994-02	1.67	11.3	34	41.8	26.3		
USC00356540	1994-03	0.52	0	45	58.5	31.5		
USC00356540	1994-04	1.18	0	52.6	65.3	39.8		
USC00356540	1994-05	2.88	0	58.1	71.7	44.5		
USC00356540	1994-06	0.76	0	62.4	78.2	46.5		
USC00356540	1994-07	0.33	0	72.6	92.1	53.1		
USC00356540	1994-08	0.07	0	69.5	88.5	50.6		
USC00356540	1994-09	0.76	0	63.4	82.4	44.5		
USC00356540	1994-10	1.44	0	49	63.5	34.5	YEARLY TOTAL	
USC00356540	1994-11	3.78	2	39	46.4	31.7	PRCP	SNOW
USC00356540	1994-12	1.84	4	35.7	43.2	28.3	17.61	17.3
USC00356540	1995-01	2.75	0	34.4	40.7	28.3		
USC00356540	1995-02	1.15	9	41.4	51.7	31.1		
USC00356540	1995-03	2.35	0	43.8	55.5	32		
USC00356540	1995-04	2.93	0	48.1	60.3	35.9		
USC00356540	1995-05	1.56	0	56.1	69.8	42.3		
USC00356540	1995-06	1.73	0	60.9	75	46.8		

STATION	DATE	PRCP (IN)	SNOW (IN)	AVE TEMP (°F)	MAX TEMP (°F)	MIN TEMP (°F)		
USC00356540	1995-07	0.22	0	70.7	87.7	53.6		
USC00356540	1995-08	0.41	0	65.4	83.9	47		
USC00356540	1995-09	0.93	0	63.9	81.2	46.5		
USC00356540	1995-10	1.35	0	49.5	62.5	36.4	YEARLY TOTAL	
USC00356540	1995-11	2.94	0	45.2	54.4	36	PRCP	SNOW
USC00356540	1995-12	2.37	0.8	34.6	40.5	28.7	20.69	9.8
USC00356540	1996-01	2.8	11.5	35.9	43.1	28.6		
USC00356540	1996-02	2.45	3	34.1	41.5	26.6		
USC00356540	1996-03	-	0	42.5	52.1	32.9		
USC00356540	1996-04	2.33	0	50.7	63	38.4		
USC00356540	1996-05	2	0	53	64.6	41.3		
USC00356540	1996-06	0.39	0	61.2	77.8	44.7		
USC00356540	1996-07	0	0	72.4	92.1	52.7		
USC00356540	1996-08	0.05	0	70.1	89.2	51		
USC00356540	1996-09	0.66	0	58.7	75.2	42.3		
USC00356540	1996-10	1.99	0	50.4	63.7	37.1	YEARLY TOTAL	
USC00356540	1996-11	3.05	0	39.5	47.8	31.1	PRCP	SNOW
USC00356540	1996-12	4.24	8	36	44.3	27.7	19.96	22.5
USC00356540	1997-01	2.74	3	32.5	41.4	23.6		
USC00356540	1997-02	1.6	1	37.9	45.4	30.5		
USC00356540	1997-03	3	0.5	45	55.4	34.7		
USC00356540	1997-04	2.46	0	48.1	60.2	36		
USC00356540	1997-05	0.46	0	58.7	73.5	43.9		
USC00356540	1997-06	1.1	0	62.4	77.3	47.6		
USC00356540	1997-07	0.36	0	68.5	86.3	50.7		
USC00356540	1997-08	0.02	0	71.5	90.4	52.7		
USC00356540	1997-09	0.88	0	63.1	79.2	47		
USC00356540	1997-10	1.34	0	50.1	65	35.3	YEARLY TOTAL	
USC00356540	1997-11	1.59	0	42.2	50.5	33.9	PRCP	SNOW
USC00356540	1997-12	0.9	6.2	34.6	41.3	27.8	16.45	10.7
USC00356540	1998-01	2.85	9.8	37.9	46.6	29.2		
USC00356540	1998-02	0.87	0	43	52.7	33.4		
USC00356540	1998-03	1.43	0	44.3	55.3	33.3		
USC00356540	1998-04	1.3	0	47.8	60.8	34.9		
USC00356540	1998-05	3.12	0	54.7	66.6	42.8		
USC00356540	1998-06	0.51	0	62.6	77.6	47.6		
USC00356540	1998-07	0.18	0	76.3	95.3	57.4		
USC00356540	1998-08	0.1	0	71.8	91.7	51.8		
USC00356540	1998-09	1.24	0	66	83.5	48.6		
USC00356540	1998-10	0.41	0	49.1	65.7	32.6	YEARLY TOTAL	
USC00356540	1998-11	4.72	0	44.6	53.3	35.9	PRCP	SNOW
USC00356540	1998-12	2.96	1	35.3	44.4	26.3	19.69	10.8

STATION	DATE	PRCP (IN)	SNOW (IN)	AVE TEMP (°F)	MAX TEMP (°F)	MIN TEMP (°F)		
USC00356540	1999-01	1.18	0	40.9	49.6	32.3		
USC00356540	1999-02	2.17	2.3	41.3	50.8	31.7		
USC00356540	1999-03	1.23	1	43.9	55.3	32.6		
USC00356540	1999-04	0.99	0	46.3	60.9	31.7		
USC00356540	1999-05	1.65	0	53.5	68.6	38.5		
USC00356540	1999-06	0.61	0	62.4	78.4	46.4		
USC00356540	1999-07	0.04	0	68.4	87.6	49.1		
USC00356540	1999-08	1.18	0	71.7	89	54.5		
USC00356540	1999-09	0	0	59.1	79.9	38.4		
USC00356540	1999-10	1.76	0	49	66.1	32	YEARLY TOTAL	
USC00356540	1999-11	2.18	0	46.1	56.4	35.8	PRCP	SNOW
USC00356540	1999-12	1.89	0	38.2	44.6	31.7	14.88	3.3
USC00356540	2000-01	2.4	5.8	35.6	42	29.2		
USC00356540	2000-02	3.35	1.6	39.2	46.8	31.7		
USC00356540	2000-03	3.39	0	42.1	53.1	31.1		
USC00356540	2000-05	1.98	0	56.8	70.1	43.5		
USC00356540	2000-06	1.39	0	61.9	78	45.9		
USC00356540	2000-07	0.31	0	69.4	88.1	50.7		
USC00356540	2000-08	0	0	68.1	88.6	47.6	YEARLY TOTAL	
USC00356540	2000-11	2.61	0	35.4	43.7	27.1	PRCP	SNOW
USC00356540	2000-12	0.85	0	32.1	37.6	26.6	22.11	7.4
USC00356540	2001-01	1.29	0	33.8	39.2	28.4		
USC00356540	2001-02	0.9	0.5	35.9	44.3	27.4		
USC00356540	2001-03	1.43	0	44.6	57.5	31.6		
USC00356540	2001-04	2.13	0.8	47.8	59.6	36.1		
USC00356540	2001-05	0.76	0	58.2	74.7	41.7		
USC00356540	2001-06	1.47	0	61.8	76.8	46.8		
USC00356540	2001-08	0	0	71.3	90.9	51.6		
USC00356540	2001-09	0.36	0	64.3	83.3	45.2		
USC00356540	2001-10	1.91	0	49.6	64.8	34.3	YEARLY TOTAL	
USC00356540	2001-11	1.89	0	43	52.4	33.6	PRCP	SNOW
USC00356540	2001-12	1.02	2.9	36.2	44.3	28.2	14.01	4.2
USC00356540	2002-02	1.33	0.1	40	51.4	28.5		
USC00356540	2002-03	1.41	2.4	39.8	49.5	30.1		
USC00356540	2002-04	1.13	0	48.1	62.2	34		
USC00356540	2002-05	1.02	0	54.6	69.2	40		
USC00356540	2002-06	1.39	0	65.4	81.1	49.7		
USC00356540	2002-07	0.23	0	73.3	92.9	53.8		
USC00356540	2002-08	0	0	67.1	86.4	47.8		
USC00356540	2002-09	0.24	0	61.1	80.2	42.1	YEARLY TOTAL	
USC00356540	2002-10	0.61	0	46.3	63.6	29.1	PRCP	SNOW
USC00356540	2002-12	3.06	3.5	38.8	45.3	32.3	13.33	8.9

STATION	DATE	PRCP (IN)	SNOW (IN)	AVE TEMP (°F)	MAX TEMP (°F)	MIN TEMP (°F)
USC00356540	2003-01	3.26	0.1	40.1	46.1	34.1
USC00356540	2003-02	2.19	0.3	39.3	49.3	29.3
USC00356540	2003-03	2.21	0	47.5	58.4	36.7
USC00356540	2003-04	1.79	0	49	61.2	36.7
USC00356540	2003-05	1.01	0	56.2	69.5	42.9
USC00356540	2003-06	0	0	65.2	83.6	46.9
USC00356540	2003-07	0	0	73.4	93.7	53.1
USC00356540	2003-08	0.23	0	69.9	89.8	50.1
USC00356540	2003-09	0.7	0	64.4	82.7	46.1
USC00356540	2003-10	0.68	0	55.5	71.5	39.5
USC00356540	2003-11	1.68	1.2	37.5	48.8	26.3
USC00356540	2003-12	3.34	9.9	36.6	44.2	28.9
USC00356540	2004-01	2.78	7.9	27.5	34	21.1
USC00356540	2004-02	2.3	2.7	39.1	47.8	30.3
USC00356540	2004-03	0.85	0	47.4	61.2	33.7
USC00356540	2004-04	2.04	0	50.2	65.5	34.8
USC00356540	2004-05	2.78	0	55.3	67.2	43.3
USC00356540	2004-06	1.88	0	62.9	78	47.8
USC00356540	2004-07	0.12	0	71.5	90.6	52.3
USC00356540	2004-08	0.91	0	71.6	88.8	54.3
USC00356540	2004-09	0.54	0	60.3	76.5	44.2
USC00356540	2004-10	0.75	0	52.3	67	37.7
USC00356540	2004-11	2.09	0	41.6	52.9	30.4
USC00356540	2004-12	1.08	0.8	38.2	46.6	29.7
USC00356540	2005-01	0.54	1.7	34.9	43.7	26.2
USC00356540	2005-02	0.33	0.5	36.6	51.2	21.9
USC00356540	2005-03	1.77	0	46.4	60.6	32.1
USC00356540	2005-04	1.41	0	50.1	63.7	36.4
USC00356540	2005-05	2.8	0	58	71.5	44.6
USC00356540	2005-06	0.66	0	61	77	44.9
USC00356540	2005-07	0.19	0	71.3	90.8	51.7
USC00356540	2005-08	0.01	0	69.8	90.4	49.2
USC00356540	2005-09	0.06	0	58.4	77.6	39.3
USC00356540	2005-10	1.38	0	51.9	66.5	37.3
USC00356540	2005-11	1.65	0	39.5	48.2	30.7
USC00356540	2005-12	2.15	1.3	31	38.5	23.5
USC00356540	2006-01	3.46	0	43.2	52.6	33.8
USC00356540	2006-02	1	0	36.2	47.2	25.2
USC00356540	2006-03	2.5	0.4	43.4	54	32.8
USC00356540	2006-04	2.84	0	49.2	62.3	36.2
USC00356540	2006-05	1.57	0	55.7	71.6	39.8
USC00356540	2006-06	2.16	0	63.6	78.7	48.6
USC00356540	2006-07	0.11	0	74.1	94.3	53.9

YEARLY TOTAL	
PRCP	SNOW
17.09	11.5

YEARLY TOTAL	
PRCP	SNOW
18.12	11.4

YEARLY TOTAL	
PRCP	SNOW
12.95	3.5

STATION	DATE	PRCP (IN)	SNOW (IN)	AVE TEMP (°F)	MAX TEMP (°F)	MIN TEMP (°F)		
USC00356540	2006-08	0	0	68.5	88.3	48.7		
USC00356540	2006-09	0.73	0	62.2	78.9	45.6		
USC00356540	2006-10	0.84	0	49.6	65	34.3	YEARLY TOTAL	
USC00356540	2006-11	3.53	2.7	42.2	51.9	32.5	PRCP	SNOW
USC00356540	2006-12	2.31	0.1	33.2	40.4	26	21.05	3.2
USC00356540	2007-01	0.65	0.6	30.7	39.1	22.3		
USC00356540	2007-02	1.76	1.1	38.2	46.8	29.6		
USC00356540	2007-03	1.65	0.4	45.9	58.7	33.1		
USC00356540	2007-04	1.06	0	47.6	61.4	33.9		
USC00356540	2007-05	0.95	0	56.6	72.3	41		
USC00356540	2007-06	1.15	0	63.6	79.6	47.6		
USC00356540	2007-07	0.32	0	73.3	92	54.6		
USC00356540	2007-08	0.4	0	65.2	83.3	47.1		
USC00356540	2007-09	0.26	0	59.2	77.8	40.6		
USC00356540	2007-10	1.3	0	49.4	63.5	35.4	YEARLY TOTAL	
USC00356540	2007-11	2.1	6.3	40	51.1	28.8	PRCP	SNOW
USC00356540	2007-12	2.35	9.6	35.6	42.6	28.5	13.95	18
USC00356540	2008-01	1.8	11.2	31	39.9	22.1		
USC00356540	2008-02	0.63	5.6	39.8	49.6	30.1		
USC00356540	2008-03	2.22	1.4	42.1	53.3	31		
USC00356540	2008-04	0.51	0	45.3	59.5	31.1		
USC00356540	2008-05	1.29	0	56.6	70.4	42.9		
USC00356540	2008-06	1.33	0	58.4	73.9	42.9		
USC00356540	2008-07	0.12	0	70.1	89.6	50.7		
USC00356540	2008-08	0.59	0	68.6	86.9	50.3		
USC00356540	2008-09	0	0	59.3	79.3	39.3		
USC00356540	2008-10	0.09	0	47.8	65.1	30.5	YEARLY TOTAL	
USC00356540	2008-11	1.54	0	43.6	54.2	33.1	PRCP	SNOW
USC00356540	2008-12	2.74	30.8	27.6	38.6	16.6	12.86	49
USC00356540	2009-01	2.05	10.5	32.9	41	24.8		
USC00356540	2009-02	1.41	4.6	36.1	44.5	27.7		
USC00356540	2009-03	2.54	1	39	49.1	28.9		
USC00356540	2009-04	1.47	0.1	47.5	61.8	33.2		
USC00356540	2009-05	1.2	0	-	-	-		
USC00356540	2009-06	-	0	-	-	-		
USC00356540	2009-07	0	0	-	-	-		
USC00356540	2009-08	-	0	-	-	-		
USC00356540	2009-09	0	0	62.3	80.7	43.8	YEARLY TOTAL	
USC00356540	2009-10	1.19	0	-	-	-	PRCP	SNOW
USC00356540	2009-12	-	0	-	-	-	9.86	16.2
USC00356540	2010-01	-	-	40.2	47.5	32.8		
USC00356540	2010-02	0.71	0	41.7	51	32.3		

STATION	DATE	PRCP (IN)	SNOW (IN)	AVE TEMP (°F)	MAX TEMP (°F)	MIN TEMP (°F)		
USC00356540	2010-03	1.4	0.3	44	57.2	30.8		
USC00356540	2010-04	2.78	0	47.2	58.6	35.8		
USC00356540	2010-05	2.42	0	51.6	63.2	40		
USC00356540	2010-06	2.87	0	59	72.4	45.6		
USC00356540	2010-07	0.02	0	68.3	87.2	49.5		
USC00356540	2010-08	-	0	-	-	-		
USC00356540	2010-09	0.85	0	59.9	77	42.8		
USC00356540	2010-10	1.97	0	50.3	63.8	36.7	YEARLY TOTAL	
USC00356540	2010-11	1.95	8.2	36.5	46.9	26.1	PRCP	SNOW
USC00356540	2010-12	3.85	10.4	35.5	43	28.1	18.82	18.9
USC00356540	2011-01	1.55	2.8	34.8	43.4	26.2		
USC00356540	2011-02	1.07	1.5	36	45.5	26.5		
USC00356540	2011-03	3.19	0.2	44	54.3	33.6	YEARLY TOTAL	
USC00356540	2011-04	1.8	0	44.7	55.9	33.5	PRCP	SNOW
USC00356540	2011-05	3.87	0	51.6	64.2	39.1	11.48	4.5
USC00356540	2012-01	2.29	6.9	35.8	46.8	24.7		
USC00356540	2012-02	1.46	0.4	35.8	44.8	26.7	YEARLY TOTAL	
USC00356540	2012-03	2.41	2.2	41.7	53.6	29.9	PRCP	SNOW
USC00356540	2012-12	1.37	0.4	38.1	45.4	30.9	7.53	9.9
USC00356540	2013-01	1.63	0.4	30.2	36.8	23.5		
USC00356540	2013-02	0.5	0	38	48.7	27.3		
USC00356540	2013-03	0.91	0.1	42.7	56.4	29		
USC00356540	2013-04	1.39	0	46.8	61.2	32.3		
USC00356540	2014-03	2.8	1.8	43.6	55.2	32		
USC00356540	2014-04	1.61	0	48.5	61.3	35.8		
USC00356540	2014-05	0.92	0	57	72.3	41.7		
USC00356540	2014-06	1.15	-	61.7	77.9	45.6		
USC00356540	2014-07	0.4	-	75	94	56.1		
USC00356540	2014-08	0.36	0	71.8	89.5	54		
USC00356540	2014-09	0.19	-	62.1	80.2	44		
USC00356540	2014-10	0.79	-	56.6	71.4	41.8	YEARLY TOTAL	
USC00356540	2014-11	2.1	5	36.6	47.2	26	PRCP	SNOW
USC00356540	2014-12	5.03	2.5	35.7	43	28.5	19.78	9.8
USC00356540	2015-01	1.14	0.5	35.9	43.6	28.1		
USC00356540	2015-04	0.47	-	47.2	61.3	33.1		
USC00356540	2015-08	0.19	-	69.4	89.4	49.4		
USC00356540	2015-09	0.64	-	58.9	75.9	41.9		
USC00356540	2015-10	0.59	-	54	69.6	38.5	YEARLY TOTAL	
USC00356540	2015-11	1.73	-	38.5	47.4	29.6	PRCP	SNOW
USC00356540	2015-12	3.19	-	37.3	44	30.5	7.95	0.5
USC00356540	2016-01	1.74	-	35.3	42.1	28.5		
USC00356540	2016-02	1.45	-	42.4	53	31.8		

STATION	DATE	PRCP (IN)	SNOW (IN)	AVE TEMP (°F)	MAX TEMP (°F)	MIN TEMP (°F)
USC00356540	2016-03	2.36	-	44.9	56.4	33.3
USC00356540	2016-04	0.87	-	53.4	67.8	39
USC00356540	2016-05	2.61	-	56.9	71.1	42.8
USC00356540	2016-06	0.45	-	64.6	81.9	47.3
USC00356540	2016-07	1.35	-	69	86.1	51.9
USC00356540	2016-08	0.14	-	68.6	88.3	48.9
USC00356540	2016-09	0.98	-	59	74.6	43.4
USC00356540	2016-10	3.67	-	51.5	63	40
USC00356540	2016-11	1.3	-	47.5	57.5	37.5
USC00356540	2016-12	2.51	18.1	27.9	36	19.9
USC00356540	2017-01	1.5	-	22.2	30.2	14.1
USC00356540	2017-02	3.12	-	33.4	41.8	25
USC00356540	2017-03	3.46	-	44.5	54.3	34.7
USC00356540	2017-04	2.84	-	48.3	60.1	36.4
USC00356540	2017-05	1.04	-	56.5	70.8	42.1
USC00356540	2017-06	1.7	-	62.7	78.1	47.4
Global Averages		16.28	12.87	50.28	63.18	37.33

YEARLY TOTAL	
PRCP	SNOW
19.43	18.1

YEARLY TOTAL	
PRCP	SNOW
13.66	0

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APPENDIX B
SURFACE WATER FLOW STATISTICS

APPENDIX B

City of Pendleton, Oregon
Surface Water Flow Statistics

Summary

This appendix provides a summary of stream flow data collected from two gage stations near the City of Pendleton. The first gage is located on the McKay Creek (MCKO) downstream of the McKay Reservoir Dam. Its coordinates are: 45°36'28", North 118°47'30" West at an elevation of 1163 feet. The second gage is located on the Umatilla River in Pendleton (PDTO) at 45°40'20" North, 118°47'30" West with an elevation of 1054 feet. Both gages are maintained by the US Bureau of Reclamation as part of the Umatilla Project in the Pacific Northwest region. A complete dataset can be found at:

https://www.usbr.gov/pn/hydromet/umatilla/umawebhydreadarc.html

The following flow statistics are derived from data collected between January 1, 2013 to June 30, 2017.

Umatilla River (PDTO) Flow Statistics at Pandleton			
Month	Monthly Minimum 7-Day Average Flow (cfs)	Monthly Maximum (cfs)	Monthly Minimum (cfs)
October	45.0	327.0	45.6
November	63.7	1670.0	70.0
December	184.6	4310.0	96.9
January	194.6	2380.0	185.0
February	257.8	4594.2	238.2
March	442.7	6793.4	309.0
April	378.9	6750.0	200.0
May	184.4	1578.9	125.0
June	71.1	386.5	49.0
July	33.5	184.0	28.0
August	29.1	58.0	27.0
September	31.4	123.0	32.0

McKay Creek (MCKO) Flow Statistics at McKay Reservoir Dam			
Month	Monthly Minimum 7-Day Average Flow (cfs)	Monthly Maximum (cfs)	Monthly Minimum (cfs)
October	106.8	137.0	121.0
November	9.4	130.0	9.4
December	8.9	15.0	8.6
January	10.5	12.0	7.6
February	8.0	14.4	8.0
March	8.1	583.6	8.1
April	9.8	1177.2	9.1
May	11.1	452.7	9.7
June	25.9	359.0	20.2
July	53.8	299.4	90.6
August	21.0	263.6	21.0
September	21.0	240.0	21.0

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APPENDIX C
SOIL RESOURCE REPORT

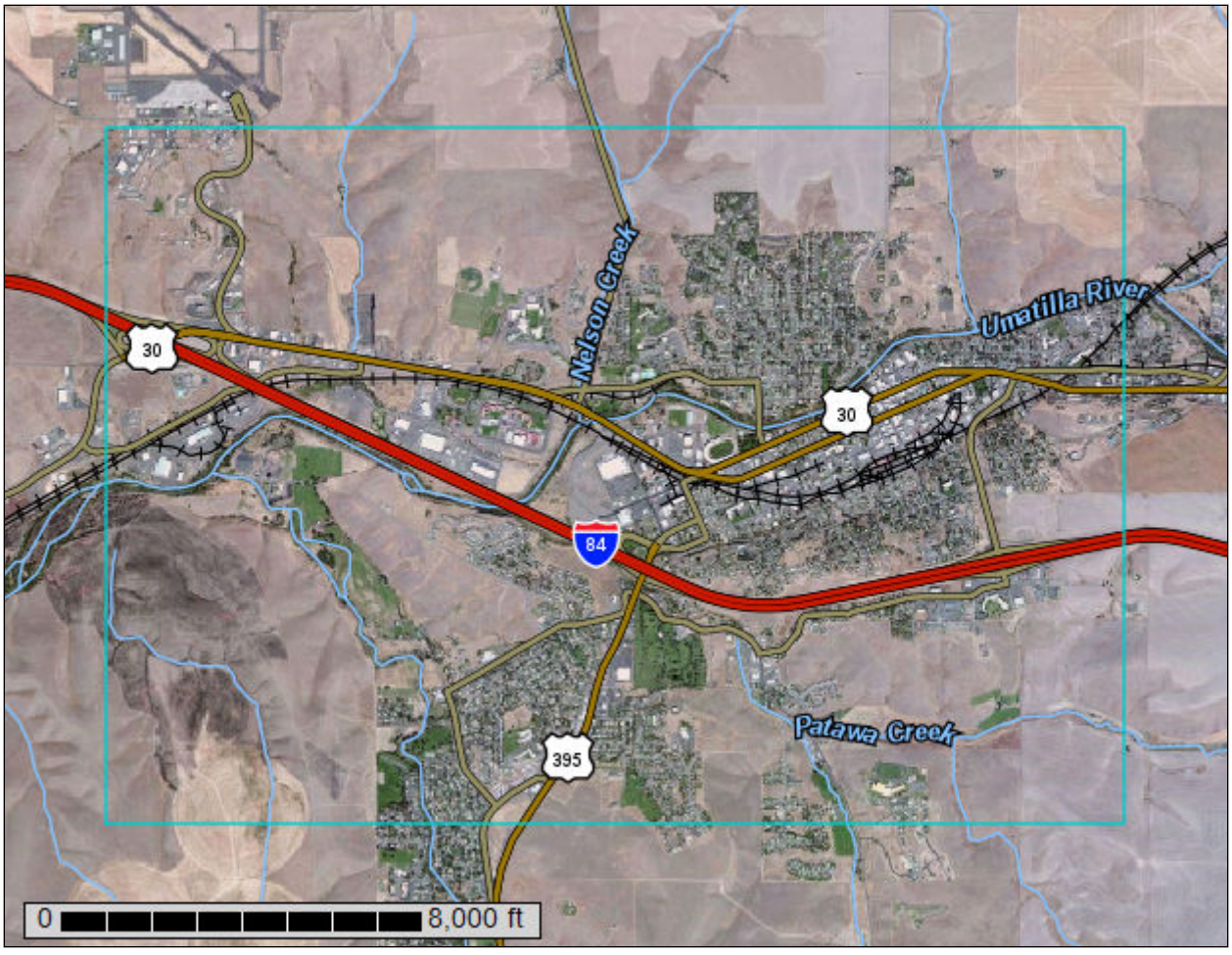
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

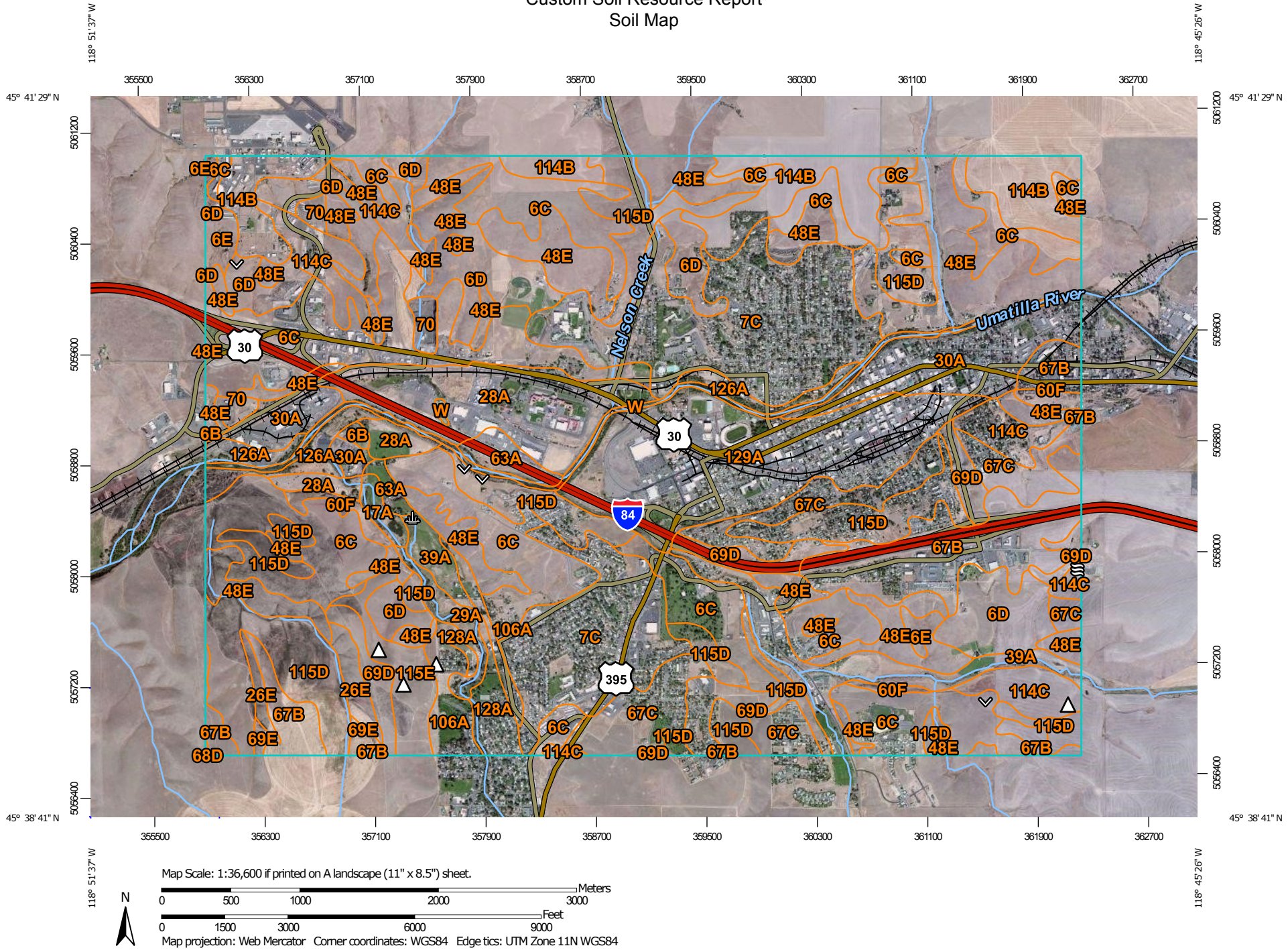
A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Umatilla County Area, Oregon



July 19, 2017

Custom Soil Resource Report
Soil Map



Map Scale: 1:36,600 if printed on A landscape (11" x 8.5") sheet.

N

0 500 1000 2000 3000 Meters

0 1500 3000 6000 9000 Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Umatilla County Area, Oregon
Survey Area Data: Version 12, Jul 29, 2016

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 7, 2010—Oct 21, 2010

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Umatilla County Area, Oregon (OR667)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
6B	Anderly silt loam, 1 to 7 percent slopes	8.8	0.1%
6C	Anderly silt loam, 7 to 12 percent slopes	1,141.1	16.8%
6D	Anderly silt loam, 12 to 20 percent slopes	406.1	6.0%
6E	Anderly silt loam, 20 to 35 percent slopes	39.6	0.6%
7C	Anderly-Urban land complex, 7 to 12 percent slopes	711.2	10.4%
17A	Catherine variant-Catherine silt loams, 0 to 3 percent slopes	21.0	0.3%
26E	Entic Durochrepts, 20 to 40 percent slopes	44.9	0.7%
28A	Freewater gravelly silt loam, 0 to 3 percent slopes	295.0	4.3%
29A	Freewater very cobbly loam, 0 to 3 percent slopes	41.5	0.6%
30A	Freewater-Urban land complex, 0 to 3 percent slopes	244.1	3.6%
39A	Hermiston silt loam, 0 to 3 percent slopes	183.5	2.7%
48E	Lickskillet very stony loam, 7 to 40 percent slopes	737.1	10.8%
60F	Nansene silt loam, 35 to 70 percent slopes	41.4	0.6%
63A	Onyx silt loam, 0 to 3 percent slopes	50.6	0.7%
67B	Pilot Rock silt loam, 1 to 7 percent slopes	351.0	5.2%
67C	Pilot Rock silt loam, 7 to 12 percent slopes	287.0	4.2%
68D	Pilot Rock silt loam, 12 to 20 percent north slopes	0.3	0.0%
69D	Pilot Rock silt loam, 12 to 20 percent south slopes	161.6	2.4%
69E	Pilot Rock silt loam, 20 to 30 percent south slopes	15.1	0.2%
70	Pits, gravel	40.3	0.6%
106A	Umapine silt loam, reclaimed, 0 to 3 percent slopes	77.6	1.1%
114B	Walla Walla silt loam, 1 to 7 percent slopes	302.4	4.4%

Umatilla County Area, Oregon (OR667)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
114C	Walla Walla silt loam, 7 to 12 percent slopes	216.0	3.2%
115D	Walla Walla silt loam, 12 to 25 percent north slopes	634.0	9.3%
115E	Walla Walla silt loam, 25 to 40 percent north slopes	77.8	1.1%
126A	Xerofluvents, 0 to 3 percent slopes	93.9	1.4%
128A	Yakima silt loam, 0 to 3 percent slopes	55.8	0.8%
129A	Yakima-Urban land complex, 0 to 3 percent slopes	464.7	6.8%
W	Water	67.1	1.0%
Totals for Area of Interest		**6,810.5**	**100.0%**

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

murraysmith

APPENDIX D
NPDES PERMIT

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
WASTE DISCHARGE PERMIT

Department of Environmental Quality
Eastern Region - Pendleton Office
700 SE Emigrant, Suite 330, Pendleton, OR 97801
Telephone: (541) 276-4063

Issued pursuant to ORS 468B.050 and The Federal Clean Water Act

ISSUED TO:

City of Pendleton
500 SW Dorion Avenue
Pendleton, Oregon 97801

SOURCES COVERED BY THIS PERMIT:

Type of Waste	Outfall Number	Outfall Location
Treated Domestic Wastewater	001	R.M. 0.1 (McKay Creek) to R.M. 52.0 (Umatilla River)
Biosolids	002	Approved sites

FACILITY TYPE AND LOCATION:

Activated Sludge
Pendleton Wastewater Treatment Plant
4255 Southwest 28th Drive
Pendleton, OR 97801
Treatment System Class: Level IV
Collection System Class: Level IV

RECEIVING STREAM INFORMATION:

Basin: Umatilla
Sub-Basin: Umatilla
Receiving Stream: McKay Creek/Umatilla River
LLID: 1193384459144 R.M. 0.1 /R.M. 52.0
County: Umatilla

EPA REFERENCE NO: OR-002639-5

Issued in response to Application No. 992123 received July 16, 1997.

This permit is issued based on the land use findings in the permit record.

D. Mitch Wolgamott, Water Quality Manager
Eastern Region

February 3, 2005
Date

PERMITTED ACTIVITIES

Until this permit expires or is modified or revoked, the permittee is authorized to construct, install, modify, or operate a wastewater collection, treatment, control and disposal system and discharge to public waters adequately treated wastewaters only from the authorized discharge point or points established in Schedule A and only in conformance with all the requirements, limitations, and conditions set forth in the attached schedules as follows:

Unless specifically authorized by this permit, by another NPDES or WPCF permit, or by Oregon Administrative Rule, any other direct or indirect discharge to waters of the state is prohibited, including discharge to an underground injection control system.

SCHEDULE A

1. Waste Discharge Limitations not to be exceeded after permit issuance.

a. Treated Effluent Outfall 001

(1) May 1 - October 31:

Parameter	Average Effluent Concentrations Monthly	Weekly	Monthly* Average lb/day	Weekly* Average lb/day	Daily* Maximum lbs
BOD_5	20 mg/L	30 mg/L	920	1400	1800
TSS	20 mg/L	30 mg/L	920	1400	1800

Parameter	Limitations
Total Ammonia- Nitrogen	2.0 mg/L (96 lb/day) daily maximum and 1.0 mg/L (48 lb/day) monthly average
Residual Chlorine	0.05 mg/L (2.0 lb/day) daily maximum and 0.02 mg/L (0.80 lb/day) monthly average

(2) November 1 - April 30:

Parameter	Average Effluent Concentrations Monthly	Weekly	Monthly* Average lb/day	Weekly* Average lb/day	Daily* Maximum lbs
BOD_5	30 mg/L	45 mg/L	1400	2100	2800
TSS	30 mg/L	45 mg/L	1400	2100	2800

Parameter	Limitations
Total Ammonia- Nitrogen	5.2 mg/L (240 lb/day) daily maximum and 3.0 mg/L (140 lb/day) monthly average
Residual Chlorine	0.04 mg/L (1.7 lb/day) daily maximum and 0.01 mg/L (0.60 lb/day) monthly average

* Average dry weather design flow to the facility equals 5.5 MGD. Mass load limits are based upon average dry weather design flow to the facility.

(3)

Other parameters (year-round)	Limitations
E. coli Bacteria	Shall not exceed 126 organisms per 100 ml monthly geometric mean. No single sample shall exceed 406 organisms per 100 ml. (See Note 1)
pH	Shall be within the range of 6.0 - 9.0
BOD_5 and TSS Removal Efficiency	Shall not be less than 85% monthly average for BOD_5 and 85% monthly average for TSS.

(4) Except as provided for in OAR 340-045-080, no wastes shall be discharged and no activities shall be conducted which violate applicable Water Quality Standards as adopted in OAR 340-041 except in the following defined mixing zone:

The allowable mixing zone is that portion of McKay Creek contained within a band extending out fifteen (15) feet from the bank of the creek at the outfall and extending to the Umatilla River. In addition, the mixing zone includes that segment of the Umatilla River that extends 200 feet downstream of the point where McKay Creek enters the river. The Zone of Immediate Dilution (ZID) shall be defined as that portion of the allowable mixing zone that is within 10% of the distance to the mixing zone boundary in any direction from the point of discharge.

(5) Maximum Allowable Effluent Temperature (See Note 2):

During the period June 1 through September 30, the effluent (end of outfall) temperature [temp., 7-Day Average of Daily Maximum °F] shall not exceed the calculated limit based on the following equation:

Effluent temp., °F = [0.25 x (0.25 x River flow / effluent flow + 1)] + River temp., °F

where: River flow is the total flow for McKay Creek and the Umatilla River. River temperature is 7-Day Average of Daily Maximum for the Umatilla River, °F

b. Biosolids Outfall 002 (Land Application)

(1) Biosolids land application and management will comply with Oregon biosolids rules and
guidelines including OAR 340-050 and all other applicable statutes, rules, and federal regulations.

(2) Land application activities shall be conducted in accordance with the approved biosolids management plan.

c. Groundwater

(1) No activities shall be conducted that could cause an adverse impact on existing or potential beneficial uses of groundwater.

(2) All wastewater shall be managed and disposed in a manner that will prevent a violation of the Groundwater Quality Protection Rules (OAR 340-040).

NOTES:

1. If a single sample exceeds 406 organisms per 100 ml, then five consecutive re-samples may be taken at intervals no greater than four-hours beginning within 28 hours after the original sample was taken. If the geometric mean of the five re-samples is less than or equal to 126 organisms per 100 ml, a violation shall not be triggered.

2. The permittee is considered to be in compliance with these limits and the applicable stream temperature criteria, provided that the permittee is complying with all terms and conditions of the Temperature Management Plan approved by the Department.

SCHEDULE B

1. **Minimum Monitoring and Reporting Requirements** (unless otherwise approved in writing by the Department).

The permittee shall monitor the parameters as specified below at the locations indicated. The laboratory used by the permittee to analyze samples shall have a quality assurance/quality control (QA/QC) program to verify the accuracy of sample analysis. If QA/QC requirements are not met for any analysis, the results shall be included in the report, but not used in calculations required by this permit. When possible, the permittee shall re-sample in a timely manner for parameters failing the QA/QC requirements, analyze the samples, and report the results.

a. Influent
The facility influent sampling location is prior to the primary clarifier.

Item or Parameter	Minimum Frequency	Type of Sample
BOD_5	2/Week	Composite
TSS	2/Week	Composite
pH	3/week	Grab

b. Treated Effluent Outfall 001
The facility effluent sampling location is after the chlorine contact chamber.

Item or Parameter	Minimum Frequency	Type of Sample
Total Flow (MGD)	Daily	Measurement
Flow Meter Calibration	Semi-Annual	Verification
BOD_5	2/Week	Composite
TSS	2/Week	Composite
pH	3/Week	Grab
E. coli	2/Week	Grab (See Note 1)
Quantity Chlorine Used	Daily	Measurement
Chlorine Residual	Daily	Grab
Pounds Discharged (BOD_5 and TSS)	2/Week	Calculation
Average Percent Removed (BOD_5 and TSS)	Monthly	Calculation
NH3-N	1/Week	24-hour Composite
Temperature	1/Week except as specified below for June 1- September 30	Grab
Bioassay (See Note 2)	As required by EPA Form 2A NPDES Application, Part E. Toxicity Testing Data	24- hour Composite for Acute & Chronic

c. Biosolids Management

Item or Parameter	Minimum Frequency	Type of Sample
Biosolids analysis including: Total Solids (% dry wt.) Volatile solids (% dry wt.) Biosolids nitrogen for: NH_3-N; NO_3-N; & TKN (% dry wt.) Phosphorus (% dry wt.) Potassium (% dry wt.) pH (standard units) Biolsolids metals content for: As, Cd, Cu, Hg, Mo, Ni, Pb, Se & Zn, measured as total in mg/kg	Quarterly During Land Application	Composite sample to be representative of the product to be land applied from the biosolids drying bed
Record of locations where biosolids are applied on each DEQ approved site. (Site location maps to be maintained at treatment facility for review upon request by DEQ)	Each Occurrence	Date, volume & locations where biosolids were applied recorded on site location map.
Record of % volatile solids reduction accomplished through stabilization	Monthly	Calculation
Record of digestion days (mean cell residence time)	Monthly	Calculation
Primary Digester Biosolids Temperature	3/Week	Grab

d. Temperature and Flow Monitoring (Monitored only during June 1- September 30)

Item or Parameter	Minimum Frequency	Type of Sample
Effluent Temperature, Daily Max (See Note 3)	Daily	Sort from measurement
Effluent Temperature, Average of Daily Maximums (See Note 3)	Weekly	Calculation
Maximum Allowable Effluent Temperature	Daily	Calculation (See Note 4)
Maximum Allowable Effluent Temperature, Average of Daily Allowable Maximums	Weekly	Calculation

Item or Parameter	Minimum Frequency	Type of Sample
McKay Cr. Temperature, Max Daily, Upstream (see Note 4)	Daily	Grab between 3 and 4 PM or Continuous
McKay Cr. Temperature, Average of Daily Maximums, Upstream (see Note 4)	Weekly	Calculation
Umatilla R. Temperature, Max. Daily, Upstream and Downstream of McKay Cr. Confluence (see Note 4)	Daily	Grab between 3 and 4 PM or Continuous

Item or Parameter	Minimum Frequency	Type of Sample
Umatilla River, McKay Creek and Mixing Zone Temperature (See Note 4)	Continuous	Data logger, Measured Hourly
Audit Continuous Tempera-ture Monitors (See Note 5)	June and September	Record
Check Temperature Monitors (See Note 6)	Monthly	Visual Observation and Record
McKay Creek Flow USGS gauge	3/week	Measurement
Umatilla River Flow USGS gauge	3/week	Measurement

2. Reporting Procedures

a. NPDES monitoring results shall be reported on USEPA approved Discharge Monitoring Report (DMR) forms. The reporting period is the calendar month.

b. State monitoring reports shall identify the name, certificate classification and grade level of each principal operator designated by the permittee as responsible for supervising the wastewater collection and treatment systems during the reporting period. State monitoring reports shall also identify each system classification as found on page one of this permit.

c. State monitoring reports shall also include: (1) a record of the quantity and method of use of all biosolids removed from the treatment facility and (2) a record of all applicable equipment breakdowns and bypassing.

d. USEPA and State reports must be submitted to the Department's Eastern Region - Pendleton office by the 15th day of the following month.

3. **Report Submittals**

a. The permittee shall have in place a program to identify and reduce inflow and infiltration into the sewage collection system. An annual report shall be submitted to the Department by August 1 each year which details sewer collection maintenance activities that reduce inflow and infiltration. The report shall state those activities that have been done in the previous year and those activities planned for the following year.

b. For any year in which biosolids are land applied, a report shall be submitted to the Department by February 19 of the following year that describes solids handling activities for the previous year and includes, but is not limited to, the required information outlined in OAR 340-050-035(6)(a)-(e).

c. An industrial waste survey report shall be submitted to the Department as required by Schedule C.

d. An annual report covering temperature monitoring done in the calendar year is due to be submitted to the Department by the permittee by February 15th of the following year. The report will also include the calculated Maximum Allowable Effluent Temperature as specified in Schedule A, 1.a(5).

NOTES:

1. *E. coli* monitoring must be conducted according to any of the following test procedures as specified in **Standard Methods for the Examination of Water and Wastewater, 19th Edition**, or according to any test procedure that has been authorized and approved in writing by the Director or an authorized representative:

Method	Reference	Page	Method Number
mTEC agar, MF	Standard Methods, 18th Edition	9-29	9213 D
NA-MUG, MF	Standard Methods, 19th Edition	9-63	9222 G
Chromogenic Substrate, MPN	Standard Methods, 19th Edition	9-65	9223 B
Colilert QT	Idexx Laboratories, Inc.		

2. The permittee shall conduct bioassay testing in accordance with the frequency and timeframe specified. The results are due at least 6 months prior to the permit's expiration. If the bioassay tests show that the effluent samples are not toxic at the dilutions determined to occur at the Zone of Immediate Dilution and the Mixing Zone, no further bioassay testing will be required during this permit cycle. Note that bioassay test results will be required along with the next NPDES permit renewal application.

3. After two full years of temperature monitoring, and if approved in writing by the Department, monitoring may be waived for those months when the effluent temperature does not exceed the stream temperature standard.

4. The temperatures and flows as required by Schedule B are to be tabulated, analyzed and submitted in an annual report. Monitoring is to begin no later than six (6) months after permit issuance. The sites shall be located following the DEQ Procedural Guidance for Water Temperature Monitoring, and shall

be located (A) just upstream from the point of discharge in McKay Creek, and in the Umatilla River (B) just upstream from the point of confluence of McKay Creek with the Umatilla River, and (C) downstream at the edge of the mixing zone along the centerline of the plume. The permittee shall keep a map clearly showing the proposed monitoring points, a description of each stream conditions (e.g. pools or riffle) and the latitude and longitude of the sites, and have this information available for DEQ inspection upon request at the facility site.

5. If continuous temperature monitors are used either for the instream or effluent monitoring, the devices must be audited (i.e. field checked and calibrated as required) in June and September, following procedures described in DEQ Procedural Guidance for Water Temperature Monitoring.

6. If continuous temperature monitors are used, the monitors are to be checked visually monthly to insure that the devices are still in place and submerged.

SCHEDULE C

Compliance Schedules and Conditions

8/05

1. By no later than six (6) months after permit issuance, the permittee shall submit to the Department an updated biosolids management plan developed in accordance with Oregon Administrative Rule 340, Division 50, "Land Application of Domestic Wastewater Treatment Facility Biosolids, Biosolids Derived Products, and Domestic Septage". Upon approval of the plan by the Department, the plan shall be implemented by the permittee.

6/20/05

2. By no later than six (6) months after permit issuance, the permittee shall submit to the Department a report which either identifies known sewage overflow locations and a plan for estimating the frequency, duration and quantity of sewage overflowing, or confirms that there are no overflow points. The report shall also provide a schedule to eliminate the overflow(s), if any.

3. Industrial Waste Survey Update/Pretreatment Program

Received 4/13/06

a. By no later than eighteen (18) months after permit issuance, the permittee shall submit to the Department an update to the industrial waste survey that was completed March 30, 1993. Another update must be submitted to the Department by no later than fifty-four (54) months after permit issuance. The updates should be completed as described in 40 CFR 403.8(f)(2)(i-iii) and suitable to make a determination as to the need for development of a pretreatment program.

b. Should the Department determine that a pretreatment program is required, the permit shall be reopened and modified in accordance with 40 CFR 403.8(e) to incorporate a compliance schedule to require development of a pretreatment program. The compliance schedule requiring program development shall be developed in accordance with the provisions of 40 CFR 403.12(k), and shall not exceed twelve (12) months.

See Permit Mod

4. The permittee shall submit an approvable mixing zone study for McKay Creek and the Umatilla River for Department review by no later than eighteen (18) months after issuance of the permit.

9/13/06

5. The permittee shall submit a revised Temperature Management Plan for Department review and approval by no later than eighteen (18) months after permit issuance. The permittee may conduct any pilot studies necessary to develop a final wastewater facility modification, design and construction proposal, to meet temperature requirements provided the planned studies are approved by the Department prior to implementation.

6. The permittee is expected to meet the compliance dates which have been established in this schedule. Either prior to or no later than fourteen (14) days following any lapsed compliance date, the permittee shall submit to the Department a notice of compliance or noncompliance with the established schedule. The Director may revise a schedule of compliance if it is determined that there exists a good and valid cause resulting from events over which the permittee has little or no control.

SCHEDULE D

Special Conditions

1. The Department-approved Temperature Management Plan (TMP) is considered part of this permit and is attached to the permit. The permittee is required to implement all elements of the Temperature Management Plan approved by the Department.

2. All biosolids shall be managed in accordance with the current, DEQ approved biosolids management plan, and the site authorization letters issued by the DEQ. Any changes in solids management activities that significantly differ from operations specified under the approved plan require the prior written approval of the DEQ.

   All new biosolids application sites shall meet the site selection criteria set forth in OAR 340-050-0070. All currently approved sites are located in Umatilla County. No new public notice is required for the continued use of these currently approved sites. Property owners adjacent to any newly approved application sites shall be notified, in writing or by any method approved by DEQ, of the proposed activity prior to the start of application. For proposed new application sites that are deemed by the DEQ to be sensitive with respect to residential housing, runoff potential or threat to groundwater, an opportunity for public comment shall be provided in accordance with OAR 340-050-0030.

3. This permit may be modified to incorporate any applicable standard for biosolids use or disposal promulgated under section 405(d) of the Clean Water Act, if the standard for biosolids use or disposal is more stringent than any requirements for biosolids use or disposal in the permit, or controls a pollutant or practice not limited in this permit.

4. Whole Effluent Toxicity Testing

   a. The permittee shall conduct whole effluent toxicity tests as specified in Schedule B of this permit.

   b. Bioassay tests may be dual end-point tests, only for the fish tests, in which both acute and chronic end-points can be determined from the results of a single chronic test (the acute end-point shall be based upon a 48-hour time period).

   c. Acute Toxicity Testing - Organisms and Protocols

      (1) The permittee shall conduct 48-hour static renewal tests with the *Ceriodaphnia dubia* (water flea) and the *Pimephales promelas* (fathead minnow).

      (2) The presence of acute toxicity will be determined as specified in **Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms**, Fourth Edition, EPA-821-R-02-012, October 2002.

      (3) An acute bioassay test shall be considered to show toxicity if there is a statistically significant difference in survival between the control and 100 percent effluent, unless the permit specifically provides for a Zone of Immediate Dilution (ZID) for toxicity. If the permit specifies such a ZID, acute toxicity shall be indicated when a statistically significant difference in survival occurs at dilutions greater than that which is found to occur at the edge of the ZID.

d. Chronic Toxicity Testing - Organisms and Protocols

(1) The permittee shall conduct tests with: *Ceriodaphnia dubia* (water flea) for reproduction and survival test endpoint, *Pimephales promelas* (fathead minnow) for growth and survival test endpoint, and *Raphidocelis subcapitata* (green alga formerly known as *Selanastrum capricornutum*) for growth test endpoint.

(2) The presence of chronic toxicity shall be estimated as specified in **Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms**, EPA-821-R-02-013, October 2002.

(3) A chronic bioassay test shall be considered to show toxicity if a statistically significant difference in survival, growth, or reproduction occurs at dilutions greater than that which is known to occur at the edge of the mixing zone. If there is no dilution data for the edge of the mixing zone, any chronic bioassay test that shows a statistically significant effect in 100 percent effluent as compared to the control shall be considered to show toxicity.

e. Quality Assurance

(1) Quality assurance criteria, statistical analyses and data reporting for the bioassays shall be in accordance with the EPA documents stated in this condition and the Department's **Whole Effluent Toxicity Testing Guidance Document**, January 1993.

f. Evaluation of Causes and Exceedances

(1) If toxicity is shown, as defined in sections c.(3) or d.(3) of this permit condition, another toxicity test using the same species and Department approved methodology shall be conducted within two weeks, unless otherwise approved by the Department. If the second test also indicates toxicity, the permittee shall follow the procedure described in section f.(2) of this permit condition.

(2) If two consecutive bioassay test results indicate acute and/or chronic toxicity, as defined in sections c.(3) or d.(3) of this permit condition, the permittee shall evaluate the source of the toxicity and submit a plan and time schedule for demonstrating compliance with water quality standards. Upon approval by the Department, the permittee shall implement the plan until compliance has been achieved. Evaluations shall be completed and plans submitted to the Department within 6 months unless otherwise approved in writing by the Department.

g. Reporting

(1) Along with the test results, the permittee shall include: 1. the dates of sample collection and initiation of each toxicity test; 2. the type of production; and 3. the flow rate at the time of sample collection. Effluent at the time of sampling for bioassay testing should include samples of required parameters stated under Schedule B, condition 1. of this permit.

(2) The permittee shall make available to the Department, on request, the written standard operating procedures they, or the laboratory performing the bioassays, are using for all toxicity tests required by the Department.

h. Reopener

(1) If bioassay testing indicates acute and/or chronic toxicity, the Department may reopen and modify this permit to include new limitations and/or conditions as determined by the Department to be appropriate, and in accordance with procedures outlined in Oregon Administrative Rules, Chapter 340, Division 45.

5. A priority pollutant scan shall be performed at least once during the term of this permit and must be submitted to the Department as part of the Permittee's NPDES permit renewal application. The permittee shall perform chemical analysis of its effluent for the specific toxic pollutants listed in Appendix J, Table 2 of 40 CFR Part 122.

6. The permittee shall comply with Oregon Administrative Rules (OAR), Chapter 340, Division 49, "Regulations Pertaining To Certification of Wastewater System Operator Personnel" and accordingly:

a. The permittee shall have its wastewater system supervised by one or more operators who are certified in a classification and grade level (equal to or greater) that corresponds with the classification (collection and/or treatment) of the system to be supervised as specified on page one of this permit.

Note: A "supervisor" is defined as the person exercising authority for establishing and executing the specific practice and procedures of operating the system in accordance with the policies of the permittee and requirements of the waste discharge permit. "Supervise" means responsible for the technical operation of a system, which may affect its performance or the quality of the effluent produced. Supervisors are not required to be on-site at all times.

b. The permittee's wastewater system may not be without supervision (as required by Special Condition 7.a. above) for more than thirty (30) days. During this period, and at any time that the supervisor is not available to respond on-site (i.e. vacation, sick leave or off-call), the permittee must make available another person who is certified at no less than one grade lower then the system classification.

c. If the wastewater system has more than one daily shift, the permittee shall have the shift supervisor, if any, certified at no less than one grade lower than the system classification.

d. The permittee is responsible for ensuring the wastewater system has a properly certified supervisor available at all times to respond on-site at the request of the permittee and to any other operator.

e. The permittee shall notify the Department of Environmental Quality in writing within thirty (30) days of replacement or redesignation of certified operators responsible for supervising wastewater system operation. The notice shall be filed with the Water Quality Division, Operator Certification Program, 811 SW 6th Ave, Portland, OR 97204. This requirement is in addition to the reporting requirements contained under Schedule B of this permit.

f. Upon written request, the Department may grant the permittee reasonable time, not to exceed 120 days, to obtain the services of a qualified person to supervise the wastewater system. The written request must include justification for the time needed, a schedule for recruiting and hiring, the date the system supervisor availability ceased and the name of the alternate system supervisor(s) as required by 7.b. above.

7. The permittee shall notify the DEQ Eastern Region - Pendleton Office [**phone: (541) 276-4063**] in accordance with the response times noted in the General Conditions of this permit, of any malfunction so that corrective action can be coordinated between the permittee and the Department.

8. An adequate contingency plan for prevention and handling of spills and unplanned discharges shall be in force at all times. A continuing program of employee orientation and education shall be maintained to ensure awareness of the necessity of good in-plant control and quick and proper action in the event of a spill or accident.

9. The permittee shall not be required to perform a hydrogeologic characterization or groundwater monitoring during the term of this permit provided:

   a. The facilities are operated in accordance with the permit conditions, and;

   b. There are no adverse groundwater quality impacts (complaints or other indirect evidence) resulting from the facility's operation.

   If warranted, at permit renewal the Department may evaluate the need for a full assessment of the facilities impact on groundwater quality.

NPDES GENERAL CONDITIONS
(SCHEDULE F)

SECTION A. STANDARD CONDITIONS

1. Duty to Comply

The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of Oregon Revised Statutes (ORS) 468B.025 and is grounds for enforcement action; for permit termination, suspension, or modification; or for denial of a permit renewal application.

2. Penalties for Water Pollution and Permit Condition Violations

Oregon Law (ORS 468.140) allows the Director to impose civil penalties up to $10,000 per day for violation of a term, condition, or requirement of a permit.

In addition, a person who unlawfully pollutes water as specified in ORS 468.943 or ORS 468.946 is subject to criminal prosecution.

3. Duty to Mitigate

The permittee shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment. In addition, upon request of the Department, the permittee shall correct any adverse impact on the environment or human health resulting from noncompliance with this permit, including such accelerated or additional monitoring as necessary to determine the nature and impact of the noncomplying discharge.

4. Duty to Reapply

If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and have the permit renewed. The application shall be submitted at least 180 days before the expiration date of this permit.

The Director may grant permission to submit an application less than 180 days in advance but no later than the permit expiration date.

5. Permit Actions

This permit may be modified, suspended, revoked and reissued, or terminated for cause including, but not limited to, the following:

a. Violation of any term, condition, or requirement of this permit, a rule, or a statute;

b. Obtaining this permit by misrepresentation or failure to disclose fully all material facts; or

c. A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge.

The filing of a request by the permittee for a permit modification or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.

6. Toxic Pollutants

The permittee shall comply with any applicable effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants within the time provided in the regulations that establish those standards or prohibitions, even if the permit has not yet been modified to incorporate the requirement.

7. Property Rights

The issuance of this permit does not convey any property rights of any sort, or any exclusive privilege.

8. Permit References

Except for effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants and standards for sewage sludge use or disposal established under Section 405(d) of the Clean Water Act, all rules and statutes referred to in this permit are those in effect on the date this permit is issued.

SECTION B. OPERATION AND MAINTENANCE OF POLLUTION CONTROLS

1. Proper Operation and Maintenance

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls, and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit.

2. Duty to Halt or Reduce Activity

For industrial or commercial facilities, upon reduction, loss, or failure of the treatment facility, the permittee shall, to the extent necessary to maintain compliance with its permit, control production or all discharges or both until the facility is restored or an alternative method of treatment is provided. This requirement applies, for example, when the primary source of power of the treatment facility fails or is reduced or lost. It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

3. Bypass of Treatment Facilities

a. Definitions

(1) "Bypass" means intentional diversion of waste streams from any portion of the treatment facility. The term "bypass" does not include nonuse of singular or multiple units or processes of a treatment works when the nonuse is insignificant to the quality and/or quantity of the effluent produced by the treatment works. The term "bypass" does not

apply if the diversion does not cause effluent limitations to be exceeded, provided the diversion is to allow essential maintenance to assure efficient operation.

(2) "Severe property damage" means substantial physical damage to property, damage to the treatment facilities or treatment processes which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

b. Prohibition of bypass.

(1) Bypass is prohibited unless:

(a) Bypass was necessary to prevent loss of life, personal injury, or severe property damage;

(b) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate backup equipment should have been installed in the exercise of reasonable engineering judgement to prevent a bypass which occurred during normal periods of equipment downtime or preventative maintenance; and

(c) The permittee submitted notices and requests as required under General Condition B.3.c.

(2) The Director may approve an anticipated bypass, after considering its adverse effects and any alternatives to bypassing, when the Director determines that it will meet the three conditions listed above in General Condition B.3.b.(1).

c. Notice and request for bypass.

(1) Anticipated bypass. If the permittee knows in advance of the need for a bypass, it shall submit prior written notice, if possible at least ten days before the date of the bypass.

(2) Unanticipated bypass. The permittee shall submit notice of an unanticipated bypass as required in General Condition D.5.

4. Upset

a. Definition. "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operation error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventative maintenance, or careless or improper operation.

b. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of General Condition B.4.c are met. No determination made during administrative review of claims

that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

c. Conditions necessary for a demonstration of upset. A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

(1) An upset occurred and that the permittee can identify the causes(s) of the upset;

(2) The permitted facility was at the time being properly operated;

(3) The permittee submitted notice of the upset as required in General Condition D.5, hereof (24-hour notice); and

(4) The permittee complied with any remedial measures required under General Condition A.3 hereof.

d. Burden of proof. In any enforcement proceeding the permittee seeking to establish the occurrence of an upset has the burden of proof.

5. Treatment of Single Operational Event

For purposes of this permit, A Single Operational Event which leads to simultaneous violations of more than one pollutant parameter shall be treated as a single violation. A single operational event is an exceptional incident which causes simultaneous, unintentional, unknowing (not the result of a knowing act or omission), temporary noncompliance with more than one Clean Water Act effluent discharge pollutant parameter. A single operational event does not include Clean Water Act violations involving discharge without a NPDES permit or noncompliance to the extent caused by improperly designed or inadequate treatment facilities. Each day of a single operational event is a violation.

6. Overflows from Wastewater Conveyance Systems and Associated Pump Stations

a. Definitions

(1) "Overflow" means the diversion and discharge of waste streams from any portion of the wastewater conveyance system including pump stations, through a designed overflow device or structure, other than discharges to the wastewater treatment facility.

(2) "Severe property damage" means substantial physical damage to property, damage to the conveyance system or pump station which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of an overflow.

(3) "Uncontrolled overflow" means the diversion of waste streams other than through a designed overflow device or structure, for example to overflowing manholes or overflowing into residences, commercial establishments, or industries that may be connected to a conveyance system.

b. Prohibition of overflows. Overflows are prohibited unless:

(1) Overflows were unavoidable to prevent an uncontrolled overflow, loss of life, personal injury, or severe property damage;

(2) There were no feasible alternatives to the overflows, such as the use of auxiliary pumping or conveyance systems, or maximization of conveyance system storage; and

(3) The overflows are the result of an upset as defined in General Condition B.4. and meeting all requirements of this condition.

c. Uncontrolled overflows are prohibited where wastewater is likely to escape or be carried into the waters of the State by any means.

d. Reporting required. Unless otherwise specified in writing by the Department, all overflows and uncontrolled overflows must be reported orally to the Department within 24 hours from the time the permittee becomes aware of the overflow. Reporting procedures are described in more detail in General Condition D.5.

7. Public Notification of Effluent Violation or Overflow

If effluent limitations specified in this permit are exceeded or an overflow occurs, upon request by the Department, the permittee shall take such steps as are necessary to alert the public about the extent and nature of the discharge. Such steps may include, but are not limited to, posting of the river at access points and other places, news releases, and paid announcements on radio and television.

8. Removed Substances

Solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters shall be disposed of in such a manner as to prevent any pollutant from such materials from entering public waters, causing nuisance conditions, or creating a public health hazard.

SECTION C. MONITORING AND RECORDS

1. Representative Sampling

Sampling and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge. All samples shall be taken at the monitoring points specified in this permit and shall be taken, unless otherwise specified, before the effluent joins or is diluted by any other waste stream, body of water, or substance. Monitoring points shall not be changed without notification to and the approval of the Director.

2. Flow Measurements

Appropriate flow measurement devices and methods consistent with accepted scientific practices shall be selected and used to ensure the accuracy and reliability of measurements of the volume of monitored discharges. The devices shall be installed, calibrated and maintained to insure that the accuracy of the measurements is consistent with the accepted capability of that type of device. Devices selected shall be capable of measuring flows with a maximum deviation of less than ± 10 percent from true discharge rates throughout the range of expected discharge volumes.

3. Monitoring Procedures

Monitoring must be conducted according to test procedures approved under 40 CFR Part 136, unless other test procedures have been specified in this permit.

4. Penalties of Tampering

The Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate, any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than two years, or by both. If a conviction of a person is for a violation committed after a first conviction of such person, punishment is a fine not more than $20,000 per day of violation, or by imprisonment of not more than four years or both.

5. Reporting of Monitoring Results

Monitoring results shall be summarized each month on a Discharge Monitoring Report form approved by the Department. The reports shall be submitted monthly and are to be mailed, delivered or otherwise transmitted by the 15th day of the following month unless specifically approved otherwise in Schedule B of this permit.

6. Additional Monitoring by the Permittee

If the permittee monitors any pollutant more frequently than required by this permit, using test procedures approved under 40 CFR 136 or as specified in this permit, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the Discharge Monitoring Report. Such increased frequency shall also be indicated. For a pollutant parameter that may be sampled more than once per day (e.g., Total Chlorine Residual), only the average daily value shall be recorded unless otherwise specified in this permit.

7. Averaging of Measurements

Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean, except for bacteria which shall be averaged as specified in this permit.

8. Retention of Records

Except for records of monitoring information required by this permit related to the permittee's sewage sludge use and disposal activities, which shall be retained for a period of at least five years (or longer as required by 40 CFR part 503), the permittee shall retain records of all monitoring information, including all calibration and maintenance records of all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least 3 years from the date of the sample, measurement, report or application. This period may be extended by request of the Director at any time.

9. Records Contents

Records of monitoring information shall include:

a. The date, exact place, time and methods of sampling or measurements;

b. The individual(s) who performed the sampling or measurements;

c. The date(s) analyses were performed;

d. The individual(s) who performed the analyses;

e. The analytical techniques or methods used; and

f. The results of such analyses.

10. Inspection and Entry

The permittee shall allow the Director, or an authorized representative upon the presentation of credentials to:

a. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit, and

d. Sample or monitor at reasonable times, for the purpose of assuring permit compliance or as otherwise authorized by state law, any substances or parameters at any location.

SECTION D. REPORTING REQUIREMENTS

1. Planned Changes

The permittee shall comply with Oregon Administrative Rules (OAR) 340, Division 52, "Review of Plans and Specifications". Except where exempted under OAR 340-52, no construction, installation, or modification involving disposal systems, treatment works, sewerage systems, or common sewers shall be commenced until the plans and specifications are submitted to and approved by the Department. The permittee shall give notice to the Department as soon as possible of any planned physical alternations or additions to the permitted facility.

2. Anticipated Noncompliance

The permittee shall give advance notice to the Director of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

3. Transfers

This permit may be transferred to a new permittee provided the transferee acquires a property interest in the permitted activity and agrees in writing to fully comply with all the terms and conditions of the permit and the rules of the Commission. No permit shall be transferred to a third party without prior written approval from the Director. The permittee shall notify the Department when a transfer of property interest takes place.

4. Compliance Schedule

Reports of compliance or noncompliance with, or any progress reports on interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than 14 days following each schedule date. Any reports of noncompliance shall include the cause of noncompliance, any remedial actions taken, and the probability of meeting the next scheduled requirements.

5. Twenty-Four Hour Reporting

The permittee shall report any noncompliance which may endanger health or the environment. Any information shall be provided orally (by telephone) within 24 hours, unless otherwise specified in this permit, from the time the permittee becomes aware of the circumstances. During normal business hours, the Department's Regional office shall be called. Outside of normal business hours, the Department shall be contacted at 1-800-452-0311 (Oregon Emergency Response System).

A written submission shall also be provided within 5 days of the time the permittee becomes aware of the circumstances. If the permittee is establishing an affirmative defense of upset or bypass to any offense under ORS 468.922 to 468.946, and in which case if the original reporting notice was oral, delivered written notice must be made to the Department or other agency with regulatory jurisdiction within 4 (four) calendar days. The written submission shall contain:

a. A description of the noncompliance and its cause;

b. The period of noncompliance, including exact dates and times;

c. The estimated time noncompliance is expected to continue if it has not been corrected;

d. Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance; and

e. Public notification steps taken, pursuant to General Condition B.7.

The following shall be included as information which must be reported within 24 hours under this paragraph:

a. Any unanticipated bypass which exceeds any effluent limitation in this permit.

b. Any upset which exceeds any effluent limitation in this permit.

c. Violation of maximum daily discharge limitation for any of the pollutants listed by the Director in this permit.

The Department may waive the written report on a case-by-case basis if the oral report has been received within 24 hours.

6. Other Noncompliance

The permittee shall report all instances of noncompliance not reported under General Condition D.4 or D.5, at the time monitoring reports are submitted. The reports shall contain:

a. A description of the noncompliance and its cause;

b. The period of noncompliance, including exact dates and times;

c. The estimated time noncompliance is expected to continue if it has not been corrected; and

d. Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

7. Duty to Provide Information

The permittee shall furnish to the Department, within a reasonable time, any information which the Department may request to determine compliance with this permit. The permittee shall also furnish to the Department, upon request, copies of records required to be kept by this permit.

Other Information: When the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or any report to the Department, it shall promptly submit such facts or information.

8. Signatory Requirements

All applications, reports or information submitted to the Department shall be signed and certified in accordance with 40 CFR 122.22.

9. Falsification of Information

A person who supplies the Department with false information, or omits material or required information, as specified in ORS 468.953 is subject to criminal prosecution.

10. Changes to Indirect Dischargers - **[Applicable to Publicly Owned Treatment Works (POTW) only]**

The permittee must provide adequate notice to the Department of the following:

a. Any new introduction of pollutants into the POTW from an indirect discharger which would be subject to section 301 or 306 of the Clean Water Act if it were directly discharging those pollutants and;

b. Any substantial change in the volume or character of pollutants being introduced into the POTW by a source introducing pollutants into the POTW at the time of issuance of the permit.

c. For the purposes of this paragraph, adequate notice shall include information on (i) the quality and quantity of effluent introduced into the POTW, and (ii) any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW.

11. Changes to Discharges of Toxic Pollutant - **[Applicable to existing manufacturing, commercial, mining, and silvicultural dischargers only]**

The permittee must notify the Department as soon as they know or have reason to believe of the following:

a. That any activity has occurred or will occur which would result in the discharge, on a routine or frequent basis, of any toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels:

(1) One hundred micrograms per liter (100 µg/L);

(2) Two hundred micrograms per liter (200 µg/L) for acrolein and acrylonitrile; five hundred micrograms per liter (500 µg/L) for 2,4-dinitrophenol and for 2-methyl-4,6-dinitrophenol; and one milligram per liter (1 mg/L) for antimony;

(3) Five (5) times the maximum concentration value reported for that pollutant in the permit application in accordance with 40 CFR 122.21(g)(7); or

(4) The level established by the Department in accordance with 40 CFR 122.44(f).

b. That any activity has occurred or will occur which would result in any discharge, on a non-routine or infrequent basis, of a toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":

(1) Five hundred micrograms per liter (500 µg/L);

(2) One milligram per liter (1 mg/L) for antimony;

(3) Ten (10) times the maximum concentration value reported for that pollutant in the permit application in accordance with 40 CFR 122.21(g)(7); or

(4) The level established by the Department in accordance with 40 CFR 122.44(f).

SECTION E. DEFINITIONS

1. BOD means five-day biochemical oxygen demand.

2. TSS means total suspended solids.

3. mg/L means milligrams per liter.

4. kg means kilograms.

5. m^3/d means cubic meters per day.

6. MGD means million gallons per day.

7. Composite sample means a sample formed by collecting and mixing discrete samples taken periodically and based on time or flow.

8. FC means fecal coliform bacteria.

9. Technology based permit effluent limitations means technology-based treatment requirements as defined in 40 CFR 125.3, and concentration and mass load effluent limitations that are based on minimum design criteria specified in OAR 340-41.

10. CBOD means five day carbonaceous biochemical oxygen demand.

11. Grab sample means an individual discrete sample collected over a period of time not to exceed 15 minutes.

12. Quarter means January through March, April through June, July through September, or October through December.

13. Month means calendar month.

14. Week means a calendar week of Sunday through Saturday.

15. Total residual chlorine means combined chlorine forms plus free residual chlorine.

16. The term "bacteria" includes but is not limited to fecal coliform bacteria, total coliform bacteria, and E. coli bacteria.

17. POTW means a publicly owned treatment works.

murraysmith

APPENDIX E
TEMPERATURE EVALUATION TECHNICAL MEMORANDUM

Draft Technical Memorandum

Date: Revised June 14, 2019

Project: City of Pendleton WWTRRF Facility Plan

To: Mr. Mark Milne, WWTRRF Superintendent
Kyle Willman, WWTRRF Staff
Bob Patterson, PE, Public Works Director

From: Preston Van Meter, PE, Project Manager
Jason Flowers, PE, PhD, Staff Engineer
Jessica Cawley, EIT, Staff Engineer

Re: WWTRRF Temperature Compliance Evaluation Review and Considerations

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The current Pendleton WWTRRF NPDES Permit contains temperature criteria based on the 2001 Umatilla River Basin Total Maximum Daily Load (TMDL) and Water Quality Management Plan (WQMP) that provided for 'no measurable increase of' 0.25°F for the City of Pendleton at the edge of the Regulatory Mixing Zone. This criterion was modified by the Umatilla River Temperature Cumulative Effects Analysis (CEA) completed in 2007 (2007 CEA) by the Oregon Department of Environmental Quality (DEQ). The 2007 CEA was advertised with a public comment period and adopted as part of the Hermiston, Oregon, WWTP NPDES Permit Renewal process. The Pendleton NPDES permit has not yet been renewed by DEQ. Changes from the numeric criteria for salmon rearing from 64°F to 64.4°F was a part of the narrative natural conditions criteria. The natural conditions criteria was invalidated in 2012 by a court case brought upon the Oregon DEQ by Northwest Environmental Advocates (NWEA). Lastly, according to the 2007 CEA, full mixing of the river was assumed for the determination of the TMDL and 25 percent mixing would be applied during the portion of the year outside of the season covered by the TMDL. However, until the TMDL is rewritten (as mandated by the court case), the new TMDL and mixing proportion used for the HUA is unknown.

This Technical Memorandum provides an overview of the WWTRRF temperature requirements and evaluation of potential long-term compliance issues associated with the Umatilla River CEA.

Background

Current WWTRRF NPDES Permit Temperature Requirements

The City of Pendleton (City) NPDES permit issued February 3, 2005, and expired January 31, 2010, specified the maximum 7-day average daily effluent temperature as shown in **Equation 1**, between June 1 and September 30:

$$Max.effluent\ temp.,°F = \left(0.25 * \left(\frac{0.25 * River\ Flow}{Effluent\ Flow}\right) + 1\right) + River\ temp.,°F \qquad \textit{(Equation 1)}$$

Where the River Flow is the total flow for the McKay Creek and the Umatilla River and the River Temperature is the 7-Day Average of Daily Maximum (7dAM). Since this criterion assumes 25 percent (25%) of the river volume is available for mixing and allows no measurable increase of 0.25°F, almost the entire permit window exceeds the temperature criteria under this evaluation. There are 343 potential temperature violations observed from 2015 to 2017, and 354 potential temperature violations anticipated from 2038 to 2040. A graph representing the NPDES permit criteria and Pendleton WWTRRF performance is shown below in **Figure 1**. It is clear that the WWTRRF discharge has not complied with the temperature criteria included in the current NPDES Permit, which will be discussed in the Findings related to Anti-Backsliding provisions contained in the Clean Water Act (CWA).

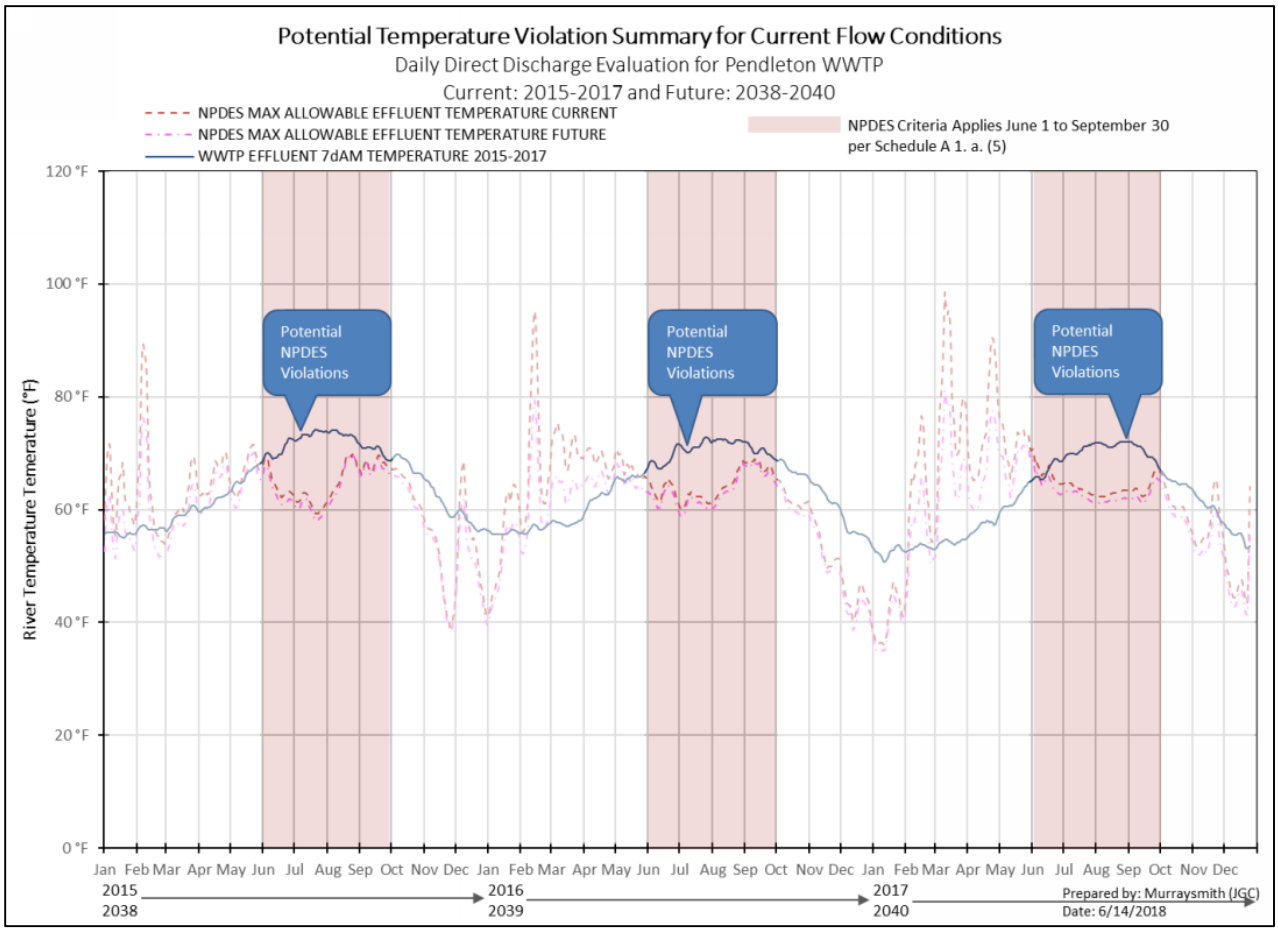

Figure 1
NPDES Permit Temperature Evaluation

While this criteria is currently included in the City's expired NPDES Permit, it is superseded by the 2007 CEA providing for a Human Use Allowance (HUA) of for the WWTRRF of 0.3 degrees Celsius (^{o}C) (0.54 degrees Fahrenheit [^{o}F]) HUA and the full (100%) of the river for thermal mixing year round.

Updated Temperature Requirements for the Pendleton WWTRRF based on the current Oregon Temperature Standard and 2007 CEA

The 2007 CEA was completed for the Umatilla Basin to clarify how the Umatilla Subbasin temperature Total Maximum Daily Load (TMDL) set forth in 2001 would overlay with the temperature standard for Oregon revised in 2004. This document is enclosed as Attachment A. Primarily, this affected the following:

- Replacing the TMDL of "no measurable increase" (0.25^{o}F) with the HUA of the new standard, 0.3^{o}C (0.54^{o}F).
- Appling the TMDL's longitudinal profile of system potential summer afternoon temperature in the context of the new standard's natural condition criteria – where no potential for significant thermal overlap between the Pendleton and Hermiston WWTRRFs.
- Replacing biologically-based numeric criteria for salmonid rearing from 64^{o}F to 64.4^{o}F.
- Clarifying when the season of criteria and wasteload allocation (WLA) applies and when the HUA 25 percent (25%) or 100 percent (100%) mixing proportions apply.
- Apportioning the new standard's HUA to various sources.

Within the 2007 CEA, a "No Reasonable Potential" study was conducted by the Oregon DEQ to model the cumulative effects of multiple wastewater treatment plants discharging into the Umatilla River, including the Pendleton WWTRRF. This study reported the following two conclusions:

1. The combined facilities lack cumulative thermal effects due to distance between sources and associated attenuation of introduced heat.
2. Do not possess the capacity, in terms of design flow and maximum likely effluent temperature, to collectively increase the Umatilla River temperature at any point by more than 0.3^{o}C.

Previously, the natural thermal potential of the river could supersede the biological criteria per Oregon Administrative Rule (OAR) 340-041-0028 (8) Natural Conditions Criteria. This natural thermal potential was calculated to be 69.8°F for the Umatilla River at the Pendleton WWTRRF. However, the EPA disapproved this "natural conditions criterion" in the Oregon Federal District Court on April 10, 2013.

Analysis

This section contains an overview of data sources, methodology used in completing the temperature evaluation using the 2007 CEA and a summary of results.

Data Sources

Completion of the temperature evaluation required flow and temperature data for the WWTRRF and Umatilla River. River flow and temperature data was obtained from the following gauging stations:

a. Umatilla River, Station ID: 14021000
b. McKay Creek, Station ID: 14023500

The wastewater treatment plant (WWTRRF) flow and temperature data was obtained from monthly Discharge Monitoring Reports (DMRs) for the years 2015 through 2017. The river and WWTRRF data were then used to complete the evaluation of temperature compliance under current conditions.

Methodology

Table 1 describes the applicable numeric criteria from the OAR 340-041-0028 specifically for the Pendleton WWTRRF site. This analysis excludes the natural conditions criteria, as mentioned above. To determine compliance, the allowable Excess Thermal Loads (ETL) used Human Use Allowance (HUA) and Cold Water Protection Criteria to determine the applicable maximum permitted river temperature change, ΔT_{PS}, during each season and based on the ambient river temperatures. Equation 2 comes from the Temperature Standard and the guidance from the Oregon DEQ Temperature Standard Implementation Internal Management Directive (IMD 2008) in order to calculate the allowable ETL. Actual data from the Umatilla River and McKay Creek from 2015 through 2017 was used in place of the lowest 7dAM streamflow period during the year on a 10-year recurrence interval (7Q10) since data from 2015 included flows below the 7Q10. The 7Q10 data was also evaluated with no difference in violation results.

For future projections to the years 2038 through 2040, linear flow projections were used based on WWTRRF flow projections. Other input parameters were held constant for effluent temperature, river flow and river temperature. While this methodology is far from exact and assumes the river conditions in 2038 through 2040 will be the same as the 2015 through 2017 period of record, it does establish a methodology that can continue to be evaluated by the City to assess compliance as WWTRRF flows increase and Umatilla River conditions change over time.

Table 1
Oregon Administrative Rules - Temperature Standard for the Pendleton WWTRRF

Criteria	Description	Season	Criteria
Biological Criteria OAR 340-041-0028 (4) (c) Figure 310A	Salmon and Trout Rearing & Migration	Year round	7dAM mixed stream temperature may not exceed

Criteria	Description	Season	Criteria
			Allowable **7dAM T = 18.0°C (64.4°F)** [1]
Biological Criteria OAR 340-041-0028 (4) (a) Figure 310B	Designated Salmon and Steelhead Spawning Use	Winter (spawning) Oct. 15 – May 15	7dAM mixed stream temperature may not exceed **Allowable** **7dAM T = 13.0°C (55.4°F)**
Cold Water Protection OAR 340-041-0028 (11)(a)		Summer[2] June 1 – Sept. 30	If ambient river 7dAM temperature is **less than the Biological Criteria** **Allowable ΔT = 0.3°C (0.54°F)** above 7dAM ambient river temperature
Cold Water Protection OAR 340-041-0028 (11)(b)(A)		Winter (spawning) Oct. 15 – May 15	If ambient river 60dAM temperature is between **10-12.8°C (50-55.04°F)** **Allowable ΔT = 0.5°C (0.9°F)** above 60dAM ambient river temperature
Cold Water Protection OAR 340-041-0028 (11)(b)(B)		Winter (spawning) Oct. 15 – May 15	If ambient river 60dAM temperature is less than **10°C (50°F)** **Allowable ΔT = 1.0°C (1.8°F)** above 60DAM ambient river temperature
Human Use Allowance OAR 340-041-0028 (12) (b) (A) & (B)	An "insignificant" addition of thermal load anthropogenic activities	When waters exceed the applicable temperature criteria	**Allowable ΔT = 0.3°C (0.54°F) / 4** **100% of stream flow or temperature mixing zone** Or **Allowable ΔT = 0.3°C (0.54°F)** **25% of stream flow or temperature mixing zone**
Exceptions OAR 340-041-0028 (12) (c) &(d)	Daily maximum air temperatures that exceed the 90th percentile value of annual maximum seven-day average maximum air temperatures calculated using at least 10 years of air temperature data are not considered violations. An exceedance of the biologically-based numeric criteria in section will not be considered a permit violation during stream flows that are less than the 7Q10 low flow condition for that water body.		

[1] Changes from the numeric criteria for salmon rearing from 64°F to 64.4°F was a part of the narrative natural conditions criteria. The natural conditions criteria was invalidated in 2012 by a court case brought upon the Oregon DEQ by NWEA. Therefore 64°F was used for the analysis.

[2] Summer means June 1 through September 30 per OAR 340-041-0002 (61) and DEQ Temperature Water Quality Standard Implementation Internal Management Directive (IMD).

After determining the allowable ETL based on the Temperature Standard Criteria, the actual ETL from the Pendleton WWTRRF was calculated for the data between 2015 and 2017 as well as the projected data between 2038 and 2040 using Equation 3. Pendleton WWTRRF effluent discharges were considered potential violations if values for the actual ETL exceeded the allowable ETL.

$$ETL = \Delta T_{PS}(Q_E + Q_R)C_F \quad \textit{(Equation 2)}$$

$$ETL = Q_E(T_E - T_C)C_F \quad \textit{(Equation 3)}$$

$$\Delta T_{MZ} = \frac{T_E * Q_E + T_R * Q_R}{Q_E + Q_R} \quad \text{(Equation 4)}$$

Where,

$ETL = the\ excess\ thermal\ load\ \left(\frac{Kcal}{day}\right)$
$\Delta T_{PS} = Maximum\ river\ temperature\ change\ permitted$
$Q_E = Point\ source\ effluent\ flow\ (CFS)$
$Q_R = the\ 7Q10\ river\ flow\ (CFS)$
$C_F = conversion\ factor = 2{,}446{,}664\ kcal \cdot \frac{s}{℃} \cdot ft^3 \cdot day$
$T_E = Point\ source\ effluent\ temperature\ (℃)\ as\ 7dAM$
$T_C = Applicable\ temerature\ criterion\ (℃)$
$T_R = Stream\ temperature\ (℃)\ as\ 7dAM$
$T_{MZ} = Temperature\ at\ the\ edge\ of\ the\ mixing\ zone\ (℃)$

Since full river mixing is permitted Equation 4 was used to calculate the change in temperature at the edge of the mixing zone.

Results

A graphical summary of the potential violations is overlaid on the Allowable and Actual River temperatures of the Umatilla River after mixing with WWTRRF effluent in Figure 2, Figure 3, and Figure 4. No potential violations are evaluated for the period from 2015 through 2017. Figure 1, Figure 2, and Figure 3 show the violation summary for the years 2015, 2016 and 2017 respectively.

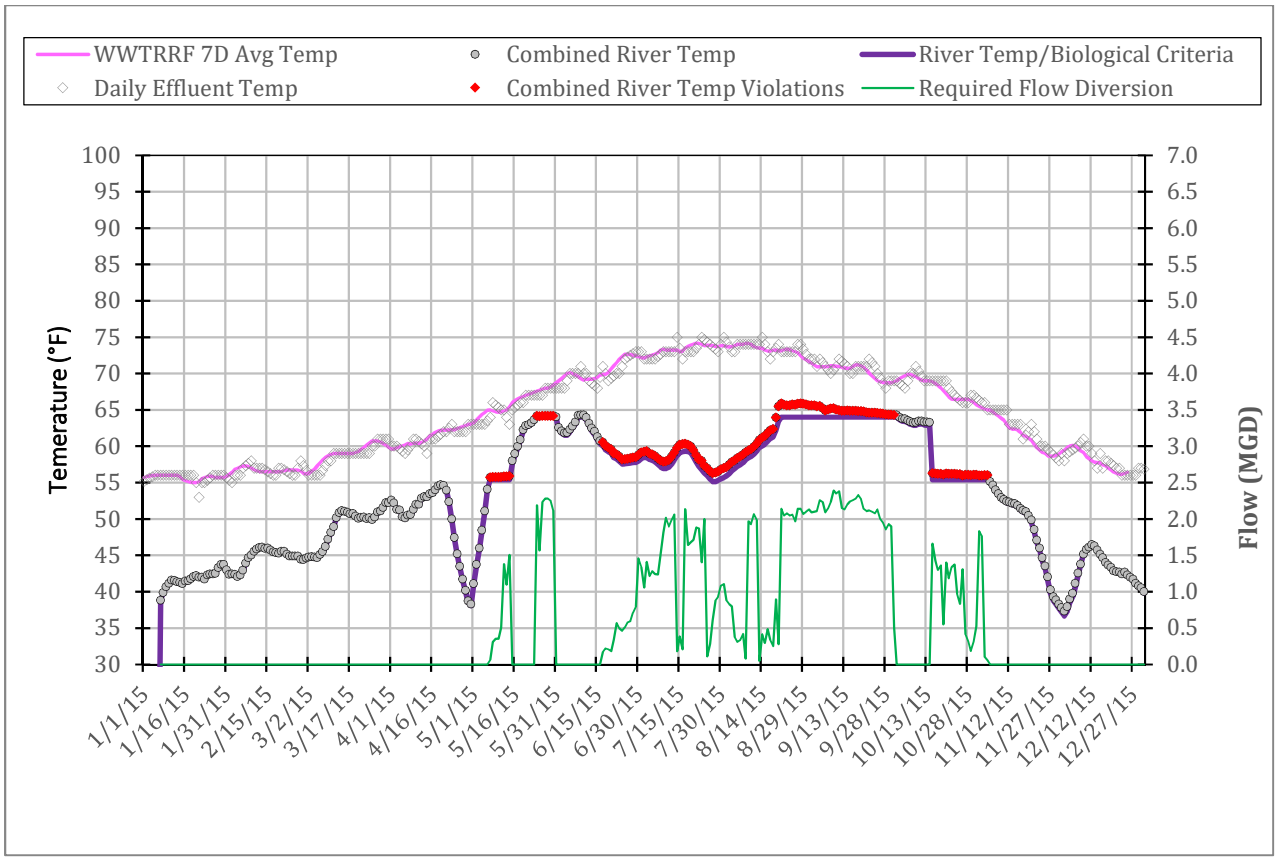

Figure 2
2015 Potential Temperature Standard Criteria Violation Results

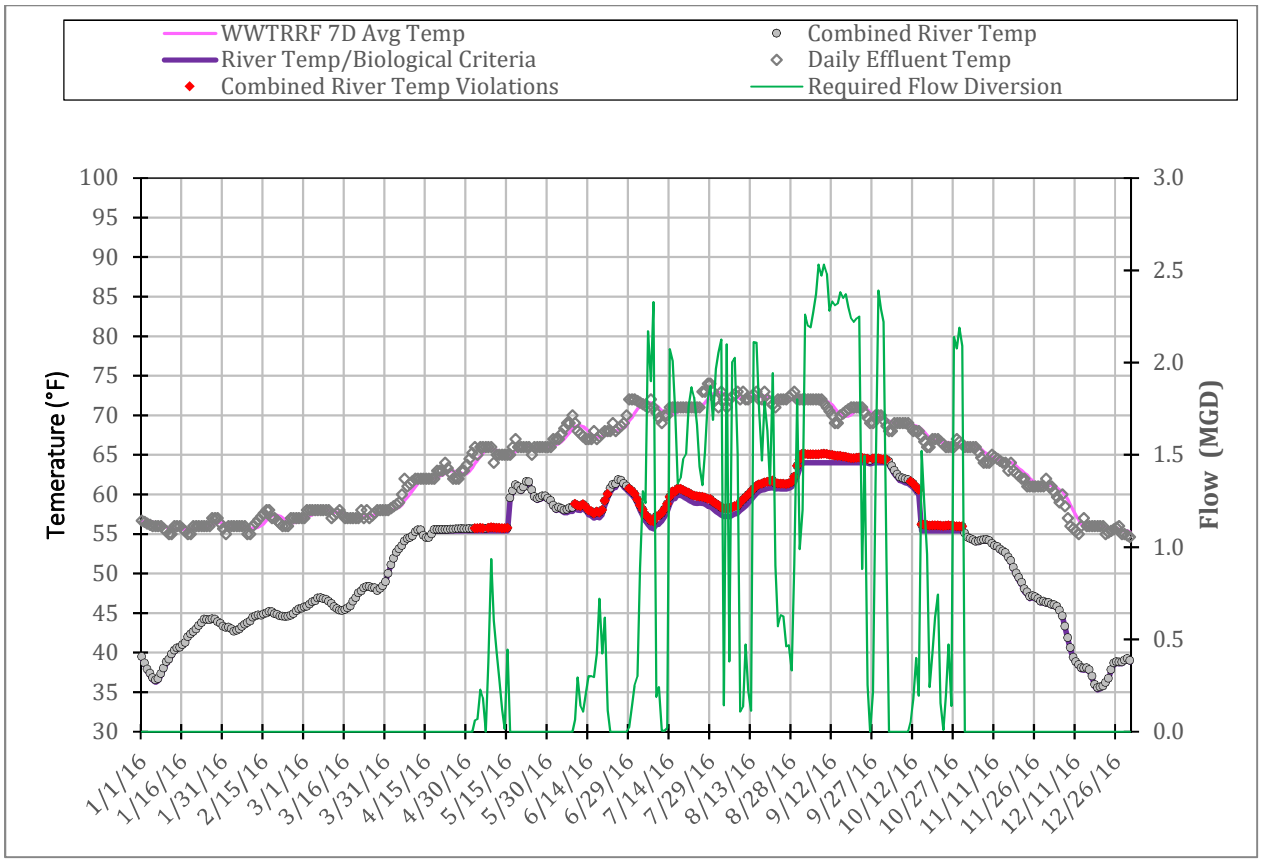

Figure 3
2016 Potential Temperature Standard Criteria Violation Results

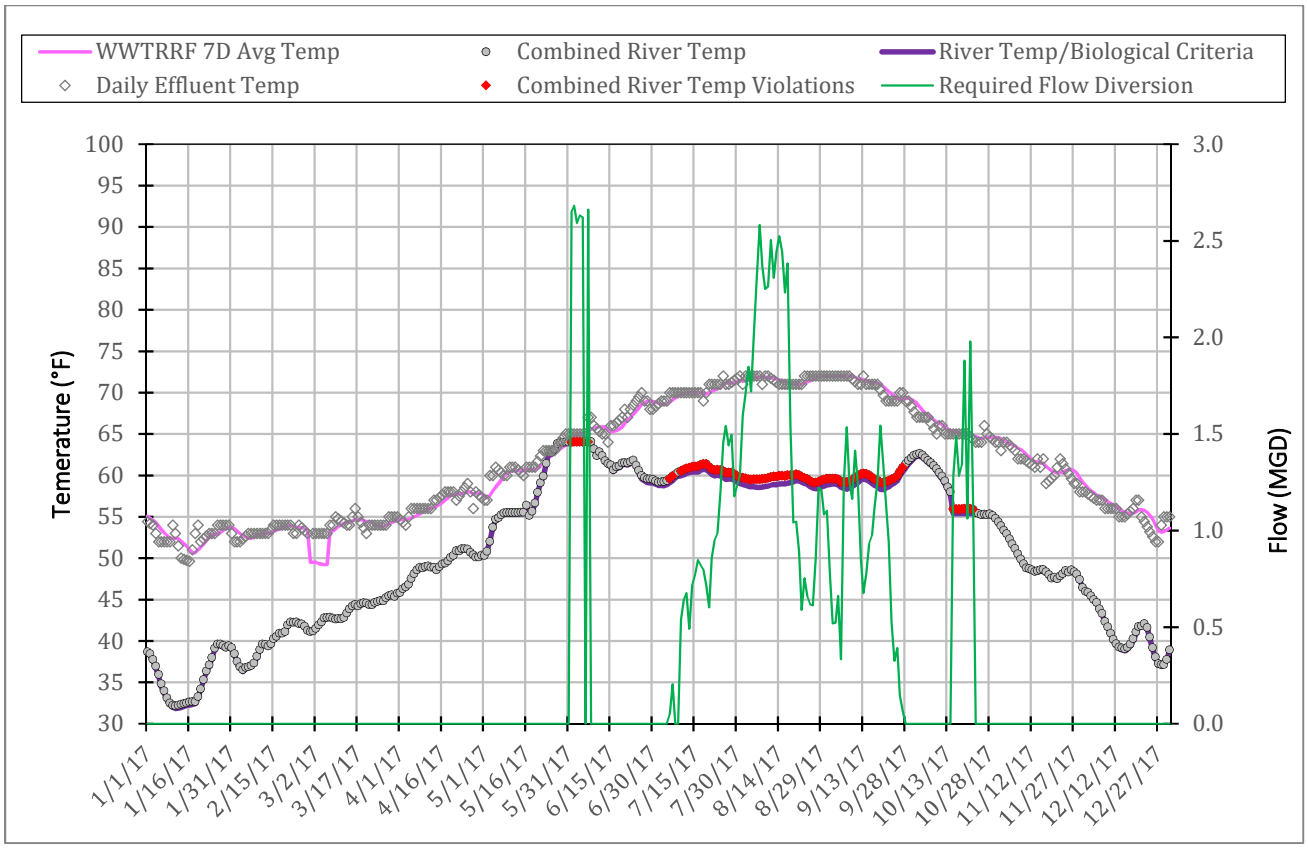

Figure 4
2017 Potential Temperature Standard Criteria Violation Results

Conclusion

Effluent temperatures in the City's NPDES Permit were based on requirements in the Oregon Temperature Standard and the Umatilla River Basin Temperature TMDL; however, the City was not able to meet the NPDES permit limits. In addition, a lawsuit by the NWEA sued the EPA over the Temperature TMDL. As a result, the City and DEQ entered into a Mutual Agreement and Order, which allowed for temporary removal of their temperature limit. While the City does not currently have a temperature discharge criterion, the lawsuit was recently settled and DEQ is required to prepare new temperature TMDL in the near future. It is likely that the city will be required to meet a limit during the next permitting cycle.

Based on the above analysis of the historical discharge data using the criteria listed in **Table 1** there have been 379 days with potential violations out of 1096 days analyzed from 2015 to 2017. **Table 2** lists the number of potential violations per year. Of the violations, 65 occurred during the shoulder season and 314 occurred during the summer season. Finding alternative disposal methods including creating Class A or C reclaimed water to be used for irrigation or other approved non-potable water uses from the treatment plant effluent should be considered.

Table 2
Potential Violation Summary

Year	Potential Violations
2015	143
2016	140
2017	96

There is a potential concern with anti-backsliding provisions in the CWA which prohibit permit limits included in an NPDES Permit to be relaxed in subsequent permits. Anti-backsliding provisions are only applicable if the permit limits have been met by the Permittee's discharge. In this case, it is clear from **Figure 1** that the WWTRRF has not complied with the temperature requirements contained in the City's expired NPDES Permit and based on the old Oregon Temperature Standard. However, the next NPDES Permit is likely to have more stringent requirements as a result of the lawsuit by NWEA.

murraysmith

APPENDIX F
OREGON NOAA ATLAS 2, VOLUME XX

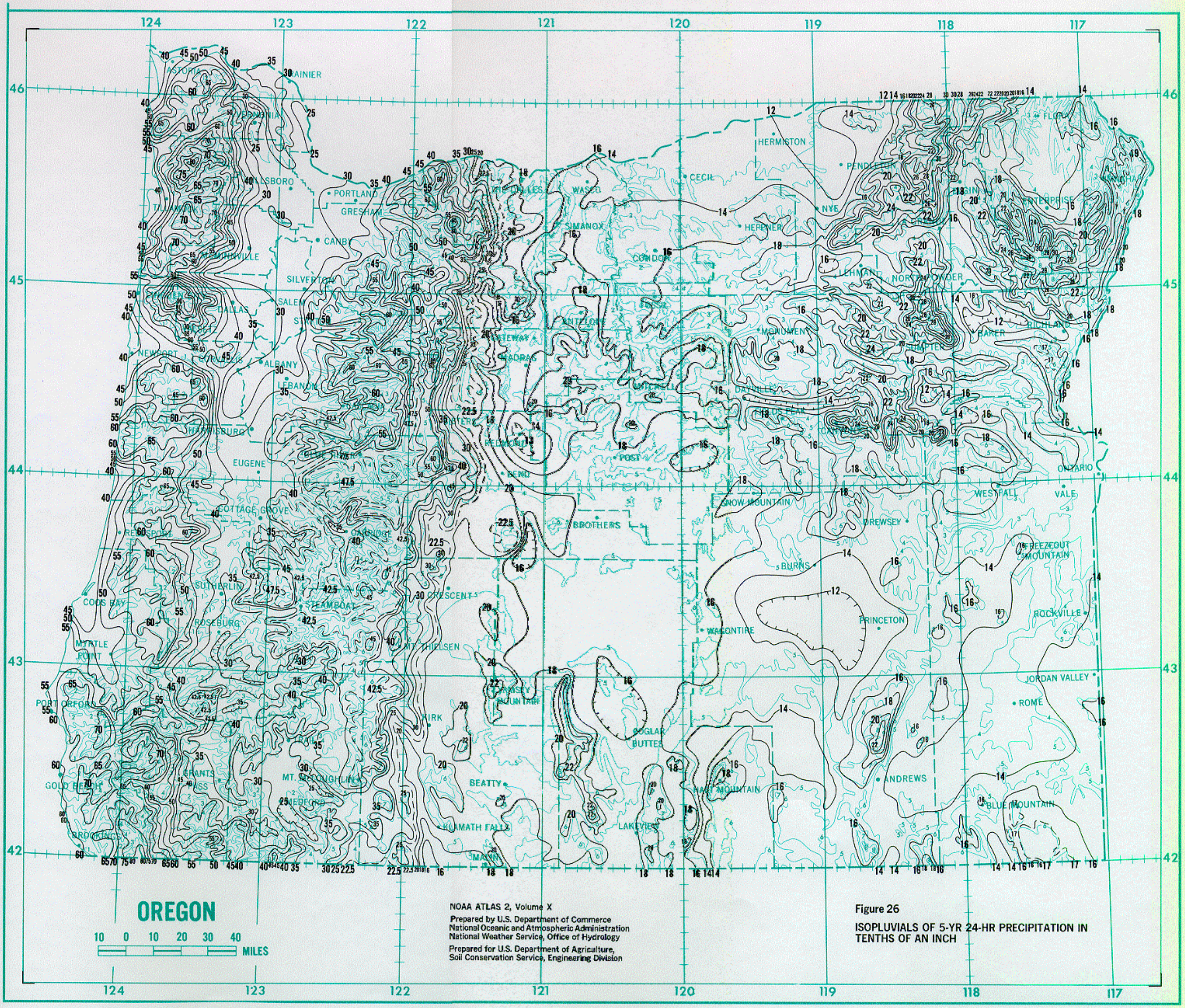

Figure 26

ISOPLUVIALS OF 5-YR 24-HR PRECIPITATION IN TENTHS OF AN INCH

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APPENDIX G
PRELIMINARY LIST OF RECOMMENDED IMPROVEMENTS

Cost Ranges	Range Groupings
A: <$5,000 B: $5,000 to $25,000	Smaller O&M-type projects, which can be completed in-house or picked up with larger CIP projects.
C: $25,000 to $50,000 D: $50,000 to $100,000	'To-Be-Determined' projects, some of which can be picked up with larger CIP projects.
E: >$100,000	CIP projects with costs over $100k.

	Summary of O&M and TBD Costs	
Unit Process Area	O&M	TBD
100 – General Site	$100,000	$100,000
200 – Preliminary Treatment	$165,000	$50,000
300 – Primary Treatment	$190,000	$400,000
400 – Secondary Treatment	$445,000	$550,000
600 – Disinfection	$185,000	$50,000
700 – Solids Treatment	$635,000	$800,000
800 – Misc. Site Utility Systems	$30,000	$200,000
900 – Misc. Site Buildings	$130,000	$400,000

Pendleton WWTRRF Preliminary List of Recommended Improvements

Unit Process Area	Component	Recommended Improvements	Cost Range	CIP Projects	O&M Subtotal	TBD Subtotal
100 – General Site	110 Yard Piping	Connect CCC to Headworks with pipe from IPPS to the storm pump station	B			
	110 Yard Piping	Encase influent gravity sewer in concrete inside fence to headworks	B			
	130 Site Security	Add automatic entrance gate	E	X		
	130 Site Security	Fencing around full WWTRRF site	D			
	130 Site Security	Add security cameras and connect to SCADA	B			
	130 Site Security	Add dumpster staging area outside of fence	B			
				1	$100,000	$100,000
200 – Preliminary Treatment	201 Headworks Building	Install more reliable air sensing device/alarm system	B			
	201 Headworks Building	Run hot water loop to building for heating	B			
	201 Headworks Building	Standardize floor grating and garbage system	B			
	205 Headworks Elec. Building Code Cons.	Replace all non-NEMA enclosures	C			
	205 Headworks Elec. Building Code Cons.	Repair or replace ventilation equipment	B			
	205 Headworks Elec. Building Code Cons.	Paint the floor yellow in front of the MCC	A			
	220 Grit Removal	Increase size of hot box and repair valve leaks	B			
	220 Grit Removal	Adjust blower for flow matching control	A			
	240 Composite Sampler	Add a temperature sensor for influent flow and connect to SCADA	B			
	250 Flow Control Structure	Repair/Replace operator gear boxes	A			
					$165,000	$50,000
300 - Primary Treatment	310 Primary Clarifier West	Repair and recoat launders, spot repair outside wall cracks, interior wall skim coat, spot repair floor slab, sandblast and coat scraper mechanism	D			
	310 Primary Clarifier West	Install groundwater relief system including standpipe to facilitate pumping from center well	B			
	310 Primary Clarifier West	Sandblast and coat catwalk and exposed metal	B			
	311 Primary Clarifier West Drive	Rebuild or replace drive in next 5 years	D			
	320 Primary Clarifier East	Repair and recoat launders, spot repair outside wall cracks, interior wall skim coat	D			
	320 Primary Clarifier East	Install groundwater relief system including standpipe to facilitate pumping from center well	B			
	320 Primary Clarifier East	Sandblast and coat catwalk and exposed metal	B			
	320 Primary Clarifier East	Replace sludge pit cover	A			
	321 Primary Clarifier East Drive	Rebuild or replace drive in next 5 years	D			
	330 I/O Junction Box	Replace lifting handle/grate	A			
	350 In-Plant Pump Station	Install flow meter	B			
	350 In-Plant Pump Station	Provide permanent pump lifting device	B			
	350 In-Plant Pump Station	Optimize station hydraulics to prevent RAS pumps from overriding check valves	B			
	350 In-Plant Pump Station	Investigate pump issues to prevent shut-off	A			
					$190,000	$400,000
400 – Secondary Treatment	410 Secondary Process Building	Install HVAC in blower room	B			
	410 Secondary Process Building Code Cons.	Relocate water pipe to location not above MCC	B			
	410 Secondary Process Building Code Cons.	Paint the floor yellow to meet code	A			
	411 Blowers	Install new, smaller blower	D			
	411 Blowers	Add blowers to SCADA	B			
	413 Secondary Process Building Dry Transformer	Remove blockage in front of transformer	A			
	413 Secondary Process Building Dry Transformer	Paint floor yellow to meet code	A			
	414 Secondary Process Building MCC	Perform 5-year maintenance	A			
	420 Aeration Basin	Investigate options to run one train in the summer months	D			
	420 Aeration Basin	Add heat tracing or insulation to air line and to utility water loop to prevent freezing	B			
	420 Aeration Basin	Increase UT water connections to 2"	B			
	420 Aeration Basin	Seal basin wall to stop air leaks	A			
	420 Aeration Basin	Add bird deterrent to bridge crane	A			
	422 Mixers	Install catwalk or platform around gear box for maintenance	C			
	429 Aeration Basin Utility Water	Configure water loop to isolate trains and add valves	B			
	430 MBR Building	Install an emergency shower and eyewash station	D			
	436 MBR Process Building Code Cons.	Rebuild VFD panel to bring it in-line with current code	C			
	436 MBR Process Building Code Cons.	Provide 42" clear space in front of 480V drives	A			
	436 MBR Process Building Code Cons.	Paint floor yellow to the required dimensions	A			
	438 MBR VFD Control Panel	Patch holes in panel to meet NEMA rating	A			
	439 MBR Building Power Panel	Provide alternate power supply for the solenoid valve	A			
	440 Secondary Clarifier West	Spot repair of launder coating, spot repair of outside wall cracks, spot repair of interior wall surface, spot repair of floor slab, sandblast and coating of scraper mechanism	C			
	440 Secondary Clarifier West	Add effluent gate to launders to facilitate repairs	B			
	440 Secondary Clarifier West	Install groundwater relief system	B			
	440 Secondary Clarifier West	Add 2" yard hydrant	A			
	450 Secondary Clarifier East	Repair and recoat launders, spot repair outside wall cracks, interior wall skim coat, spot repair floor slab, sandblast and coat scraper mechanism, remove and replace topping slab	E	X		
	450 Secondary Clarifier East	Add effluent gate to launders to facilitate repairs	B			
	450 Secondary Clarifier East	Install groundwater relief system	B			
	450 Secondary Clarifier East	Add 2" yard hydrant	A			
	451 Secondary Clarifier East Drive	Rebuild or replace drive in next 5 years	D			
	480 RAS Pump Station	Install flow meter	B			
	480 RAS Pump Station	Install lifting device over pumps	B			
	480 RAS Pump Station	Optimize pumps so they can be turned down to provide lower flow rate to aeration basin	B			
	480 RAS Pump Station	Replace grate over pumps with a sectioned grate system	A			
	480 RAS Pump Station	Abandon existing iron pipe and concrete chamber	A			
	490 Underground Pump Station (WAS)	Replace flow meter and pressure gauge/sensor	B			
	490 Underground Pump Station (WAS)	Replace manual valves	B			
				1	$445,000	$550,000
600 – Disinfection	610 Disinfection System	Investigate alternative disinfection methods	E	X		
	610 Disinfection System	Replace chlorine gas scales	B			
	610 Disinfection System	Update SCADA to improve operations	A			
	615 Disinfection Building	Add roll-up door and loading dock for unloading chemicals	E	X		
	620 Chlorine Contact Chamber	Patch spalled and cracked concrete around anchors, repair of vertical cracks along wall exterior, repair of wall expansion joints, recoat interior walls	E	X		
	620 Chlorine Contact Chamber	Install partitions in south train of contact chamber	B			
	620 Chlorine Contact Chamber	Construct additional catwalk	B			
	620 Chlorine Contact Chamber	Repair groundwater relief system	B			
	620 Chlorine Contact Chamber	Replace chlorine analyzer	A			
	620 Chlorine Contact Chamber	Add 2" yard hydrants on north and south sides	A			
	630 General Dechlorination Code Cons.	Provide necessary clearance for transformer	A			
	630 General Dechlorination Code Cons.	Paint floor yellow to necessary dimensions	A			
	631 Dechlorination Building	Repair building wall to fill in door opening	B			
	634 Dechlorination Building MCC	Perform 5 year maintenance	A			
	635 Dechlorination Control Panel	Relocate instrumentation outside of panel	B			
	635 Dechlorination Control Panel	Convert fiber wire to copper	A			
	660 Effluent Flow Meter	Install Parshall flume to measure effluent flow and connect to SCADA	C			
				3	$185,000	$50,000

Unit Process Area	Component	Recommended Improvements	Cost Range	CIP Projects	O&M Subtotal	TBD Subtotal
700 – Solids Treatment	705 Primary Digester Complex	Improve chemical storage and handling	C			
	705 Primary Digester Complex	Install ferric chloride injection system	B			
	705 Primary Digester Complex	Connect chemical injection pumps to SCADA	A			
	706 Primary Digester Structure	Partially cover outside area on loading dock for storage	E	X		
	706 Primary Digester Structure	Repair the façade	B			
	706 Primary Digester Structure	Seal cracks in concrete stair piers and continue monitoring	A			
	707 Primary Digester Sludge Pump	Add redundant pump	B			
	710 Lime System	Remove system and salvage parts	A			
	715 Primary Mixing Building	Add a redundant primary mixing pump	C			
	720 Primary Sludge Pump East	Replace pump system (including valves and flow meter)	C			
	720 Primary Sludge Pump East	Separate piping on outside of building	B			
	720 Primary Sludge Pump East	Raise floor of pump station	B			
	725 Primary Sludge Pump West	Connect building drain to scum pit	B			
	725 Primary Sludge Pump West	Replace pump system (including valves and flow meter)	C			
	725 Primary Sludge Pump West	Raise floor of pump station	B			
	730 Solids Electrical Building	Move microturbine control panel inside building	B			
	733 Solids Electrical Building MCC	Perform 5 yr maintenance	A			
	733 Solids Electrical Building MCC	Paint the floor yellow to meet code	A			
	742 Gas Handling Equipment	Add digester gas heat exchanger	B			
	742 Gas Handling Equipment	Move waste flare feed	B			
	742 Gas Handling Equipment	Add gas moisture removal system	B			
	743 Gas Flow Meter	Move existing gas flow meter to the waste flare and replace with methane meter	B			
	752 FOG Receiving Pump	Relocate controls to doorway	B			
	752 FOG Receiving Pump	Remove concrete footing to help flood suction	A			
	753 FOG Metering Pump	Finish installing pump safety components	A			
	755 FOG Storage Tank	Improve FOG mixing	B			
	755 FOG Storage Tank	Add a level sensor	B			
	756 FOG Heat Exchanger	Make more accessible, add grinder and strainer	B			
	760 Secondary Digester Complex	Reconfigure layout, replace valves and piping; add external mixing system; improve yard piping between primary and secondary digester complexes; add drains to digesters; possibly expand digester complex into laundry room area	E	X		
	760 Secondary Digester Complex	Install ferric chloride injection system, plus two injection ports for other chemicals	B			
	761 Secondary Digester Structure	Replace floating cover with gas storage lid	E	X		
	761 Secondary Digester Structure	Repair façade	C			
	761 Secondary Digester Structure	Add a rooftop radar level sensor	B			
	763 Secondary Digester Mixing Pump	Furnish and install redundant pump	C			
	763 Secondary Digester Mixing Pump	Automate mixing operation	A			
	764 Secondary Digester Boiler	Replace boiler	C			
	765 Secondary Digester Boiler Water Pump	Replace booster pump	A			
	766 Secondary Digester Heat Exchanger	Replace heat exchanger	C			
	780 Digester Gas Flare	Replace waste flare	B			
	780 Digester Gas Flare	Replace or repair aging pipes and fittings	A			
	780 Digester Gas Flare	Move existing gas flow meter to the waste flare	A			
	785 Dewatering Building	Run hot water or provide natural gas to building for heating	B			
	785 Dewatering Building	Improve lab capability and safety	B			
	785 Dewatering Building	Install an emergency shower and eyewash station	C			
	786 Dewatering Press	Add permanent access to top of press	B			
	786 Dewatering Press	Replace press ductwork and slope to drain condensation back to press	A			
	788 Dewatering Polymer System	Consider replacement of the obsolete polymer system	D			
	789 Dewatered Solids Deposition	Reconfigure dumping area outside of building to improve drainage and, add permanent wall for solids removal	C			
	789 Dewatered Solids Deposition	Add a truck washdown station	B			
	795 Sludge Drying Beds	Purchase 0.5 acres south of dewatering building for additional biosolids storage and construct drying beds	E	X		
	795 Sludge Drying Beds	Drying Bed Nos. 1-4: Repair or replace the four southern drying bed walls and valves; rework basin isolation; and replace inlet	D			
	795 Sludge Drying Beds	Drying Bed No. 7: Add vertical walls on the east and south sides; consider splitting into three cells	D			
				4	$635,000	$800,000
800 – Misc. Site Utility Systems	810 Hot Water System	Upsize main trunk pipe and expand to nearby buildings	C			
	810 Hot Water System	Add SCADA controls for monitoring	B			
	812 Primary Boiler	Connect boiler to SCADA	A			
	830 Utility Water System	Reconfigure UT water yard piping to add loops, increase size of line to dewatering system, install pressure tank near headworks, install flow meters and valves for isolation, install 2" connections around plant, and possibly add system to irrigate neighboring FFA Land Lab and/or I-84 median	E	X		
	850 Cogeneration - Microturbines	Reconfigure gas transmission from primary and secondary digesters	C			
	850 Cogeneration - Microturbines	Optimize microturbine performance, including improved gas moisture removal	D			
	860 Instrumentation and SCADA	Update plantwide SCADA system	E	X		
				2	$30,000	$200,000
900 – Misc. Site Buildings	915 Laboratory	Remove and replace cabinetry, including countertops	D			
	915 Laboratory	Combine the two lab spaces	C			
	915 Laboratory	Add lockers and showers per OSHA requirements	C			
	915 Laboratory	Replace and combine refrigerators	B			
	915 Laboratory	Install OSHA approved eyewash station	B			
	920 Welding and Parts Shop	Run hot water loop to building for heat or install new heater	B			
	920 Welding and Parts Shop	Consider relocating and/or reorganize the parts storage area	A			
	940 Machine Shed	Pour concrete floors	C			
	940 Machine Shed	Enclose bay and install roll-up door	D			
	950 Lawn Equipment Shed	Provide electrical service and heating that meets required code	C			
	960 Chemical Storage Building	Install chemical containment system, emergency shower and eyewash station	B			
	960 Chemical Storage Building	Repair roof	B			
	960 Chemical Storage Building	Consider new building to house chemicals stored all over site	E	X		
				1	$130,000	$400,000

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APPENDIX H
CONDITION ASSESSMENT TECHNICAL MEMORANDUM

PETERSON STRUCTURAL ENGINEERS

PORTLAND OFFICE
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Suite 100
Portland, OR 97225
Phone: 503.292.1635

February 5, 2018

Preston Van Meter
Murraysmith, Inc.
888 SW 5th Ave., Suite 1170
Portland, OR 97204

RE: Pendleton WWTRRF Facilities - Condition Assessments

File: 17-172-02.2

Dear Preston,

The following report has been generated to provide the results of our investigations of several structures located at the City of Pendleton's Wastewater Treatment and Resource Recovery Facility. The purpose of our investigation was to view the existing structures and gather information on the as-built conditions, to assess the current state of the structural elements, and to provide recommendations for repairs or further investigations.

Please note that the information contained herein is based on our limited visual observation of the existing construction and is based upon the experience and opinions of a licensed professional engineer. To date, no analytical load-based analysis has been performed for the structures.

INVESTIGATION METHODOLOGY

The findings of this report are based solely on the information gathered during two site visits performed by our office. The first site visit was conducted on September 19, 2017 and consisted of observations of the drained Primary Clarifier East (PC-E), Secondary Clarifier West (SC-W), and Chlorine Contact Chamber South (CC-S). The structures had been drained, allowing for investigations of the interior and exterior surfaces and equipment. The exterior of the walls and roof of both Secondary Digesters and the Primary Digester were also observed as well as the roof lid of the Secondary Digester North (SD-N) which was removed at the time of our visit. A second site visit was performed on October 18, 2017 during which we investigated the Primary Clarifier West (PC-W), Secondary Clarifier East (SC-E), Chlorine Contact Chamber North (CC-N), and the interior of the Secondary Digester North (SD-N).

Inspection of the structures consisted primarily of visual review. A thorough walkthrough of the structures was performed to measure and photograph the condition of the structures surfaces. Size, spacing, and extent of cracks were documented as wells as areas of localized damage or spalling. Concrete surfaces were also inspected for areas of staining indicating potential corrosion, efflorescence or leaks. For the steel mechanisms in the clarifiers, thicknesses were measured and areas of corrosion documented.

Concrete surfaces were further inspected by sounding and Schmidt hammer tests. Sounding is a non-destructive inspection method that can be used to identify areas of concern. Sounding, in this case, was performed by striking the concrete surfaces with a hammer or dragging the hammer against the

concrete surface and listening. Sharp, high-tones indicate solid concrete layer. Low, dull sounds or hollow sounds indicate potential delamination or otherwise compromised concrete. Concrete surfaces were also lightly scraped with the claw end of the hammer to assess deterioration of the concrete from wear or exposure to structure contents. The Schmidt hammer is a device used to non-destructively gauge concrete compressive strength by measuring the rebound forces from a spring-loaded piston pushed against a concrete surface.

OBSERVATIONS

The following table provides a summary of our condition assessments of the various structures according to the rating scale provided. The proceeding sections elaborate on the condition rating for the individual structures.

Condition Rating Scale:

Rating	Description
1	Very Good, well maintained, expected to remain reliable for more than 10 years
2	Good, some degradation but performance and reliability is not significantly affected. Performance and reliability expected to remain satisfactory for 10 years +/-
3	Fair, performance and reliability is still acceptable but some rehabilitation or replacement in the next 5-10 years is needed to maintain performance and/or reliability at acceptable levels
4	Poor, performance and/or reliability has significantly decreased, maintenance rehabilitation or replacement needed to restore performance or reliability to acceptable levels. Failure (no longer functions) is likely in 5 years +/- if not rehabilitated or replaced
5	Very poor, performance and/or reliability has significantly decreased and failure is probable within 3 years if rehabilitation or replacement is not performed
--	Not Applicable/Not Accessible
i	Further Investigation/Information May be Required

Grading of Observed Structural Condition:

Element	PC-E	PC-W	SC-E	SC-W	CC-N	CC-S	SD-N	PD
Clarifier Outer Walls	3	3	3/4	3	--	--	--	--
Clarifier Inner Walls	3	3/4	3/4	3	--	--	--	--
Clarifier Floor Slab	3	3/4	4/5	3	--	--	--	--
Launder Coating	5	3/4	3/i	3/i	--	--	--	--
Steel Scraper Mechanism	1	4/5	4/5	5	--	--	--	--
Chamber Walls	--	--	--	--	3	3	--	--
Chamber Floors	--	--	--	--	3	3	--	--
Expansion Joints	--	--	--	--	4/5	4/5	--	--

Chamber Panels	--	--	--	--	4/5	--	--	--
Digester Brick Facing	--	--	--	--	--	--	3/4	3/i
Digester Wall	--	--	--	--	--	--	3	--
Digester Floor	--	--	--	--	--	--	3	--
Digester Lid	--	--	--	--	--	--	3	--
Fall Protection	--	--	--	--	--	--	--	3/i

Primary Clarifier East

PC-E is 90’ in diameter with a 2’3” wide launder and 10’ high inner wall. The launder bottom is 3’6” below the top of the outer wall which forms a curb roughly 4” above grade. Walls are approximately 6” thick.

Cracking was observed around the perimeter of the outer wall and throughout the floor slab. Vertical wall cracks were present at regular intervals around the outer wall and appear mainly due to concrete shrinkage (Photo 1). Some of the cracks appear to have been previously patched. Abandoned guardrail post bases are causing corrosion along the top of the outer wall (Photo 2). Concrete around the skimming arm anchorage appears to have spalled at some point likely due to temperature effects (Photo 3). The concrete appears to have been patched and the anchor holes are slotted which should allow for differential movement.

The floor slab appeared in good condition. Minor radial cracks were observed in the base slab and (Photo 4) and a circumferential crack was observed near the wall likely over the edge of the wall footing below (Photo 5). Sounding tests revealed several dull or hollow sounding areas, especially around the circumferential crack near the wall. However, overall, the topping slab appeared to be adhered well to the base slab.

The surfaces of the inner wall and launders were observed to assess the condition of the concrete and coatings. The interior wall surface showed signs of wear. Exposed aggregate was observed in the top portions of the wall as well as abandoned brackets that were corroded (Photo 6). The surface of the interior wall scraped off easily indicating deterioration of the outer surface. The launder coating was also observed to be deteriorating. Areas of delaminated, peeling, or missing patches of coating were observed all along the launder surfaces (Photo 7-8).

The steel scraper mechanism appears newer than the rest of the construction. The coating appears largely intact with only slight signs of wear (Photo 9).

Primary Clarifier West

PC-W is approximately 90’ in diameter with an 8’ high inner wall. The launder is roughly 2’3” wide. The outer and inner walls are approximately 6” thick.

Cracking was observed around the perimeter of the outer wall. Vertical cracks were evenly spaced around the circumference of the outer wall and appear mainly due to shrinkage. Several of the cracks are relatively wide and should be patched (Photo 10). Abandoned post bases were present along the top of the wall and showing signs of corrosion (Photo 11). Continued corrosion of the abandoned steel may eventually lead to deterioration of the surrounding concrete.

Overall, the floor slab appeared in fair condition. Circumferential cracks were observed at even intervals in the floor (Photo 12). Some hollow areas and areas of exposed aggregate were observed (Photo 13) but in most places, the slab sounded solid and well-adhered.

The surfaces of the inner wall and launders were observed to assess the condition of the concrete and coatings. The inner wall surface is showing signs of wear. Exposed aggregate was observed in several spots and spalled and pocked areas were found throughout (Photo 14). The launder coating was observed to be in fair condition along the weir wall and floor. Spots of wear were observed in the floor but the coating appeared mostly well-adhered. The inner surface of the outer wall, however, contained multiple areas of peeling and flaking coating which may require maintenance (Photo 15).

The clarifier steel elements appeared to be in poor condition. Elements exhibited corrosion of virtually all exposed elements (Photo 16-17).

Secondary Clarifier East

SC-E is approximately 115’ in diameter and has an inner wall height of roughly 11’. The launder is 2’3” wide with 8” walls. The launder floor is approximately 4’2” below the top of the outer wall.

Cracking was observed around the perimeter of the outer wall. Vertical cracks were present the entire circumference of the wall at roughly 5’ on center spacing. Cracks appear primarily due to shrinkage. Most appear to go through the entire thickness of the wall (Photo 18). Some of the wider cracks appear to have previously been patched. The bearing block at the skimmer arm anchorage is split (Photo 19). The split does not appear to extend to the clarifier wall below but there is potential for damage as the anchorage connection does not allow for movement of the steel beam due to temperature shrinkage and expansion.

Many cracks and delaminated areas were present throughout the floor surface (Photos 20-21). Several areas were observed where the floor was pitted, or the delaminated topping slab could be cracked with a hammer. There were two large areas that appeared to be previous patches (Photo 22). Both these patches sounded hollow and fully delaminated from the base slab.

The surfaces of the inner wall and launders were observed to assess the condition of the concrete and coatings. The interior wall and floor surfaces of SC-E were observed to be in poor condition. Walls were pitted with areas of exposed aggregate (Photo 23). The outer surface of the wall was soft and scraped easily indicating concrete deterioration. The condition of the launder coating could not be clearly observed due to standing water and sludge covering the launder surfaces. Observable areas on the west side of the launder showed missing patches of coating and some areas of cracking and peeling (Photo 24).

Most of the clarifier steel elements exhibited heavy corrosion. The sludge arm coating appeared acceptable as well as newer framing supporting the launder sweeper arm (Photo 25). However, the scraper arm and central column exhibited heavy corrosion (Photo 26). At one particular location, where newer framing was attached to an older channel, the welds have failed and the scraper arm may not have adequate support (Photo 27).

Secondary Clarifier West

General dimensions for SC-W roughly match those for SC-E.

Overall the condition of the clarifier was in fair condition. The exterior of the outer wall exhibited shrinkage cracks at roughly 4-5' on center around the circumference of the clarifier. Some cracks were more extensive than others and should be patched (Photo 28), but most of the cracking appeared to be minor at this time.

Cracking was present throughout the floor slab (Photo 29) and isolated dull sounding areas were observed at various locations. However, most of the topping slab sounded solid and well-adhered to the base slab.

The surfaces of the inner wall and launders were observed to assess the condition of the concrete and coatings. The interior wall surfaces appeared in fair condition. Some pitting was observed (Photo 30) but the inner walls appeared sound with little or no exposed aggregate. A few isolated areas of peeling and spalling were observed in the launder coating on the interior side of the outer wall (Photo 31). Overall, however, the launder coating appeared to be in acceptable condition. Standing water in the launder prevented direct observation of the launder floor.

As with the other clarifiers, the steel elements exhibited heavy corrosion. In particular, corrosion of the well plates appears severe enough that loss of material may be a concern (Photo 32).

Chlorine Contact Chamber

The Chlorine Contact Chamber is a roughly 140' x 60' partially buried, concrete basin divided longitudinally down the middle into 30' wide North and South chambers. The exterior walls and central dividing wall are 10" thick and vary from 2'9" to 3'9" above the adjacent grade. The floor of the chamber is approximately 8'10" below the top of the walls. Aluminum walkways provide access around and over the chambers. The South Chamber is open with no obstructions. The North Contact Chamber is divided by plastic panels into approximately 10' wide lanes. The panels are secured to 4x4 stainless steel posts anchored to the chamber base slab.

Several flaws were observed in the concrete walls. Cracking was observed all along the exterior wall surfaces and around the grating covering the east and west ends (Photo 33). Some of the cracks shows signs of previous patching and may indicate an ongoing issue. Most of the cracks appear to be due to shrinkage and expansion in the concrete. Expansion joints around the wall were generally observed to be poorly formed or have moved significantly since original construction (Photo 34). Expansion joints were too wide and the joint filler materials had deteriorated. The waterstop in some of the expansion joints were clearly exposed.

The south side of the contact chamber appears to be in fair condition. Cracks in the walls and the issues with the expansion joints are visible from the interior side of the walls. Some rusts spots are visible on the surface from what appears to be form ties. Some areas of pitting and dull sounding spots were observed in the base slab towards the west end of the chamber. Minor cracks were observed in several areas throughout the base slab.

The North Chamber appears to be in generally poorer condition that the South Chamber. Areas of the floor felt uneven. Cracking was observed throughout the floor and more concentrated towards the west end of the chamber (Photo 35). Like the walls, the expansion filler in the floor slab appears to be showing signs of wear and pushing from below (Photo 36). The pattern of cracking and uniform direction indicates the cracks may be due to flexure in the base slab, potentially from heaving that was reported to have occurred during the winter of 2016. The walls of the chambers show more

deterioration at the upper portions of the walls. Pitting and exposed aggregate is more prevalent at the water level height (Photo 37). Biological growth is also contributing to the deterioration of the concrete (Photo 38).

Much of the damage observed in the chambers stems from attachment of metal components to the concrete. The attachments appear to be too rigid to accommodate forces from temperature shrinkage and expansion. The reported heaving over the winter may also have contributed to wrenching of the anchorage points. The fiberglass panels do not appear to have been constructed with slotted connections to allow for temperature expansion and contraction. Many of the panels are cracked around their attachment bolts. Forces from temperature shrinkage and expansion have also caused damage to the concrete surfaces at the post bases and where framing is anchored to the concrete wall (Photo 39-41).

Secondary Digester North

The SD-N is an approximately 45’ diameter by 18’ tall cylindrical concrete structure with brick facing. The bottom of the digestor is below grade and slopes steeply towards the center. Interior wall height is approximately 21’6” to the top of the roof curb. Ten concrete corbels are radially distributed around the digestor interior approximately 10’ above the wall base to support the metal lid (Photo 42). The conical roof lid is comprised of ¼” steel plate with a membrane roof covering (Photo 43-44). The lid rest on top of the corbels, inside of the digester walls. When installed, the top of the roof is located below the top of the digester walls.

The interior wall and floor surfaces of the digester appear in fair condition. Some minor pitting of the walls was observed, but overall the surfaces sound solid and competent. The interior piping appears to be in poor condition; however, it is our understanding that the interior piping is to be replaced and therefore the condition is not addressed in this report.

The roof lid was removed for observation but had not been cleaned making the condition of the surfaces difficult to assess. The outer membrane covering the roof appeared intact and in acceptable condition. The coating on the sides of the roof were abraded from contact with the digester walls. The underlying steel showed some corrosion but appeared in fair condition overall. The interior of the of the lid was covered in sludge. Observable surfaces appeared in acceptable condition, but the coating is showing signs of wear throughout (Photo 45). Corrosion appeared most concentrated at the vent chimneys (Photo 46).

The exterior brick facing is showing signs of wear. The upper half of the walls appear to be in good condition, but the bottom half is noticeably more worn and discolored (Photo 47). This may be due to temperature influences and moisture from the digester contents. The region of increased deterioration approximately lines up with the height of the digester contents. Mortar in the lower portions is deteriorated and completely eroded in a few areas (Photos 49).

Secondary Digester South

The Secondary Digester South appears to be of substantially similar construction to the SD-N. The exterior condition of the SD-S matched the observations of the SD-N. Conditions observed for the interior of SD-N is expected to be similar for SD-S.

Primary Digester

The Primary Digester is an approximately 60’ diameter x 28’ tall building constructed of concrete with brick veneer to match the adjacent buildings. Only the exterior surfaces and appurtenances were observed.

The outer brick veneer of the wall appeared in good condition except for the 3-4 brick courses at the top of the wall below the roof curb. The mortar was observed to be severely deteriorated at the top courses the entire circumference of the digester (Photo 50). We hypothesize that this may be due to varying atmospheric conditions at the top of the wall. The top layers may be subject to increased freeze-thaw due to fluctuations in temperature and the heat of the digester contents. The lack of drip edging may also be directing water towards the top of the wall.

We observed several potential issues with the roof guardrails and stair. The steel guardrail on top of the roof is of older construction than the stair and is showing signs of corrosion (Photo 51). Anchorage of the guardrail bases to the concrete is also unlikely to meet current code criteria. An aluminum, self-supporting stair provides access to the digester roof. The stair appears to be of newer construction and is in good condition. However, the concrete piers supporting the stair posts show cracking at the anchor locations (Photo 52-53). The stair post bases are embedded and do not appear to have a liner or coating. In general, aluminum should not be in direct contact with concrete as concrete tends to corrode aluminum which in turn can cause spalling in the concrete. Bituminous paint is usually applied to aluminum surfaces next to concrete. Aluminum also expands and contracts at a different rate than concrete which may be contributing to the cracks.

RECOMMENDATIONS

Recommendations follow the condition ratings scale contained in the previous section. Elements with a rating of 5 should be replaced in full as soon as possible. Elements with a rating of 4 will require partial replacement or spot repairs/patches at many locations. Elements with a rating of 3 are mostly in fair condition and are not considered an immediate structural concern. However localized areas may exhibit damage which should be repaired. Elements with rating of 2 or less appear to be stable and do not require any immediate action.

The estimated repair costs are preliminary and based on our experience with similar past projects. Actual costs will vary depending on type of repair and materials used. Further investigation of specific items are also recommended which may affect costs. Estimates and totals are provided for all potential repair items, but all repairs are not necessarily required or recommended at this time.

Primary Clarifier East

The launder coating is significantly delaminated, and recoating is recommended. We also recommend considering apply a skim coat to the inner surface of the clarifier wall to prevent further deterioration of the concrete surface and exposure of more aggregate. Corrosion of the abandoned steel elements in the wall may compromise the surrounding concrete. Abandoned steel elements should be removed where possible or otherwise ground smooth and a corrosion inhibitor applied.

The cracks along the outer wall do not appear significant enough to be a concern at this time, but they are likely to widen over time and may eventually need to be patched. We recommend continued monitoring of the outer wall cracks. The steel elements, being relatively new, also do not currently require any treatment.

Estimated Repair Costs	
Launder coating demo and recoating	$35,000
Spot repair of outside wall cracks	$2,500
Interior wall skim coat	$53,000
TOTAL	**$90,500**

Primary Clarifier West

We recommend spot repair of the larger vertical cracks along the outer wall which may allow for water seepage. The launder floor and weir wall coating appear acceptable, but the interior face of the outer wall may be due for recoating. As with PC-E, we recommend considering apply a skim coat to the inner surface of the clarifier wall to prevent further deterioration of the concrete surface and exposure of more aggregate. Abandoned steel elements should be removed where possible or otherwise ground smooth and a corrosion inhibitor applied before application of a skim coat. The floor slab may be spot patched, or a skim coat applied to address areas of delamination and wear. However, we do not believe complete removal and replacement of the existing topping slab is required at this time. For the steel elements, we recommend blasting the corroded surfaces and recoating of the steel elements where material loss is acceptable.

Estimated Repair Costs	
Partial launder recoating	$11,500
Spot repair of outside wall cracks	$2,500
Interior wall skim coat	$42,500
Spot repair of floor slab	$4,500
Recoating of scraper mechanism	TBD
TOTAL	**$61,000 + Steel Recoating**

Secondary Clarifier East

The SC-E is in the poorest condition of the structures investigated. We recommend full removal and replacement of the topping slab. A new wall coating should be applied to the inner surface of the clarifier wall to prevent further deterioration of the concrete surface. The larger vertical cracks along the outer wall may be selectively patched. Visual assessment of the launder coating was limited but appeared in acceptable condition and may only need isolated spot repairs. For the steel elements, we recommend blasting the corroded surfaces and recoating of the steel elements where material loss is acceptable. The torn weld must also be repaired.

Estimated Repair Costs	
Spot repair of launder coating	$3,200
Spot repair of outside wall cracks	$4,500
Interior wall skim coat	$65,000
Removal and replacement of topping slab	$320,000
Recoating of scraper mechanism	TBD
TOTAL	**$392,700 + Steel Recoating**

Secondary Clarifier West

SC-W appears to be in fair condition. At this time, we believe spot repairs of deteriorated areas of the floor slab, wall surfaces, and launder are sufficient. However, the steel scraper mechanism and well should be blasted and recoated at minimum and possibly replaced if loss of material is too great.

Estimated Repair Costs	
Spot repair of launder coating	$3,200
Spot repair of outside wall cracks	$4,500
Spot repair of interior wall surface	$2,000
Spot repair of floor slab	$4,500
Recoating of scraper mechanism	TBD
TOTAL	**$14,200 + Steel Recoating**

Chlorine Contact Chamber

The larger vertical cracks around the outer walls should be patched and the expansion joints repaired. The interior wall surfaces should be power washed. A new coating may be applied to the walls for added protection. All spalled and broken areas around equipment anchorages should be patched.

To prevent further damage at anchorage locations, we recommend replacing the plastic partition walls with and new system that allows for expansion and contraction of framing members via slotted hole connection or other methods. Further investigation is also recommended to determine if buoyancy is an issue or what other causes there might be for the reported heaving.

Estimated Repair Costs	
Patching of spalled and cracked concrete around anchors	$6,000
Repair of vertical cracks along wall exterior	$4,500
Repair of wall expansion joints	$6,000
Wall interior recoating (full recoating)	$110,000
New divider panels	TBD
TOTAL	**$126,500 + New Dividers**

Secondary Digester North

The digester walls appear in acceptable condition and no actions for the interior are recommended at this time. Although a non-structural element, we recommend maintenance of the brick facing and repointing where mortar has been eroded.

Estimated Repair Costs	
Brick Repointing (does not include SD-S)	$35,000
TOTAL	**$35,000**

Primary Digester

Although a non-structural element, we recommend the top courses of brick be repointed. Further investigation may be required to determine if any preventative upgrades are possible. We also recommend further investigation into the adequacy of the existing roof guardrails and the aluminum stair post piers. The guardrails appear stable now, but may eventually become a safety concern. The post piers should be closely monitored for continued deterioration. Original construction documents should be located to verify how the piers and posts were constructed to determine if continued deterioration is likely due to the aluminum-concrete contact.

Estimated Repair Costs	
Brick Repointing of upper courses	$9,000
New roof guardrail	$6,000
Replacement of concrete stair piers	$8,000
TOTAL	**$23,000**

CONCLUSIONS

Our condition assessment of the various structures reveals the need for further investigation and potential repairs in order to maintain and extend the usable life of the structures. Recommendations may be implemented in whole or part at the Owner's option. In addition to the recommendations in the preceding section, typical maintenance and monitoring should continue.

We thank you for the opportunity to assist you with your project. Please don't hesitate to call if you have any further questions.

Sincerely,

Edward Ling, P.E., S.E.

Submitted via e-mail: preston.vanmeter@murraysmith.us

PSE
PETERSON STRUCTURAL ENGINEERS

PHOTOGRAPHIC APPENDIX

	**Photo 1:** Crack along top of outer wall. Cracks present at regular intervals throughout the circumference of the clarifier.
Photo 1: Primary Clarifier East	
	**Photo 2:** Corrosion of steel elements at abandoned guardrail post base. Abandoned post bases spaced at regular intervals along the top of the outer wall.
Photo 2: Primary Clarifier East	

Photo 3: Patched concrete at steel skimming arm anchorage. Slotted holes in base plate can be seen.

Photo 3: Primary Clarifier East

Photo 4: Floor of clarifier showing minor radial cracks.

Photo 4: Primary Clarifier East

Photo 5: Circumferential crack near wall over wall strip footing.

Photo 5: Primary Clarifier East

Photo 6: Exposed aggregate at top of wall and corroded steel at abandoned brackets

Photo 6: Primary Clarifier East

	**Photo 7:** Delaminated launder floor coating and flaking inner wall coating.
Photo 7: Primary Clarifier East	
	**Photo 8:** Delaminated launder floor coating.
Photo 8: Primary Clarifier East	

Photo 9: Steel scraper arms shown. Coating appears in good condition.

Photo 9: Primary Clarifier East

Photo 10: Cracking along outer wall.

Photo 10: Primary Clarifier West

Photo 11: Abandoned post base anchors showing corrosion.

Photo 11: Primary Clarifier West

Photo 12: Clarifier floor slab with radial crack over underlying expansion joint and circumferential cracks.

Photo 12: Primary Clarifier West

Photo 13: Pocket of delaminated topping slab. Topping slab is thin and significantly worn.

Photo 13: Primary Clarifier West

Photo 14: Clarifier inner wall surface showing areas of wear and deterioration.

Photo 14: Primary Clarifier West

Photo 15: Launder surface showing flaking of outer wall coating. Wearing of coating is observable in launder floor.

Photo 15: Primary Clarifier West

Photo 16: Corroded steel platform

Photo 16: Primary Clarifier West

Photo 17: Corroded steel scraper mechanism

Photo 17: Primary Clarifier West

Photo 18: Shrinkage cracks in outer wall. Cracks extend through the entire thickness of the wall down to the base of the launder.

Photo 18: Secondary Clarifier East

Photo 19: Split bearing block at skimmer arm anchorage.

Photo 19: Secondary Clarifier East

Photo 20: Clarifier floor showing areas of deteriorated topping slab.

Photo 20: Secondary Clarifier East

	**Photo 21:** Delaminated area of topping slab. Topping slab is thin and worn.
Photo 21: Secondary Clarifier East	
	**Photo 22:** One of two large floor patches. Patches sound hollow and areas are springy when stepped on.
Photo 22: Secondary Clarifier East	

Photo 23: Worn and pitted surface of interior face of clarifier wall.

Photo 23: Secondary Clarifier East

Photo 24: Launder coating. Caked on debris and standing water inhibited assessment of the coating condition.

Photo 24: Secondary Clarifier East

Photo 25: Scraper arm shown with newer framing supporting the launder sweeper.

Photo 25: Secondary Clarifier East

Photo 26: Corrosion of well and central column.

Photo 26: Secondary Clarifier East

Photo 27: Ropes supporting the scraper arm attached to newer framing member with blue coating. The weld of the new framing to the older channel can be seen to be tearing apart.

Photo 27: Secondary Clarifier East

Photo 28: Cracking along the outer wall. Selective patching may be required for the more extensive cracks.

Photo 28: Secondary Clarifier West

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Photo 29: Floor slab shown with cracking present throughout. Radial lines are ridges in the floor from forming.

Photo 29: Secondary Clarifier West

Photo 30: Interior surface of inner clarifier wall.

Photo 30: Secondary Clarifier West

Photo 31: Launder

Photo 31: Secondary Clarifier West

Photo 32: Scraper mechanism showing extensive corrosion.

Photo 32: Secondary Clarifier West

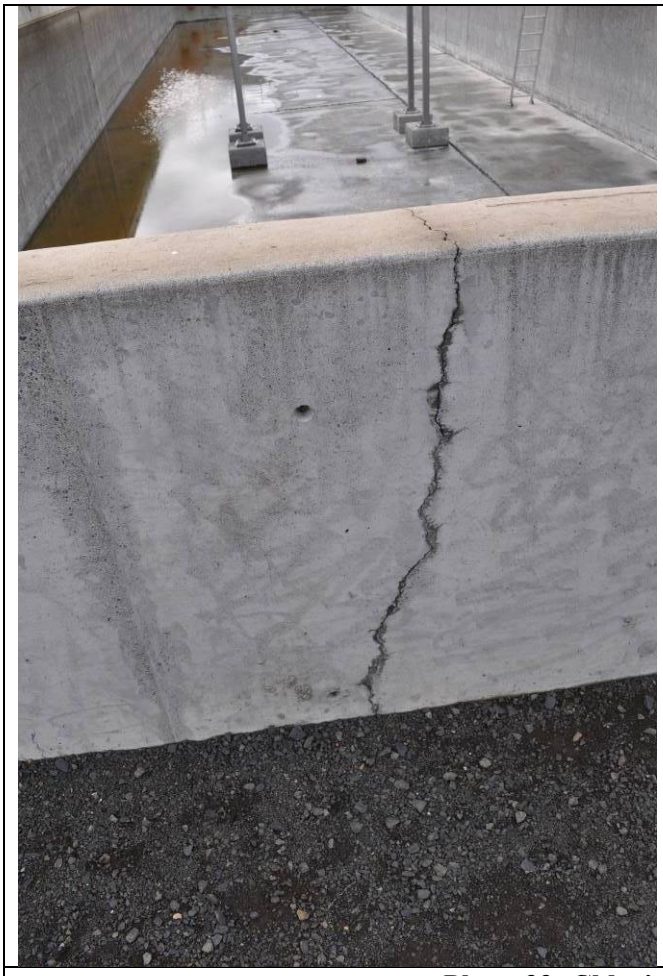

Photo 33: Vertical crack in outer wall.

Photo 33: Chlorine Contact Chamber

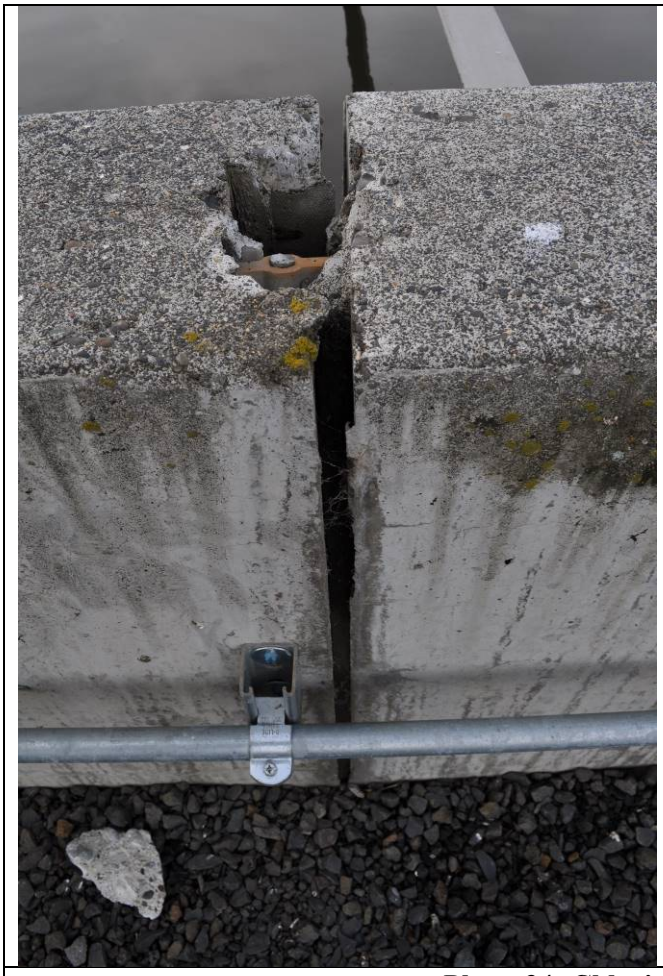

Photo 34: Expansion joint in the outer wall. Filler materials appears to be absent and water stop is visible for the top.

Photo 34: Chlorine Contact Chamber

Photo 35: Cracking in the floor slab.

Photo 35: Chlorine Contact Chamber

Photo 36: Floor slab and expansion joints

Photo 36: Chlorine Contact Chamber

Photo 37: Interior wall surface showing increased deterioration near the water surface.

Photo 37: Chlorine Contact Chamber

Photo 38: Biological growth on chamber wall.

Photo 38: Chlorine Contact Chamber

Photo 39: Split plastic panel detached from fastening bolt. Post base anchor causing cracking in base slab.

Photo 39: Chlorine Contact Chamber

Photo 40: Spalled concrete and detached framing anchorage.

Photo 40: Chlorine Contact Chamber

Photo 41: Spalled concrete due to movement of embedded anchors.

Photo 41: Chlorine Contact Chamber

Photo 42: Interior of digester showing piping and roof support corbels.

Photo 42: Secondary Digester North

Photo 43: Detached roof lid.

Photo 43: Secondary Digester North

Photo 44: Installed roof lid inset of the digester walls.

Photo 44: Secondary Digester South

Photo 45: Underside of roof lid.

Photo 45: Secondary Digester North

Photo 46: View from underside of roof lid looking up at vent cap.

Photo 46: Secondary Digester North

Photo 47: Digester wall showing deteriorated brick facing in lower half of wall.

Photo 47: Secondary Digester North

Photo 48: Deteriorated brick facing and eroded mortar.

Photo 48: Secondary Digester North

Photo 49: Deteriorated brick facing at west side of building between SD-N and SD-S.

Photo 49: Secondary Digester North

Photo 50: Deteriorated joints in upper brick courses.

Photo 50: Primary Digester

Photo 51: Digester roof showing corrosion of older guardrails.

Photo 51: Primary Digester

Photo 52: Cracked concrete pier supported aluminum stair post base.

Photo 52: Primary Digester

Photo 53: Cracked concrete pier supported aluminum stair post base.

Photo 53: Primary Digester

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APPENDIX I
CONDITION ASSESSMENT FIELD NOTES

Equipment Name: 010 Service Entrance

Location: North side of site near secondary elec bldg

Unit Process: 000 – General Electrical

Notes: Main transformer for WWTRRF
Power Supplier: PacifiCorp

Photos:

010 Service Entrance

Condition (1-5)	N/A
Criticality (1-4)	N/A
Serviceability (1-4)	N/A

Type	
Quantity	1
Manufacturer	Cooper Power Systems
Model	000M1P12K16A
Serial No.	1050009327
Primary Voltage	12470V / 7200
Secondary Voltage	480V / 277V
Impedance	5.6% Z
Age	7yr
Apparent Power	750 kVA

Equipment Name: 011 Primary Power Meter

Location: Aeration basin, right side of site

Unit Process: 000 – General Electrical

Description: Owned By: Pacific Power

Photos:

011 Primary Power Meter

Condition (1-5)	2
Criticality (1-4)	4
Serviceability (1-4)	2

Type	Multifunction Meter
Quantity	1
Manufacturer	General Electric
Model	kV2c
Serial No.	45 749 110
Motor HP	N/A
Age	
Flow	N/A

Equipment Name: 012 Utility Power Phase Monitor

Location:

Unit Process: 000 – General Electrical

Description:

Photos:

012 Utility Power Phase Monitor

Condition (1-5)	2
Criticality (1-4)	4
Serviceability (1-4)	2

Type	-
Quantity	1
Manufacturer	Siemens
Model	Sentron PAC 3200
Serial No.	-
Motor HP	-
Age	-
Flow	-

Equipment Name: 020 Generator

Location: North side of site near secondary electrical bldg

Unit Process: 000 – General Electrical

Notes: Main breaker on generator set @ 1600A frame.

Photos:

020 Generator

Condition (1-5)	-
Criticality (1-4)	-
Serviceability (1-4)	-

Type	Deisel Generator
Quantity	1
Manufacturer	Kohler
Model	100REOZMB
Serial No.	2307605
Voltage Output	480 V WYE
Phase	3
Age	7yr
Tank	belly

Equipment Name: 030 Switchgear

Location: Aeration Basin Exterior

Unit Process: 000 – General Electrical

Notes: Feeds power to all buildings on site:
-Admin 100 Amp
-Headworks 150 Amp
-MBR 150 Amp
-Digester 600 Amp
-Spare 50 A
-2x Spare 300 Amp

Photos:

030 Switchgear

Condition (1-5)	2
Criticality (1-4)	4
Serviceability (1-4)	2

Type	SB3 REV. A
Quantity	1
Manufacturer	Seimens
Model	
Serial No.	3002735982-002500-01
System	480Y/277V
Supply (Mains/Neu)	2500A / 2500A
Section(Main/Neu)	1600A / 1600A
Age	7yr

Equipment Name: 040 Solar Feed Disconnect

Location: North side of site near secondary electrical building

Unit Process: 000 – General Electrical

Notes: Uninstalled using 10 ft tap rule. Disconnect switches fused.
Connected to 2000A copper bus on top.
Connected to cabinent 3 in main switch gear.

Photos:

040 Solar Feed Disconnect

Condition (1-5)	
Criticality (1-4)	
Serviceability (1-4)	

Type	-
Quantity	4 Banks
Manufacturer	-
Model	-
Serial No.	-
Motor HP	-
Age	-
Flow	200A per bank

Equipment Name: 041 Solar Array Electrical Assembly

Location: North east of site on fenceline by solar array

Unit Process: 000 – General Electrical

Description:

Photos:

041 Solar Array Electrical Assembly

Condition (1-5)	-
Criticality (1-4)	-
Serviceability (1-4)	-

Equipment Name: 120 Septage Receiving Station

Location: Directly east of the headworks building

Unit Process: 100 – General Site

Description: A stainless steel structure designed to screen and receive septage from trucks.

Photos:

120 Septage Receiving Station

Condition (1-5)	1
Criticality (1-4)	1
Serviceability (1-4)	1

Type	-
Quantity	1
Manufacturer	-
Model	-
Serial No.	-
Motor HP	-
Age	6yr
Flow	-

Notes: Installation needs to be finished. Operators indicated they are working on this.

Equipment Name: 130 Site Security

Location: WTRRF Site

Unit Process: 100 – General Site

Description: Site is not secure as fence does not completely surround the site. Gate must be manually unlocked each morning and locked each evening. No security cameras.

Photos:

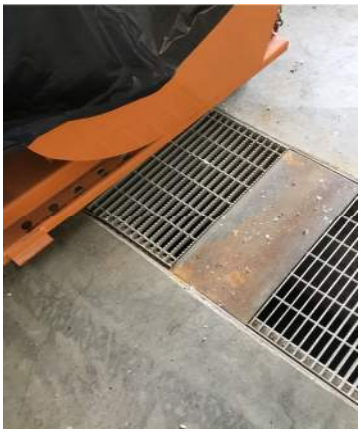
Equipment Name: 201 Headworks Building

Location: At entrance of plant

Unit Process: 200 – Preliminary Treatment

Description: Headworks building with screening and grit removal and classification. Influent flow meter and sampler is adjacent to but outside the headworks building.

Photos:



201 Headworks Building

Condition (1-5)	3
Criticality (1-4)	2
Serviceability (1-4)	1

Type	-
Quantity	-
Manufacturer	-
Model	-
Serial No.	-
Motor HP	-
Age	-
Flow	-

Notes: Screen maintenance work area is not adequate. Only about 6" of cover over 36" influent pipe. Current air sensing device/alarm is on the ceiling and does not pick up potentially dangerous, heavier gases that stay closer to the floor. Makeshift wheeled dumpsters cause grate issues.

Equipment Name: 205 Headworks Electrical Building

Location: Near front entrance

Unit Process: 200 – Preliminary Treatment

Description: Brick building approx 12'x12'

Photos:

Notes: Headworks electrical is old grit building.
There is a PC in the headworks HMI panel, not a panel PC.
Headworks ventiation does not attain 12 air changes per hour; ergo, the space cannot be declassified to Class 1 Division 2.

Equipment Name:	205 Headworks Electrical Building Code Considerations
Location:	Headworks Electrical Building
Unit Process:	200 – Preliminary Treatment
Classification (NFPA 820)	None
Panel Clearance Issues	Need to extend yellow painting to 42" from front of MCC. There is currently no paint in front of headworks HMI panel
Other Code Issues	No fans on for declassifying space. Garage doors were open. Electrical enclosures are not all NEMA 7. There is improper ventilation due to the fans not operating

Equipment Name: 206 Headworks Electrical Building Dry Transformer

Location: Headworks Electrical Building

Unit Process: 200 – Preliminary Treatment

Notes: Blocked in front. Otherwise the transformer is in good condition.

480V primary requires 42" clear. The yellow paint must be extended in front of xfmr

206 Headworks Electrical Building Dry Transformer

Condition (1-5)	1
Criticality (1-4)	2
Serviceability (1-4)	2

Type	-
Quantity	1
Manufacturer	-
Model	-
Serial No.	-
Apparent Power	75 kVA
Primary Voltage	480V / 3 Phase
Secondary Voltage	208V / 120V 3 Phase
Age	-

Notes (additional): Not currently in use.

Equipment Name: 207 Headworks Motor Control Center

Location: Headworks Electrical Building

Unit Process: 200 – Preliminary Treatment

Notes: 7.5 hp Spare
4 Blanks for additional breakers
150A main feeder from seitch gear

Photos:

207 Headworks Motor Control Center

Condition (1-5)	1
Criticality (1-4)	1
Serviceability (1-4)	1

Type	-
Quantity	-
Manufacturer	Allen - Bradley
Model	Centerline 2100
Serial No.	-
Motor HP	-
Age	-
Flow	150 A

Equipment Name: 208 Headworks Panelboard

Location: Headworks Electrical Building

Unit Process: 200 – Preliminary Treatment

Notes: AB PLC for Huber
Remote IO Rack for other Headworks equipment

208 Headworks Panelboard

Condition (1-5)	1
Criticality (1-4)	3
Serviceability (1-4)	1

Type	-
Quantity	-
Manufacturer	AB-Huber
Model	-
Serial No.	-
Motor HP	-
Age	-
Flow	-

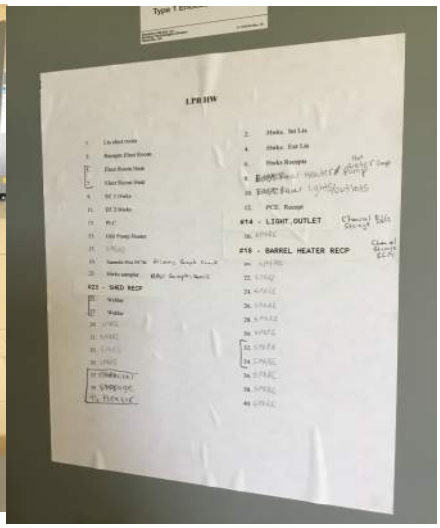
Equipment Name: 209 Headworks Lighting Power Panel

Location: Headworks Electrical Building

Unit Process: 200 – Preliminary Treatment

Notes:

Photos:



209 Headworks Lighting Power Panel

Condition (1-5)	2
Criticality (1-4)	1
Serviceability (1-4)	1

Type	LPB-HW-01
Quantity	1
Manufacturer	Siemens
Catalog No.	3F3Y045BCLN3TP1
Serial No.	335205
Apperant Power	45 kVA
Primary Voltage	480V
Secondary Voltage	208/120V

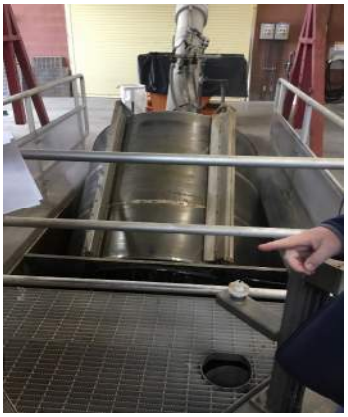
Equipment Name: 210 Fine Screens

Location: Within Headworks Building

Unit Process: 200 – Preliminary Treatment

Description: 2 existing Huber Technology drum screens, with space/flow channel for a third if necessary.

Photos:



210 Fine Screens

Condition (1-5)	1
Criticality (1-4)	3
Serviceability (1-4)	1

(Motor)

Type	Centrifugal
Quantity	2
Manufacturer	Baldor
Model	NP0887XP
Serial No.	BZ730088
Motor HP	2 (60 Hz)
Age	6yr
Flow	-

Notes: Hard to preform routine maintenance, need more space.

Equipment Name: 220 Grit Removal

Location: Within Headworks building

Unit Process: 200 – Preliminary Treatment

Description: Classifier, air release valve, blower pump, hot box

Photos:

220 Grit Removal

Condition (1-5)	1
Criticality (1-4)	2
Serviceability (1-4)	1

Type	T Series Forman-rupp
Quantity	1
Manufacturer	Self priming centrifugal pump
Model	Super t series T3A71S-B
Serial No.	1457386N
Motor HP	-
Age	4yr
Flow	-

Notes: Air release valve has occasional leaking issues, hot box is undersized. Lower blower adjustment for flow matching control.

Equipment Name: 230 Influent Flow Meter and 240 Composite Sampler

Location: Just South, outside Headworks

Unit Process: 200 – Preliminary Treatment

Description: 12" Parshall Flume w/ ultrasonic flow reader

Photos:

230 Influent Flow Meter and 240 Composite Sampler

Condition (1-5)	1
Criticality (1-4)	2
Serviceability (1-4)	1

Type	Ultrasonic Flow Meter
Quantity	1
Manufacturer	Siemens
Model	HydroRanger 200
Serial No.	-
Motor HP	-
Age	-
Flow	-

Notes: Read out on digital screen is in unknown units requiring conversion.

Equipment Name: 250 Flow Control Structure

Location: West of Headworks, after meter

Unit Process: 200 – Preliminary Treatment

Description: Distributes flow through of wastewater Tto PCE or PCW.

Photos:

250 Flow Control Structure

Condition (1-5)	3
Criticality (1-4)	1
Serviceability (1-4)	1

Type	Water Control Knife Gates
Quantity	2
Manufacturer	Golden Gates
Model	-
Serial No.	-
Motor HP	-
Age	-
Flow	-

Notes: Operator gear box(es) broken due to freezing

Equipment Name: 310 Primary Clarifier West

Location: SW from Headworks Building

Unit Process: 300 - Primary Treatment

Description: 90ft diameter circular clarifier with drive, rake arm, scum well, weirs and baffles.

Photos:

310 Primary Clarifier West

Condition (1-5)	2
Criticality (1-4)	3
Serviceability (1-4)	1

Type	Circular Clarifier
Quantity	1
Manufacturer	-
Model	-
Serial No.	-
Motor HP	-
Age	47yr
Flow	-

Notes: Clarifiers are only set up to run in series. Operators would prefer to operate them in parallel if possible. Sludge sump accumulates groundwater.

Equipment Name: 311 Primary Clarifier West Drive

Location: At center of West primary clarifier

Unit Process: 300 - Primary Treatment

Description: Drives the west clarifier rake arm.

Photos:

311 Primary Clarifier West Drive

Condition (1-5)	3
Criticality (1-4)	4
Serviceability (1-4)	1

Type	Inverter Duty Motor
Quantity	1
Manufacturer	Nord
Model	80 S748US KKV
Serial No.	821008474700
Motor HP	60Hz
Age	65yr (?)
Flow	-

Equipment Name: 320 Primary Clarifier East

Location: SE of Headworks Building

Unit Process: 300 - Primary Treatment

Description: 90ft diameter circular clarifier with drive, rake arm, scum well, weirs and baffles.

Photos:

320 Primary Clarifier East

Condition (1-5)	2
Criticality (1-4)	3
Serviceability (1-4)	1

Type	Circular Clarifier
Quantity	1
Manufacturer	-
Model	-
Serial No.	-
Motor HP	-
Age	65yr
Flow	-

Notes: Clarifier pipes in series with slide gate & aluminum frame. Sludge sump accumulates groundwater. Sludge pit cover is decaying and its piping comes in the side and leaves vertically. Catwalks need to be repainted. Launders need to be repaired and recoated.

Equipment Name: 321 Primary Clarifier East Drive

Location: At center of East Primary Clarifier

Unit Process: 300 - Primary Treatment

Description: Drives the east clarifier rake arm.

Photos:

321 Primary Clarifier East Drive

Condition (1-5)	3
Criticality (1-4)	4
Serviceability (1-4)	1

Type	-
Quantity	1
Manufacturer	SEW-EURODRIVE INC.
Model	R47DRS71S4/DH
Serial No.	860054776.15.15.001
Motor HP	50 (60 Hz)
Age	65yr (?)
Flow	-

Notes: Close to the end of its useful life.

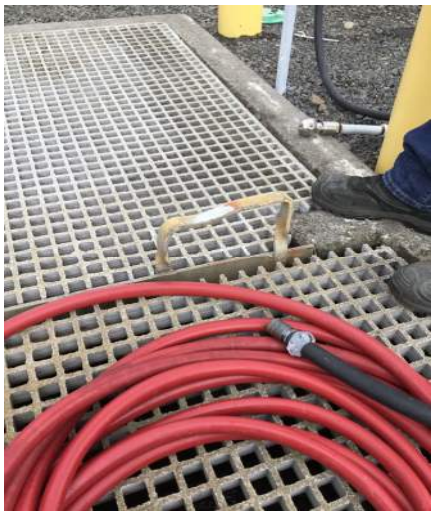
Equipment Name: 330 I/O Junction Box

Location: South of Generator Building

Unit Process: 300 – Primary Treatment

Description: Side with hose on top is "IN" to West primary clarifier, and other side is "OUT" to In-Plant Pump Station.

Photos:



330 I/O Junction Box

Condition (1-5)	2
Criticality (1-4)	1
Serviceability (1-4)	1

Type	Concrete Box
Quantity	1
Manufacturer	-
Model	-
Serial No.	-
Motor HP	-
Age	65yr
Flow	-

Notes: Needs new gate - handle is broken and there are small leaks.

Equipment Name: 340 Combined Effluent Junction Box

Location: Just East of the West Primary Clarifier

Unit Process: 300 – Primary Treatment

Description: Effluent junction box combines effluent from primary clarifiers and sends it to In-Plant Pump Station

Photos:

340 Combined Effluent Junction Box

Condition (1-5)	1
Criticality (1-4)	1
Serviceability (1-4)	1

Type	Concrete Box
Quantity	1
Manufacturer	-
Model	-
Serial No.	-
Motor HP	-
Age	65yr
Flow	-

Equipment Name: 350 In-Plant Pump Station

Location: North of West Primary Clarifier

Unit Process: 300 – Primary Treatment

Description: Triplex Pump Station, gate valves, 2-ton max pump lifting device and electric chain hoist. About 16' deep.

Photos:

350 In-Plant Pump Station

Condition (1-5)	1
Criticality (1-4)	4
Serviceability (1-4)	1

(Pump 1)

Type	8" Submersible
Quantity	1
Manufacturer	Meyers
Model	8VLX500MX-43
Serial No.	S00105853U
Motor HP	
Age	
Flow	

(Pump 2)

Type	8" Submersible
Quantity	1
Manufac	Meyers
Model	8VLX500MX-43
Serial No.	S00105854U
Motor	
Age	
Flow	

(Pump 3)

Type	8" Submersible
Quantity	1
Manufac	Meyers
Model	8VLX500MX-43
Serial	S00105855U
Motor	
Age	
Flow	

Notes: No flow meter. Shallow sump in valve box. Pumps are not running high enough on pump curve to operate efficiently - often times shut off.

Equipment Name: 410 Secondary Process Building Code Considerations

Location: Secondary Process Building

Unit Process: 400 – Secondary Treatment

Classification (NFPA 820) None

Clearance Issues There shall be 3 ft of clearance in gront of the step-down xfmr

There needs to be 42" of yellow paint in front of the MCC

Photos:

Other Code Issues Water pipes should not be placed above control panels.

Photos:

Equipment Name: 411 Blowers (Aerzen)

Location: In Secondary Process Bldg

Unit Process: 400 – Secondary Treatment

Description: Forces air into the aeration basin to support aerobic metobolic processes within the biological treatment process.

Photos:

411 Blowers (Aerzen)

Condition (1-5)	1
Criticality (1-4)	3
Serviceability (1-4)	1

Type	Air Blower
Quantity	1
Manufacturer	Aerzen
Model	D 36 S
Serial No.	1045460
Motor HP	60
Age	-
Flow	-

Notes: Too large of a unit - cannot be turned down any further. Blowers currently are able to produce too much air.

Equipment Name: 412 Blowers (K Turbo)

Location: In Secondary Process Bldg

Unit Process: 400 – Secondary Treatment

Description: Provides air to aeration basin.

Photos:

412 Blowers (K Turbo)

Condition (1-5)	1
Criticality (1-4)	3
Serviceability (1-4)	1

Type	Air Blower
Quantity	3
Manufacturer	K Turbo
Model	TB100 1.0
Serial No.	TB100-3100086
Motor HP	125
Age	6yr
Flow	1408 cfs

Type	Air Blower
Quantity	3
Manufacturer	K Turbo
Model	TB100 1.0
Serial No.	TB100-3100087
Motor HP	125
Age	6yr
Flow	1408 cfs

Type	Air Blower
Quantity	3
Manufacturer	K Turbo
Model	TB100 1.0
Serial No.	TB100-3100088
Motor HP	125
Age	6yr
Flow	1408 cfs

Notes: Run about 8 hours total. These three units don't communicate with each other. Check Valves are audibly leaking - operators to repair. All 3 Turbo inverters melted down due to excessive heat in the building - need to install a fan/heater system for summer/winter extreme temperatures.

Equipment Name: 413 Secondary Process Building Dry Transformer

Location: Secondary Process Building

Unit Process: 400 – Secondary Treatment

Notes: Blocked in Front, otherwise it is in good condition.
Yellow paint must extend to 42" in front of xfmr

Photos:

413 Secondary Process Building Dry Transformer

Condition (1-5)	1
Criticality (1-4)	2
Serviceability (1-4)	2

Type	-
Quantity	-
Manufacturer	Siemens
Model	-
Serial No.	-
Apperant Power	75 kVA
Primary Voltage	480V / 3 Phase
Secondary Voltage	208/120V 3 Phase
Age	

Equipment Name: 414 Secondary Process Building MCC

Location: Secondary Process Building

Unit Process: 400 – Secondary Treatment

Notes: Reletively clean, but 5-year maintenance should be performed.

Photos:

414 Secondary Process Building MCC

Condition (1-5)	1
Criticality (1-4)	4
Serviceability (1-4)	2

Type	-
Quantity	-
Manufacturer	AB
Model	Centerline 2100
Serial No.	-
Primary Voltage	480V / 3 Phase
Age	5yr
Flow	-

Equipment Name: 415 Secondary Process Building Control Panel

Location: Secondary Process Building

Unit Process: 400 – Secondary Treatment

Notes: Remote racks.
Contains ethernet switch, unknown RIO source.
Contains redundant processors

Photos:

415 Secondary Process Building Control Panel

Condition (1-5)	2
Criticality (1-4)	-
Serviceability (1-4)	-

Type	-
Quantity	-
Manufacturer	AB
Model	Control Logic 5581
Serial No.	-
Motor HP	-
Age	-
Flow	-

Equipment Name: 416 Secondary Process Building SCADA Alarm Panel

Location: Secondary Process Building

Unit Process: 400 – Secondary Treatment

Description: Contains fiber patch panel, ethernet switch, and alarm dialer (shown respectively photo 2-4).

Photos:

416 Secondary Process Building SCADA Alarm Panel

Condition (1-5)	1
Criticality (1-4)	2
Serviceability (1-4)	1

Equipment Name: 417 Secondary Process Building Flow Control Valve Panel

Location: Secondary Process Building

Unit Process: 400 – Secondary Treatment

Description:

Photos:

417 Secondary Process Building Flow Control Valve Panel

Condition (1-5)	1
Criticality (1-4)	4
Serviceability (1-4)	1

Type	System
Quantity	1
Manufacturer	Siemens
Model	Frame - E.G
Serial No.	DPB-SPB-01
Primary Voltage	480/277 V 3 Phase
Age	7yr
Flow (max)	250A

Equipment Name: 418 Secondary Process Building Aeration Flow Control Power Panel

Location: Secondary Process Building

Unit Process: 400 – Secondary Treatment

Description:

Photos:

418 Secondary Process Building Aeration Flow Control Power Panel

Condition (1-5)	1
Criticality (1-4)	4
Serviceability (1-4)	1

Type	System
Quantity	1
Manufacturer	Siemens
Model	Frame - E.G
Serial No.	DPB-SPB-02
Primary Voltage	480/277V 3 Phase
Age	7yr
Flow (Max)	250A

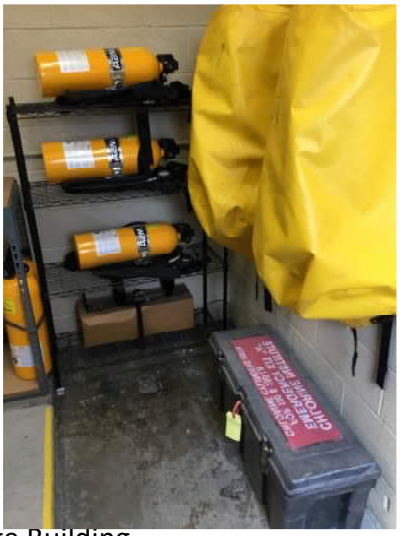
Equipment Name: 419 Secondary Process Storage Building

Location: North of RAS Pump Station

Unit Process: 400 – Secondary Treatment

Description: Building used for safety equipment, file storage, and extra miscellaneous storage.

Photos:



419 Secondary Process Storage Building

Condition (1-5)	1
Criticality (1-4)	1
Serviceability (1-4)	1

Type	-
Quantity	-
Manufacturer	-
Model	-
Serial No.	-
Motor HP	-
Age	-
Flow	-

Notes: Could use this building primarily for file storage. Building structure and HVAC is in good condition.

Equipment Name: 420 Aeration Basin Structure

Location: Adjacent to Secondary Process Bldg - West of SSB

Unit Process: 400 – Secondary Treatment

Description: The structure which houses the activated biological treatment process.

Photos:

420 Aeration Basin Structure

Condition (1-5)	2
Criticality (1-4)	4
Serviceability (1-4)	2

Type	-
Quantity	-
Manufacturer	-
Model	-
Serial No.	-
Motor HP	-
Age	6yr
Flow	-

Notes: Air pipe from Secondary Process Building (blowers) travels through the basin wall instead of under or over - sometimes leaks. Birds nest in the bridge crane and create a mess. 3/4" size utility water connections are too small.

Equipment Name: 421 Flow Split Flumes and Meters

Location: Influent channel of aeration basin

Unit Process: 400 – Secondary Treatment

Description: Three 9" Parshall flumes split the flow through 3 trains in the aeration basin.

Photos:

421 Flow Split Flumes and Meters

Condition (1-5)	1
Criticality (1-4)	2
Serviceability (1-4)	1

Type	Ultra Sonic
Quantity	3
Manufacturer	Endress & Hauser
Model	FDU90-UW3BB
Serial No.	F7004701123
Motor HP	-
Age	6yr
Flow	-

Notes: Two trains are used for current flows.

Equipment Name: 422 Mixers

Location: Within Aeration Chamber

Unit Process: 400 – Secondary Treatment

Description: Mix MLSS within aeration chambers

Photos:



422 Mixers

Condition (1-5)	1
Criticality (1-4)	3
Serviceability (1-4)	2

Train 1

(Mixers)

Type	Invert Mixers
Quantity	2
Manufacturer	Sew Eurodrive Mix-AB1-30/20
Model	FAF87DRP112M4CDH/ FAF77DRP90L4CDH
Serial No.	890024960.10.10.001/ 890024964.10.10.001
Motor HP	
Age	
Flow	

(Gearbox chambers)

Type	Wilo Pumps
Quantity	1
Manufact	Wilo Mix-AB1-10/50
Model	TR50/RZP50
Serial No.	650094190/650097482
Motor HP	
Age	
Flow	

Train 1

(Mixers)

Type	Invert Mixers
Quantity	2
Manufacturer	Sew Eurodrive Mix-AB1-30/20
Model	FAF87DRP112M4CDH/ FAF77DRP90L4CDH
Serial No.	890024960.10.10.002/ 890024964.10.10.002
Motor HP	
Age	
Flow	

(Gearbox chambers)

Type	Wilo Pumps
Quantity	1
Manufact	Wilo Mix-AB2-10/50
Model	TR50/RZP50
Serial No.	650094189/650097481
Motor HP	
Age	
Flow	

Train 1

(Mixers)

Type	Invert Mixers
Quantity	2
Manufacturer	Sew Eurodrive Mix-AB1-30/20
Model	FAF87DRP112M4CDH/ FAF77DRP90L4CDH
Serial No.	890024960.10.10.003/ 890024964.10.10.003
Motor HP	
Age	
Flow	

(Gearbox chambers)

Type	Wilo Pumps
Quantity	1
Manufact	Wilo Mix-AB3-10/50
Model	TR50/RZP50
Serial No.	650094188/650097483
Motor HP	
Age	
Flow	

Notes: Heavy Motor. Gear box and motor complex for invert mixers are hard to maintain because they're offset from catwalk. Operators currently fill basin and boat out to repair/perform maintenance on system.

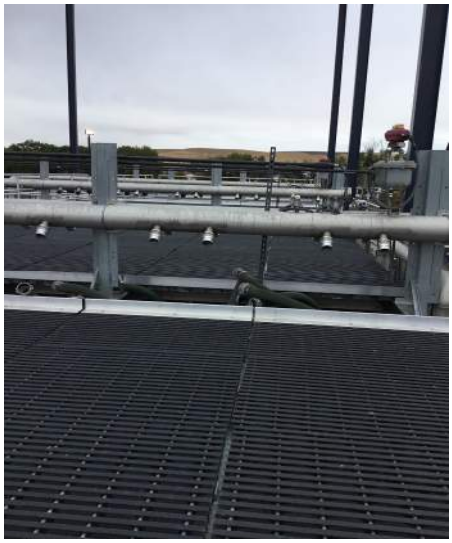
Equipment Name: 423 Membrane Bioreactors

Location: At end of Aeration trains

Unit Process: 400 – Secondary Treatment

Description: Old membranes from water treatment plant sit in active trains. Act as fixed film media, not reactors.

Photos:



423 Membrane Bioreactors

Condition (1-5)	4
Criticality (1-4)	1
Serviceability (1-4)	1

Notes: Membrane inserts grow lots of red worms. Consider options for future installation of new MBR in basins for production of Class A recycled water for reuse.

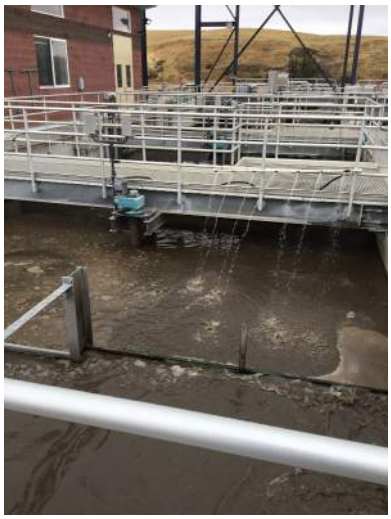
Equipment Name: 429 Aeration Basin Utility Water

Location: In/throughout Aeration Basin

Unit Process: 400 – Secondary Treatment

Description: Part of the utility water system that runs through the aeration basin

Photos:



429 Aeration Basin Utility Water

Condition (1-5)	1
Criticality (1-4)	2
Serviceability (1-4)	2

Notes: Need better UT water system train isolation - currently designed like a regular water loop, making it hard to shut down sections. Problems occur in winter when operators have to fill train(s)

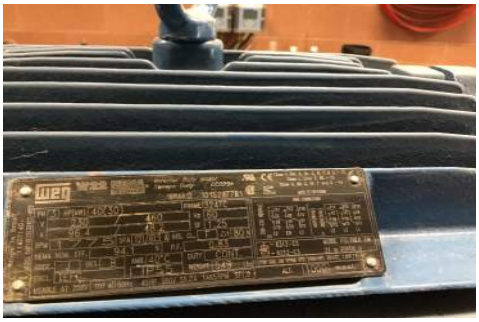
Equipment Name: 431 MBR Pumps

Location: Inside MBR Building

Unit Process: 400 – Secondary Treatment

Description: Three pumps designed to move wastewater through the MBR process

Photos:



431 MBR Pumps

Condition (1-5)	1
Criticality (1-4)	1
Serviceability (1-4)	1

(Pump)

Type	Rotary Lobe
Quantity	3
Manufacturer	Borger
Model	FL 776
Serial No.	12002125 1.2
Motor HP	-
Age	5yr
Flow	-

(Motor)

Type	Inverter Duty
Quantity	3
Manufacturer	WEG
Model	04018ET3E324TC-W22
Serial No.	1015297791
Motor HP	30
Age	5yr
Flow	

(Gear Box)

Type	
Quantity	3
Manufactu	NORD
Model	62 VL N320TC
Serial No.	200870651-100 15705368
Motor HP	30
Age	5yr
Flow	

Notes: Building includes a 5000 gallon storage tank for chlorinated membrane wash water that feeds into the utility water system post membrane cleaning - it feeds and receives.

Equipment Name: 432 MBR Metering Pumps

Location: Inside MBR Building

Unit Process: 400 – Secondary Treatment

Description: Feeds/meters chlorinated water into tank for cleaning.

Photos:

432 MBR Metering Pumps

Condition (1-5)	1
Criticality (1-4)	1
Serviceability (1-4)	1

Type	Metering pumps
Quantity	3
Manufacturer	Grundfos
Model	DDA
Serial No.	-
Motor HP	-
Age	6yr
Flow	-

Equipment Name: 433 MBR Actuated Valves

Location: Inside MBR Building

Unit Process: 400 – Secondary Treatment

Description: Actuated valves which control wastewater through the MBR building.

Photos:

433 MBR Actuated Valves

Condition (1-5)	1
Criticality (1-4)	1
Serviceability (1-4)	1

(Gear Box)

Type	-
Quantity	6
Manufacturer	PRATT
Model	FL
Serial No.	1551444-1-2 HP, etc.
Motor HP	-
Age	5yr
Flow	-

(Actuator)

Type	Pneumatic
Quantity	6
Manufacturer	Western States Automation
Model	C-DA105-NI
Serial No.	-
Motor HP	-
Age	5yr
Flow	-

(Sensor)

Type	-
Quantity	6
Manufactur	Eclipse by StoneL
Model	EN33C02F A - WSA04
Serial No.	T306407, etc.
Motor HP	-
Age	6yr
Flow	-

Equipment Name: 434 MBR Pneumatic Valve Compressor

Location: Inside MBR Building

Unit Process: 400 – Secondary Treatment

Description: Compressor that allows opening of the pneumatic valves.

Photos:

434 MBR Pneumatic Valve Compressor

Condition (1-5)	1
Criticality (1-4)	1
Serviceability (1-4)	1

(Tank)

Type	Pressure
Quantity	1
Manufacturer	IR - Ingersoll Rand
Model	2340L5Grainger
Serial No.	CBV197697
Motor HP	-
Age	-
Flow	-

(Compressor Pump)

Type	-
Quantity	1
Manufacturer	IR - Ingersoll Rand
Model	2340
Serial No.	1205280
Motor HP	-
Age	-
Flow	-

Equipment Name: 435 MBR Flow Meters

Location: Inside MBR Building

Unit Process: 400 – Secondary Treatment

Description: Meter flow into MBR.

Photos:

435 MBR Flow Meters

Condition (1-5)	1
Criticality (1-4)	1
Serviceability (1-4)	1

Type	-
Quantity	3
Manufacturer	KROHNE
Model	ENVIROMAG 2100 C CSA
Serial No.	C11 5059
Motor HP	-
Age	5yr
Flow	-

Equipment Name:	436 MBR Process Building Code Considerations
Location:	MBR Building
Unit Process:	400 – Secondary Treatment
Classification (NFPA 820)	None
Panel Clearance Issues	Need 42" clearance for the 480V drives
Other Code Issues	Equipment not currently in use. When put back online, VFDs need to be separated from panel wiring. No overcurrent or disconnects for drives in panel. Power to drives cannot be disconnected even if power to panel is off. Drives appear to have been added after the fact. There appear to be UL listing concerns. The breakers are not lockable and are not switch rated. Each VFD needs its own lockout switch in the control panel. Power wiring and control wiring needs to be segregated.

Equipment Name: 437 MBR Building Dry Transformer

Location: MBR Building

Unit Process: 400 – Secondary Treatment

Description:

437 MBR Building Dry Transformer

Condition (1-5)	1
Criticality (1-4)	2
Serviceability (1-4)	2

Type	-
Quantity	-
Manufacturer	Siemens
Model	-
Serial No.	-
Primary Voltage	480V / 3 Pase
Secondary Voltage	208/120V 3 Phase
Apperant Power	75kVA
Age	-

Notes: Blocked in front. Otherwise it is in good condition. 480V primary needs 42" of clearance. Yellow paint must be extended on the floor in front of the xfmr

Equipment Name: 438 MBR VFD Control Panel

Location: MBR Building

Unit Process: 400 – Secondary Treatment

Description:

Photos:



438 MBR VFD Control Panel

Condition (1-5)	3
Criticality (1-4)	3
Serviceability (1-4)	3

Type	-
Quantity	-
Manufacturer	AB
Model	Remote IO Rack
Serial No.	-
Motor HP	-
Age	-
Flow	-

Notes: No processor, just comm card and I/O racks.

Panel has holes/openings compromising NEMA code rating. Holes need to be patched.

Equipment Name: 439 MBR Building Power Panel

Location: MBR Building

Unit Process: 400 – Secondary Treatment

Description: Distributes power for the MBR building

Photos:



439 MBR Building Power Panel

Condition (1-5)	2
Criticality (1-4)	4
Serviceability (1-4)	1

Type	-
Quantity	-
Manufacturer	Siemens
Model	BOD
Serial No.	-
Primary Voltage	480 V
Age	-
Flow	-

Notes: The third picture shows the compressor tank's solenoid valve powered via the control panel's uninteruptable power supply. This creates a voltage spike in the panel when it kicks on. This should be moved.

Equipment Name: 439 MBR Building Lighting Control Panel

Location: MBR Building

Unit Process: 400 – Secondary Treatment

Description:

Photos:

439 MBR Building Lighting Control Panel

Condition (1-5)	2
Criticality (1-4)	4
Serviceability (1-4)	1

Type	-
Quantity	-
Manufacturer	Seimens
Model	-
Serial No.	-
Primary Voltage	120V
Age	-
Flow	-

Equipment Name: 440 Secondary Clarifier West

Location: West of the east clarifier

Unit Process: 400 – Secondary Treatment

Description: 115 ft diameter circular clarifier.

Photos:

440 Secondary Clarifier West

Condition (1-5)	3
Criticality (1-4)	3
Serviceability (1-4)	2

Type	Circular clarifier
Quantity	1
Manufacturer	-
Model	-
Serial No.	-
Motor HP	-
Age	48yr
Flow	-

Notes: Flooring concrete is degrading - sections coming up in a few places. Launder needs repair and paint. New scum boxes put in with 2011 upgrades. Weld on center column is pulling apart.

Equipment Name: 441 Secondary Clarifier West Drive

Location: Middle Column of Clarifier

Unit Process: 400 – Secondary Treatment

Description: Drives the west clarifier's rake arm.

Photos:

441 Secondary Clarifier West Drive

Condition (1-5)	4
Criticality (1-4)	2
Serviceability (1-4)	1

Type	-
Quantity	1
Manufacturer	REX
Model	5MCTDW
Serial No.	B556-154A
Motor HP	-
Age	47yr
Flow	-

Notes: No name plate on larger gear box. Rebuilt 2 years after upgrade.

Equipment Name: 450 Secondary Clarifier East

Location: Northwest of admin building

Unit Process: 400 – Secondary Treatment

Description: 115 ft diameter circular clarifier.

Photos:

450 Secondary Clarifier East

Condition (1-5)	3
Criticality (1-4)	3
Serviceability (1-4)	2

Type	Circular Clarifier
Quantity	1
Manufacturer	-
Model	-
Serial No.	-
Motor HP	-
Age	48yr
Flow	-

Notes: Launder has cracks and deficiencies - needs repair. Need to install groundwater reliefs to prevent infiltrating groundwater (at all primary and secondary clarifiers).

Equipment Name: 451 Secondary Clarifier East Drive

Location: Middle Column of Clarifier

Unit Process: 400 – Secondary Treatment

Description: Drives the east clarifier's rake arm.

Photos:

451 Secondary Clarifier East Drive

Condition (1-5)	4
Criticality (1-4)	2
Serviceability (1-4)	1

Type	-
Quantity	1
Manufacturer	REX
Model	5MCTDW
Serial No.	B556-154A
Motor HP	-
Age	47yr
Flow	-

Equipment Name: 460 Secondary Control Junction Box

Location: Between secondary clarifiers

Unit Process: 400 – Secondary Treatment

Description: Splits influent flow between two Secondary Clarifiers.

Photos:

460 Secondary Control Junction Box

Condition (1-5)	1
Criticality (1-4)	1
Serviceability (1-4)	1

Equipment Name: 470 Effluent Junction Box

Location: Immediately South of aeration basin

Unit Process: 400 – Secondary Treatment

Description: Combines flow from secondary clarifiers. Also primary chlorine injection site

Photos:

470 Effluent Junction Box

Condition (1-5)	1
Criticality (1-4)	1
Serviceability (1-4)	1

Equipment Name: 480 RAS Pump Station

Location: Between Secondary Clarifiers

Unit Process: 400 – Secondary Treatment

Description: The RAS Pump Station pumps recycled activated sludge from the bottom of the Secondary Clarifiers back to the Aeration Basins.

Photos:

480 RAS Pump Station

Condition (1-5)	3
Criticality (1-4)	2
Serviceability (1-4)	2

(Pump 1)

Type	Submersible
Quantity	1
Manufacturer	Myers Pump
Model	8VLX500MX-43
Serial No.	S000106012U
Motor HP	-
Age	-
Flow	-

(Pump 2)

Type	Submersible
Quantity	1
Manufacturer	Myers Pump
Model	8VLX500MX-43
Serial No.	S000106013U
Motor HP	-
Age	-
Flow	-

(Pump 3)

Type	Submersible
Quantity	1
Manufacturer	Myers Pump
Model	8VLX500MX-43
Serial No.	S000106014U
Motor HP	-
Age	-
Flow	-

Notes: RAS valves leak - chamber collects water and has to be manually pumped. Vault could use some rehabilitation to increase efficiency - possible reconfigure one chamber for chemical storage. Re-configure floating floor panels above submersible pumps for easier removal, as it is currently full-width across the entire pump chamber. Mud valve in upper chamber is leaking. No flow meters are installed, which makes measuring RAS versus WAS difficult. There is no lifting device for pump maintenance. Concrete chamber in ground on the West side of the pump station is housing an offline, rotting iron pipe and needs to be abandoned completely.

Equipment Name: 490 Underground Pump Station (WAS)

Location: Immediately South of RAS PS

Unit Process: 400 – Secondary Treatment

Description: The Underground WAS Station routes WAS from Sludge Storage Basins to drying beds. WAS is taken from the bottom of the Secondary Clarifiers and NOT returned to the Aeration Basin so that operations remain at equilibrium.

Photos:




490 Underground Pump Station (WAS)

Condition (1-5)	3
Criticality (1-4)	2
Serviceability (1-4)	2

(Waste Pump)

Type	Centrifugal
Quantity	1
Manufacturer	Paco Pumps
Model	53-409591-141000-1624
Serial No.	1969702 C
Motor HP	-
Age	6yr
Flow	250 GPM

(Solids Pump)

Type	Regressive Cavity
Quantity	1
Manufacturer	Moyno
Model	1F065G1 CDQ3 AAA
Serial No.	AM16176 CJ
Motor HP	70 HP
Age	6yr
Flow	-

(Sump Pump)

Type	Submersible Sump
Quantity	1
Manufacturer	-
Model	-
Serial No.	-
Motor HP	-
Age	-
Flow	-

(Waste Pump Motor)

Type	Industrial
Quantity	1
Manufacturer	Baldor
Model	215TCZ
Serial No.	37F223-042961
Motor HP	8
Age	6yr
Flow	-

(Solids Pump Gear Box)

Type	-
Quantity	1
Manufacturer	SEW-EURODRIVE, INC.
Model	K67AM215
Serial No.	8502 14610.10.10.001
Motor HP	-
Age	6yr
Flow	-

Notes: The sump pump is configured with a 2" trash pump. The waste pump is old, but functions well. The solids transfer pump has been rebuilt and is functioning fine. The pump station's flow meter, flow gauge, and some of the auto valves are new. The non-automatic valves are finicky and diffuclt to turn. Birds nest in the ceiling of the building and make their way into the above-ground hose storage portion of the pump station.

Equipment Name: 610 Disinfection System

Location: In Disinfection Building

Unit Process: 600 – Disinfection

Description: Chlorination system includes chlorine gas cylinders, rotameters, scales, chlorine monitors, metering pumps, etc. used for disinfection.

Photos:

610 Disinfection System

Condition (1-5)	2
Criticality (1-4)	4
Serviceability (1-4)	2

Notes: Operators would like to move away from chlorine gas and use a more safe, liquid disinfecting agent (e.g. low sodium hypochlorite). Current system is maintenance and labor intensive and has multiple safety constraints. New scales/SCADA would improve operations. Current system is costly to operate.

Equipment Name: 615 Disinfection Building

Location: East of Chlorine Contact Chamber

Unit Process: 600 – Disinfection

Description: This building is used for storage, dosing, and distributing chlorine gas to the effluent before it travels through the chlorine contact chamber. The primary chlorination point is in the Secondary Clarifier Effluent Junction Box, the secondary injection site is the chlorine contact chamber, and the bypass injection point has been taken offline.

Photos:

615 Disinfection Building

Condition (1-5)	1
Criticality (1-4)	2
Serviceability (1-4)	1

Notes: Unloading and storing chemicals is difficult.
Improvements to the loading dock area are needed.

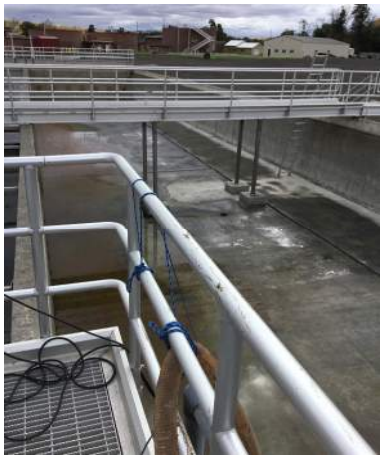
Equipment Name: 620 Chlorine Contact Chamber

Location: South of the West Secondary Clarifier

Unit Process: 600 – Disinfection

Description: The chlorine contact chamber is the final stage of disinfection before treated effluent leaves the wastewater treatment plant. The water is statically mixed with injected chlorine as it moves through the chamber. A utility water hose showers effluent with diluted dechlorination chemical to remove chlorine from the water before it is discharged downstream.

Photos:



620 Chlorine Contact Chamber

Condition (1-5)	4
Criticality (1-4)	2
Serviceability (1-4)	1

Notes: Only the North section of the chamber has partitions installed to increase contact time. South chamber is currently offline. A second catwalk across the middle and down center of the chamber would simplify maintenance. Ground water reliefs are not functioning properly. The chlorine analyzer does not work. Structural damage is present.

Equipment Name: 621 Chlorine Contact Chamber Splitter Box

Location: Adjacent to Contact Chamber

Unit Process: 600 – Disinfection

Description: Splits flow between the two trians of the chlorine contact chamber. Currently routing to the North side of the contact chamber, as the South train is drained.

Photos:

621 Chlorine Contact Chamber Splitter Box

Condition (1-5)	1
Criticality (1-4)	1
Serviceability (1-4)	1

Equipment Name: 630 Dechlorination Building General Notes

Location: Dechlorination Building

Unit Process: 600 – Disinfection

Notes: The environment for which this equipment must operate is of concern. In looking around the room corrosion is evident on bolts and other hardware. Control panel interior is okay, but the MCC is NEMA 1 and has open ventilation grilles.

Maintenance is necessary and on the MCC and the bus must be checked for corrosion.

Photos:

Equipment Name: 630 General Dechlorination Code Considerations

Location: Dechlorination Building

Unit Process: 600 – Disinfection

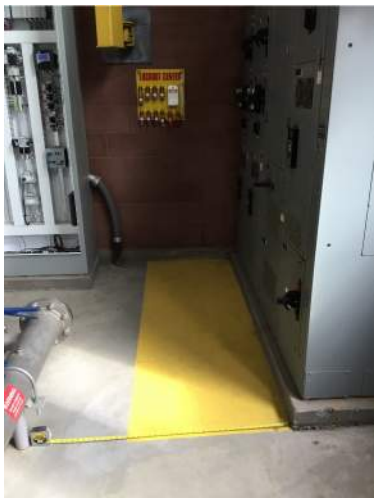
Classification (NFPA 820) None

Panel Clearance Issues

Step down transformer needs 3ft of clearance in front

Need to extend yellow paint on floor to 42" in front of 480V MCC. The current paint only extends 30"

Photos:



Other Code Issues

Move instruments outside of Panel. Non-qualified persons must open live electrical panel to read and operate instrument transmitter/controllers

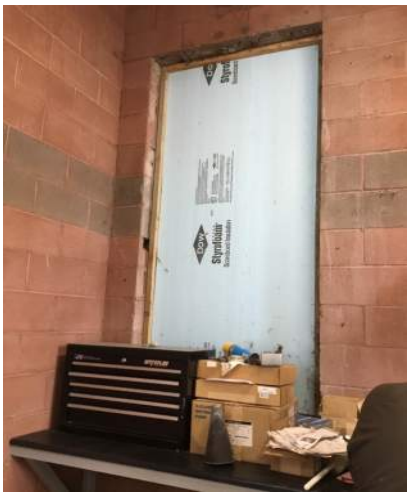
Equipment Name: 631 Dechlorination Building

Location: Westernmost Structure On-Site

Unit Process: 600 – Disinfection

Description: CMU building which houses the dechlorination chemicals and the utility water system.

Photos:



631 Dechlorination Building

Condition (1-5)	1
Criticality (1-4)	1
Serviceability (1-4)	1

Type	-
Quantity	1
Manufacturer	-
Model	-
Serial No.	-
Motor HP	-
Age	6yr
Flow	-

Notes: Door opening should be filled, brick needed is specialty order.

Equipment Name: 632 Dechlorination Pumps

Location: Dechlorination Buildin

Unit Process: 600 – Disinfection

Description: Dual metering pumps designed to dose the chlorinated water with calcium theophosphate.

Photos:

632 Dechlorination Pumps

Condition (1-5)	
Criticality (1-4)	
Serviceability (1-4)	

Type	Metering Pump
Quantity	2
Manufacturer	IWAKI
Model	EHE31E1-VC
Serial No.	1304294236
Motor HP	0.25
Age	6yr
Flow (gpm)	0.1

Type	Metering Pump
Quantity	2
Manufact	IWAKI
Model	EHE31E1-VC
Serial No.	1303131938
Motor HP	0.25
Age	6yr
Flow	0.1

Equipment Name: 633 Dechlorination Chemical Storage

Location: Dechlorination Building

Unit Process: 600 – Disinfection

Description: 6200 Gallon HDPE tank which stores calcium thiosulfate for dechlorination

Photos:

633 Dechlorination Chemical Storage

Condition (1-5)	1
Criticality (1-4)	2
Serviceability (1-4)	1

Equipment Name: 634 Dechlorination Building MCC

Location: Dechlorination Building

Unit Process: 600 – Disinfection

Notes: Corrosion is starting to form around the base of the MCC and there is dust on the fans. Needs 5 year maintenance cleaning.

Photos:

634 Dechlorination Building MCC

Condition (1-5)	1
Criticality (1-4)	2
Serviceability (1-4)	2

Type	
Quantity	1
Manufacturer	Allen-Bradley
Model	Centerline 2100
Serial No.	KZDP51/2
Primary Voltage	480V / 3 Phase
Age	5yr
Flow	-

Equipment Name: 635 Dechlorination Control Panel

Location: Dechlorination Building

Unit Process: 600 – Disinfection

Notes: Operator access instruments should be outside of the panel.

SCADA switches. Black wire is fiber. It should be converted to copper.

Photos

635 Dechlorination Control Panel

Condition (1-5)	1
Criticality (1-4)	2
Serviceability (1-4)	2

Type	
Quantity	
Manufacturer	AB
Model	Remote I/O
Serial No.	
Motor HP	
Age	
Flow	

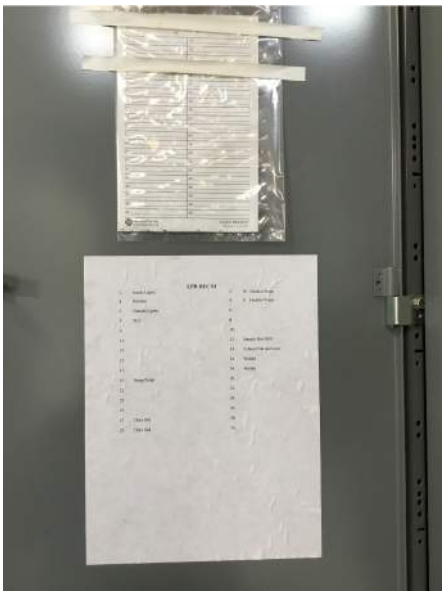
Equipment Name: 636 Dechlorination Building Lighting Power Panel

Location: Dechlorination Building, within MCC

Unit Process: 600 – Disinfection

Notes: Lighting panel in MCC w/step down transformer

Photos:



636 Dechlorination Building Lighting Power Panel

Condition (1-5)	1
Criticality (1-4)	2
Serviceability (1-4)	2

Type	
Quantity	1
Manufacturer	Easton/Cutler-Hammer
Model	Power line
Serial No.	DOB-DEC-01
Motor HP	-
Age	-
Flow	-

Equipment Name: 640 Outfall

Location: Adjacient to the westernmost fenceline

Unit Process: 600 – Disinfection

Description: Outfall manholes, flow meter and sampler. Effluent from the chlorine contact chamber flows through these structures then under stream and across open field to final outfall location.

Photos:

640 Outfall

Condition (1-5)	2
Criticality (1-4)	1
Serviceability (1-4)	1

Notes: Outfall flow meter and sampler are located adjacent to the first outfall manhole. Operators would like to see a parshal flume installed to monitor effluent at this point. Chlorine residual is checked in second manhole. Outfall manhole 3 contains a submersible flow meter - the meter's sensor was recently replaced. Final manhole includes temperature sensors that are checked once a year. Currently, effluent discharge is slightly warmer than ideal per environmental regulations.

Equipment Name: 705 Primary Digester Complex

Location: Attached directly east of the primary digester structure.

Unit Process: 700 – Solids Treatment

Description: The primary digester complex houses all of the piping needed to move solids and FOG from the clarifiers to the primary digester and to the secondary digesters. It also heats the sludge to the requisite temperature for anaerobic digestion to occur

Photos:

705 Primary Digester Complex

Condition (1-5)	2
Criticality (1-4)	4
Serviceability (1-4)	2

Type	Brick-faced concrete structure
Quantity	1
Manufacturer	-
Model	-
Serial No.	-
Motor HP	-
Age	48yr
Flow	

Notes: The complex appears to be in good working order. The piping appears to be in good condition. There is some issues with one of the valves in the area of photo one, and the FOG heat exchanger is in a difficult place to service. In general there is enough room to operate and maintain the valves and components. Operators wish to add ferric injection.

Equipment Name: 706 Primary Digester Structure

Location: South of Admin building

Unit Process: 700 – Solids Treatment

Description: 59 ft diameter 30ft tall circular structure with a fixed roof. The structure has a stairway on the north side leading to the roof.

Photos:

706 Primary Digester Structure

Condition (1-5)	2
Criticality (1-4)	4
Serviceability (1-4)	1

Type	Brick-faced concrete structure
Quantity	1
Manufacturer	-
Model	-
Serial No.	-
Motor HP	-
Age	48 yr
Flow	-

Notes: The façade is stripping off along the top of the structure. Overall the structure appears to be in well working condition. The only issues appear to be superficial. There is a foaming issue that occurs yearly in the fall. The operators have dealt with this issue by increasing MLSS to 5k mg/l. This appears to solve the problem.

Equipment Name: 707 Primary Digester Sludge Pump

Location: Basement of anaerobic digester complex

Unit Process: 700 – Solids Treatment

Description: Gold colored pump in the basement of the digester complex room. Brings sludge from primary clarifiers to primary digestion.

Photos:

707 Primary Digester Sludge Pump

Condition (1-5)	3
Criticality (1-4)	4
Serviceability (1-4)	2

Type	CL 390
Quantity	1
Manufacturer	Borger
Model	VFGCCCCEA5N
Serial No.	1011429611
Motor HP	7.5
Age	7yr
Flow	-

Notes: Only one pump, need redundancy

Equipment Name: 708 Primary Digester Heat Exchanger

Location: Upper floor of primary digester complex

Unit Process: 700 – Solids Treatment

Description: Large, blue, semi-cylindrical construct which takes heat from the hot water loop and transfers it to the sludge.

Photos:

708 Primary Digester Heat Exchanger

Condition (1-5)	1
Criticality (1-4)	4
Serviceability (1-4)	1

Type	Spiral
Quantity	1
Manufacturer	Alfa Laval
Model	1H-SW-1W
Serial No.	30112-68358
Motor HP	N/A
Age	6yr
Flow	N/A

Equipment Name: 709 Primary Digester Sludge Recirculation Pump

Location: Basement of digester complex

Unit Process: 700 – Solids Treatment

Description: Circulates primary sludge through the heat exchanger to keep the required temperature for primary anaerobic digestion.

Photos:

709 Primary Digester Sludge Recirculation Pump

Condition (1-5)	2
Criticality (1-4)	4
Serviceability (1-4)	2

Type	Chopper
Quantity	1
Manufacturer	Wemco-Hidrostal
Model	D4K-HS-DOW 4x4
Serial No.	11DW08502-02
Motor HP	5
Age	6yr
Flow	250

Notes: In the second photo the recirculation pump is the near side pump.

Equipment Name: 710 Lime System

Location: Top floor of primary digester complex

Unit Process: 700 – Solids Treatment

Description: Two pumps, a slurry tank, and a holding tank skid mounted. The lime system is intended to inject a lime slurry into primary digestion.

Photos:

710 Lime System

Condition (1-5)	4
Criticality (1-4)	1
Serviceability (1-4)	2

Type	-
Quantity	2
Manufacturer	Browning Series 3000
Model	Series 3000
Serial No.	S05K 6876345011
Motor HP	-
Age	6yr
Flow	-

Notes: This system is currently inoperable and has been for the better part of six years. The skid is mounted approx 3ft from the east wall of the complex room. It partially covers the roll up door preventing loaded pallet jacks from entering or exiting.

Equipment Name: 711 Primary Digester Complex Lighting and Power Panel

Location: Dewatering Building

Unit Process: 700 – Solids Treatment

Notes: Two panels DP1 and DP2, picturerd together in the first photo and respectively in the second and third. Panel DP2 has a 30 kVA step down transformer.

Photos:

Condition (1-5)	2
Criticality (1-4)	2
Serviceability (1-4)	1

Type	DP1 - system
Quantity	1
Manufacturer	Siemens
Catalog No.	P1E42BQ100CTS
Sales No.	3003358913
Primary Voltage	480/277 3 Phase
Age	6yr
Flow (max)	250 A

Type	DP2 - System
Quantity	1
Manufacturer	Siemens
Catalog No.	P1C30QJ150CTS
Sales No	3003358913
Primary Voltage	208/120 3 Phase
Age	6yr
Flow (max)	250 A

Equipment Name: 712 Primary Digester Complex Control Panel

Location: Dewatering Building

Unit Process: 700 – Solids Treatment

Description:

Photos:

712 Primary Digester Complex Control Panel

Condition (1-5)	2
Criticality (1-4)	2
Serviceability (1-4)	2

Equipment Name: 715 Primary Mixing Building

Location: South of primary digester structure

Unit Process: 700 – Solids Treatment

Description: The mixing building contains the pump required to mix the sludge contained within the primary digester. It also contains polymer feed for primary digestion and FOG intake components

Photos:

715 Primary Mixing Building

Condition (1-5)	1
Criticality (1-4)	4
Serviceability (1-4)	1

Type	Brick-faced Concrete
Quantity	1
Manufacturer	-
Model	-
Serial No.	-
Motor HP	-
Age	6yr
Flow	-

Notes: The building is new as is all the equipment within.

Equipment Name: 716 Primary Mixing Pump

Location: Mixing Building

Unit Process: 700 – Solids Treatment

Description: A pump designed to mix sludge within the primary anaerobic digester.

Photos:

716 Primary Mixing Pump

Condition (1-5)	1
Criticality (1-4)	4
Serviceability (1-4)	1

Type	Centrifugal sludge pump
Quantity	1
Manufacturer	Wemco-Hidrostal
Model	H12K-SD-H2W 12x12
Serial No.	11DW08502-01
Motor HP	25hp
Age	6yr
Flow	3200

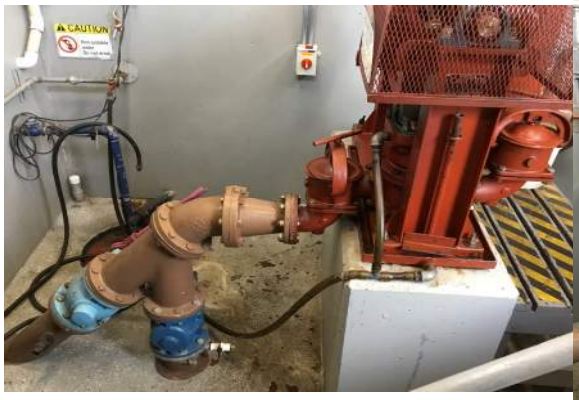
Equipment Name: 720 Primary Sludge Pump East

Location: West of East Primary Clarifier

Unit Process: 700 – Solids Treatment

Description: Pumps sludge from East Primary Clarifier

Photos:



720 Primary Sludge Pump East

Condition (1-5)	4
Criticality (1-4)	2
Serviceability (1-4)	2

(Motor)

Type	UTP
Quantity	1
Manufacturer	U.S. Electrical Motors
Model	Series 2000
Serial No.	RC06-98082033-6T 01
Motor HP	3 (60 Hz)
Age	
Flow	

(Pump)

Type	11" Piston
Quantity	1
Manufact	Carter Pump Company
Model	Model 800S
Serial No.	356
Motor HP	
Age	
Flow	85gpm at 80' head

Notes: Floor is below grade requiring steps to reach pump, making maintenance hard. New pump, valves, and flow meters needed within next 5-10 years. Separate piping outside of the building would create more room. Building houses part of hot water loop.

Equipment Name: 725 Primary Sludge Pump West

Location: East of West Primary Clarifier

Unit Process: 700 – Solids Treatment

Description: Pumps sludge from West Primary Clarifier

Photos:

725 Primary Sludge Pump West

Condition (1-5)	3
Criticality (1-4)	2
Serviceability (1-4)	2

(Motor)

Type	
Quantity	1
Manufacturer	SEW-EURODRIVE
Model	R87 DRE132M4
Serial No.	80.7200037801.0001.15
Motor HP	
Age	
Flow	

(Pump)

Type	4" SludgePro 4SDWP
Quantity	1
Manufacturer	Wastecorp
Model	
Serial No.	
Motor HP	
Age	
Flow	0-127 GPM

Notes: Floor is below grade requiring steps to reach pump, making maintenance hard. Problematic pump system - discs need to be replaced pretty frequently. All valving is outside so can pump from scum pit or center well. Lacking a pressure sensor. Drain connects to 36" primary clarifier effluent line but should connect to west primary clarifier scum pit - building floods if power is lost, if the plant pump station level hits about 10' it backs up into this drain (control issue asociated with power outages)

Equipment Name: 730 Solids Electrical Building

Location: Due east of primary digester complex

Unit Process: 700 – Solids Treatment

Description: Newly built, CMU building with an approximate footprint of 20'x12'. This building houses most of the electric panels for the solids handling processes.

Photos:

730 Solids Electrical Building

Condition (1-5)	1
Criticality (1-4)	4
Serviceability (1-4)	1

Equipment Name: 731 Solids Electrical Building HVAC

Location: South wall of solids electrical building, outside

Unit Process: 700 – Solids Treatment

Description: Climate control unit for the solids electrical building

Photos:

731 Solids Electrical Building HVAC

Condition (1-5)	1
Criticality (1-4)	2
Serviceability (1-4)	1

Type	-
Quantity	1
Manufacturer	Bard
Model	-
Serial No.	-
Motor HP	-
Age	-
Flow	-

Equipment Name: 732 Solids Electrical Building Control Panel

Location: Solids Electrical Building

Unit Process: 700 – Solids Treatment

Notes: Solids Electrical CP - remote I/O to secondary process building. Second Photo: Mod bus is second ethernet connection from microturbines. It appears that there are two processors pulling data out of RIO rack. Office and admin computers should be on separate network

Photos:

732 Solids Electrical Building Control Panel

Condition (1-5)	1
Criticality (1-4)	2
Serviceability (1-4)	1

Type	
Quantity	
Manufacturer	AB
Model	
Serial No.	
Motor HP	
Age	
Flow	

Equipment Name: 733 Solids Electrical Building MCC

Location: Solids Electrical Building

Unit Process: 700 – Solids Treatment

Description: Appears to be in good condition. It needs 5yr maintenance.

Photos:

733 Solids Electrical B

Condition (1-5)	1
Criticality (1-4)	2
Serviceability (1-4)	2

Type	
Quantity	1
Manufacturer	AB
Model	Centerling 2100
Serial No.	
Primary Voltage	
Age	
Flow	600 A main feeder from Secondary Process Bldg

Equipment Name: 734 Solids Electrical Building Power Panel

Location: Solids Electrical Building

Unit Process: 700 – Solids Treatment

Description:

Photos:

734 Solids Electrical Building Power Panel

Condition (1-5)	
Criticality (1-4)	
Serviceability (1-4)	

Type	
Quantity	1
Manufacturer	Seimens
Model	
Serial No.	
Motor HP	
Age	
Flow	

Equipment Name: 741 Gas Handling Room

Location: Connected to primary digester complex on eastern side

Unit Process: 700 – Solids Treatment

Description: All digester gas from primary and secondary digesters comes through this room where it is either sent to cogen or to the waste flare.

Photos:

741 Gas Handling Room

Condition (1-5)	1
Criticality (1-4)	4
Serviceability (1-4)	1

Type	Brick faced concrete structure
Quantity	1
Manufacturer	-
Model	-
Serial No.	-
Motor HP	-
Age	6yr
Flow	-

Equipment Name: 742 Gas Handling Equipment

Location: Gas handling room

Unit Process: 700 – Solids Treatment

Description: All of the piping and components of the gas handling room. First photo is a small sedimentation basin. Second photo shows the pressure regulator.

Photos:

742 Gas Handling Equipment

Condition (1-5)	1
Criticality (1-4)	4
Serviceability (1-4)	1

Type	Misc
Quantity	-
Manufacturer	-
Model	-
Serial No.	-
Motor HP	-
Age	6yr
Flow	-

Notes: The operators wish to add a heat exchanger to the pipe in the third picture. This heat exchanger would be run off the hot water loop. The intention is to heat the gas to prevent freezing of the Iron Sponges.

The current gas meter needs to be replaced. The intent is to also move it to the flare feed shown in the fourth photo.

Equipment Name: 743 Gas Flow Meter

Location: Gas handling room south wall

Unit Process: 700 – Solids Treatment

Description: Mid-size, blue and grey meter used to meter digester gas flow to cogen.

Photos:

743 Gas Flow Meter

Condition (1-5)	3
Criticality (1-4)	1
Serviceability (1-4)	1

Type	Type 4x
Quantity	1
Manufacturer	Endress Hauser
Model	651-20AA0AD1N1BABA
Serial No.	F1000102000
Motor HP	1
Age	5yr
Flow	-

Notes: Meter is not specifically designed for methane, and it should be replaced.

Equipment Name: 751 FOG Receiving Station

Location: 5ft south of primary digester mixing building

Unit Process: 700 – Solids Treatment

Description: This pipe assembly is where trucks tie in to to offload FOG. This station includes the FOG screen and rock trap. City does not receive FOG often.

Photos:

751 FOG Receiving Station

Condition (1-5)	1
Criticality (1-4)	1
Serviceability (1-4)	1

Equipment Name: 752 FOG Receiving Pump

Location: Primary Mixing Building

Unit Process: 700 – Solids Treatment

Description: This assembly pumps FOG from the receiving assembly into the FOG storage tank.

Photos:

752 FOG Receiving Pump

Condition (1-5)	1
Criticality (1-4)	1
Serviceability (1-4)	1

Type	Chop-Flow pump
Quantity	1
Manufacturer	Wemco
Model	CFV2 6X4
Serial No.	110W08501-01
Motor HP	5
Age	6YR
Flow	300

Notes: This pump has no suction capacity. Because it is not a flooded suction, it loses prime often. The controls are located on the outer east side of the building. In order for the pump to be observed and run at the same time, there needs to be two people.

Equipment Name: 753 FOG Metering Pump

Location: Primary digester building

Unit Process: 700 – Solids Treatment

Description: This pump meters FOG as it moves from the FOG tank into primary digestion

Photos:

753 FOG Metering Pump

Condition (1-5)	1
Criticality (1-4)	1
Serviceability (1-4)	2

Type	Progressive cavity pump
Quantity	1
Manufacturer	Seepex
Model	BN- 10-6LS
Serial No.	834271.2
Motor HP	2
Age	4
Flow	0.132-2200

Equipment Name: 754 FOG Mixing Pump

Location: Basement of primary digestion building

Unit Process: 700 – Solids Treatment

Description: These two pumps are used to continually mix the FOG within the storage tank, and they run the FOG through the FOG heat exchanger.

Photos:

754 FOG Mixing Pump

Condition (1-5)	2
Criticality (1-4)	2
Serviceability (1-4)	2

Type	Centrifugal
Quantity	2
Manufacturer	Wemco-Hidrostal
Model	D4K-HS-D0W 4x4
Serial No.	11DW08502-03
Motor HP	5
Age	6yr
Flow (gpm)	340

Equipment Name: 755 FOG Storage Tank

Location: Loading dock south of primary digester building

Unit Process: 700 – Solids Treatment

Description: Concrete tank halfway outside halfway inside primary digester building.

Photos:

755 FOG Storage Tank

Condition (1-5)	1
Criticality (1-4)	1
Serviceability (1-4)	3

Type	Concrete Tank
Quantity	1
Manufacturer	-
Model	-
Serial No.	-
Motor HP	-
Age	-
Flow	-

Notes: Concrete columns accumulate solids. Mixing is minimal. More mixing is desired but it is low priority. Level transducer does not work well.

Equipment Name: 756 FOG Heat Exchanger

Location: Basement of primary digester building

Unit Process: 700 – Solids Treatment

Description: Heat exchanger that transfers heat from the hot water loop the FOG.

Photos:

756 FOG Heat Exchanger

Condition (1-5)	2
Criticality (1-4)	1
Serviceability (1-4)	3

Type	-
Quantity	1
Manufacturer	Bell and Gosset
Model	%BY504500058000
Serial No.	158834-02
Motor HP	-
Age	6yr
Flow	-

Notes: This heat exchanger has problems. The holes are easilly plugged, there are no controls beyond on/off meaning there is no temp control, and servicing is difficult.

Equipment Name: 760 Secondary Digester Complex

Location: Between secondary anaerobic digesters

Unit Process: 700 – Solids Treatment

Description: The pipe network that connects the secondary digesters and facilitates mixing, waste gas discharge, supernatant removal, etc.

Photos:

760 Secondary Digester Complex

Condition (1-5)	5
Criticality (1-4)	3
Serviceability (1-4)	3

Notes: The secondary digester piping is of non standard size, and there are several frozen valves. Supernatant lines are inoperable. Mixing needs improvement. Laundry room area adjacent to complex could be used for expansion.

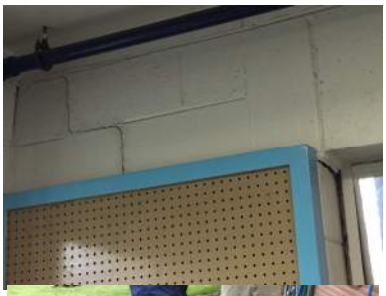
Equipment Name: 761 Secondary Digester Structure

Location: Central Plant

Unit Process: 700 – Solids Treatment

Description: Two concrete tanks with floating covers. Receives sludge from primary digestion.

Photos:



761 Secondary Digester Structure

Condition (1-5)	2
Criticality (1-4)	3
Serviceability (1-4)	2

Type	Brick-faced concrete stucture
Quantity	2
Manufacturer	-
Model	-
Serial No.	-
Motor HP	-
Age	65yr
Flow	-

Notes: Clear cracking in the façade of the building which could be indicative of structural deficiencies. There has been differential settlement between the pavement and the secondary digester complex such that water can freely drain through the cracks. The location of this occurance can be seen in the fourth photo. The North side digester also has some cracks in the facade, yet the walls and floor appear to be in solid condition.

Equipment Name: 762 North Secondary Digester Floating Cover

Location: North Secondary digester

Unit Process: 700 – Solids Treatment

Description: Hollow steel covers that float on top of the sludge in the north secondary digester

Photos:

762 North Secondary Digester Floating Cover

Condition (1-5)	3
Criticality (1-4)	3
Serviceability (1-4)	3

Type	Hollow Steel Cover
Quantity	2
Manufacturer	-
Model	-
Serial No.	-
Motor HP	-
Age	-
Flow	-

Notes: City recently had lid removed for tank interior inspection.

Equipment Name: 763 Secondary Digester Mixing Pump

Location: Secondary digester building

Unit Process: 700 – Solids Treatment

Description: Sludge pump designed to move sludge between secondary digestion tanks.

Photos:

763 Secondary Digester Mixing Pump

Condition (1-5)	1
Criticality (1-4)	4
Serviceability (1-4)	1

Type	Centerfugal
Quantity	1
Manufacturer	Wemco-Hidrostal
Model	D4K-HS-D0K 4K4
Serial No.	110 W08502-04
Motor HP	7.5
Age	6yr
Flow	310

Notes: There is a single mixing pump and it is manually operated. Operators would like automatic operation.

Equipment Name: 764 Secondary Digester Boiler

Location: Secondary digestion building

Unit Process: 700 – Solids Treatment

Description: Secondary boiler used in conjunction with the cogen system and primary boiler. Adds heat to the hot water loop providing heat for secondary digestion.

Photos:

764 Secondary Digester Boiler

Condition (1-5)	4
Criticality (1-4)	3
Serviceability (1-4)	4

Type	Gas Boiler
Quantity	1
Manufacturer	HB Smith
Model	Series 28
Serial No.	-
Motor HP	-
Age	65yr
Flow	-

Notes: There are constant issues with this boiler. It needs to be replaced.

Equipment Name: 765 Secondary Digester Boiler Water Pump

Location: Secondary digester building

Unit Process: 700 – Solids Treatment

Description: Small pump designed to boost the circulation of water through the secondary digestion building.

Photos:

765 Secondary Digester Boiler Water Pump

Condition (1-5)	4
Criticality (1-4)	2
Serviceability (1-4)	3

Type	Cartrage Circulator
Quantity	1
Manufacturer	Taco
Model	0012-F4-2
Serial No.	-
Motor HP	0.125 (1/8)
Age	65
Flow	0-31

Notes: Pump is old and near the end of its useful life.

Equipment Name: 766 Secondary Digester Heat Exchanger

Location: Secondary digester building

Unit Process: 700 – Solids Treatment

Description: Small heat exchanger in the secondary digestion building. It takes heat from the hot water loop and imparts it into the secondary digester sludge.

Photos:

766 Secondary Digester Heat Exchanger

Condition (1-5)	3
Criticality (1-4)	3
Serviceability (1-4)	3

Type	Spiral Heat Exchanger
Quantity	1
Manufacturer	Alfa-Laval
Model	1-H
Serial No.	20803
Motor HP	-
Age	25
Flow	-

Notes: There are some failures with the hot water flow control, but the operators are able to throttle valves to provide some control of the heat.

Equipment Name: 767 Secondary Digester Gas Flow Meter

Location: Secondary digester building

Unit Process: 700 – Solids Treatment

Description: Gas meter which quantifies the amount of digester gas coming out of the secondary digester process.

Photos:

767 Secondary Digester Gas Flow Meter

Condition (1-5)	1
Criticality (1-4)	1
Serviceability (1-4)	2

Type	NEMA/4x
Quantity	1
Manufacturer	Endress Hauser
Model	-
Serial No.	-
Motor HP	-
Age	6yr
Flow	-

Equipment Name: 780 Digester Gas Flare

Location: 150 ft north of the gas handling room

Unit Process: 700 – Solids Treatment

Description: Several pipes emanating from a small shed. One pipe is connected to the digester gas and the other is connected to a natural gas line to ensure constant operation. The flare is intended to burn waste digester gas.

Photos:

780 Digester Gas Flare

Condition (1-5)	3
Criticality (1-4)	2
Serviceability (1-4)	2

Notes: The flare has some rust and chipping paint along one of the feed pipes. Flare should be replaced. The valve shed is old, but the general condition is decent.

Equipment Name: 785 Dewatering Building

Location: Southern most building on-site

Unit Process: 700 – Solids Treatment

Description: The building which houses all dewatering equipment.

Photos:

785 Dewatering Building

Condition (1-5)	1
Criticality (1-4)	2
Serviceability (1-4)	1

Type	Brick-faced Concrete Structure
Quantity	1
Manufacturer	-
Model	-
Serial No.	-
Motor HP	-
Age	6yr
Flow	-

Notes: Currently have electric heat, but it is grossly inadequate. The building needs either natural gas or hot water heating.

The building has an operator's lab in the corner and is missing an OSHA appvd eyewash station.

Equipment Name: 786 Dewatering Press

Location: Dewatering Building

Unit Process: 700 – Solids Treatment

Description: Screw press produces approx 18% solids

Photos:

786 Dewatering Press

Condition (1-5)	1
Criticality (1-4)	1
Serviceability (1-4)	1

Type	Screw Press
Quantity	1
Manufacturer	FKC CO
Model	SHX-1050 X 5500 L
Serial No.	M-2622
Motor HP	3
Age	6yr
Flow	-

Notes: Opening through wall for solids deposition outside leaks when it rains. Access to the upper levels of the press is unsafe, need engineered platform.

Equipment Name: 787 Dewatering Press Feed Pumps

Location: Dewatering Building

Unit Process: 700 – Solids Treatment

Description: Pumps that feed the screw press

Photos:

787 Dewatering Press Feed Pumps

Condition (1-5)	1
Criticality (1-4)	2
Serviceability (1-4)	1

Type	CL 390
Quantity	2
Manufacturer	Borger
Model	VFGCCCCEA5N
Serial No.	-
Motor HP	3
Age	6yr
Flow	-

Notes: These pumps are the same size as the plant sludge pump and are too big.

Equipment Name: 788 Dewatering Polymer System

Location: Dewatering Building

Unit Process: 700 – Solids Treatment

Description: Large polymer tank. This process feeds polymer into the dewatering system to induce better dewatering percentages.

Photos:

788 Dewatering Polymer System

Condition (1-5)	2
Criticality (1-4)	2
Serviceability (1-4)	2

Type	-
Quantity	1
Manufacturer	Several
Model	-
Serial No.	-
Motor HP	-
Age	6yr
Flow	0.124 (varies)

Notes: There are issues with the metering system. The operators have reconfigured the pumps to provide a more reliable system. There are still issues present.

The actuator valve, shown in the upper left corner of photo 2, has had issues with corrosion in the past. The valve has since been replace with a plastic model. So far, no issues.

All piping is sub-grade. Operators would like this brought above grade to allow for reconfiguration and optimization.

Equipment Name: 789 Dewatered Solids Deposition

Location: South side of dewatering building

Unit Process: 700 – Solids Treatment

Description: A conveyor carries the dried solids out of the dewatering building and deposits it on the ground outside

Photos:

789 Dewatered Solids Deposition

Condition (1-5)	3
Criticality (1-4)	2
Serviceability (1-4)	2

Type	-
Quantity	1
Manufacturer	-
Model	-
Serial No.	-
Motor HP	-
Age	6yr
Flow	-

Notes: The area shown in the second photo is directly behind the dewatering building where the dewatered solids are deposited. This area needs better accessibility for a vac/sweeper truck, including a washdown area.

The ecoblocks that delineate this area tend to catch on the loader's bucket. There is clear damage to the wall.

Equipment Name: 795 Sludge Drying Beds

Location: Southern-most operation on-site

Unit Process: 700 – Solids Treatment

Description: Large, asphalt lined basins designed to store and dry sludge through passive evaporation. Operation tends to only occur in the summer months when it is dry.

Photos:

795 Sludge Drying Beds

Condition (1-5)	3
Criticality (1-4)	3
Serviceability (1-4)	2

Type	-
Quantity	5 + Eastern Basin
Manufacturer	-
Model	-
Serial No.	-
Motor HP	-
Age	48 - 65yr
Flow	-

Notes: The asphalt is in decent shape in flat areas, but equipment scrapes it in the vertical areas in the eastern basin. The concrete walls are in bad shape. There are leaks in the on the southern side of the basins, as shown in the second photo. The eastern basin has sloping walls making it difficult for the operators to remove the dry solids without damaging the basin. Valves between basins are present for basin selection, are hard to operate, and some do not work.

Equipment Name: 811 Hot Water Pumps

Location: Basement of primary digester complex

Unit Process: 800 – Miscellaneous Site Utility Systems

Description: Two red pumps running in parallel. These are the primary pumps meant to circulate hot water through the plant.

Photos:

811 Hot Water Pumps

Condition (1-5)	3
Criticality (1-4)	3
Serviceability (1-4)	2

Type	Centrifugal
Quantity	2
Manufacturer	Bell & Gosset
Model	2x9.5 9.258F
Serial No.	PV3319-2 F11
Motor HP	5
Age	6yr
Flow	125

Equipment Name: 812 Primary Boiler

Location: Upper level of primary digester complex

Unit Process: 800 – Miscellaneous Site Utility Systems

Description: Auxillery unit which adds heat to hot water loop when cogen is offline. This unit is located in the primary digester complex.

Photos:

812 Primary Boiler

Condition (1-5)	1
Criticality (1-4)	2
Serviceability (1-4)	2

Type	-
Quantity	1
Manufacturer	Parker Boiler
Model	-
Serial No.	60494
Motor HP	N/A
Age	6yr
Flow	N/A

Notes: This boiler is the auxillery water heating unit for the primary digester. Not connected to SCADA.

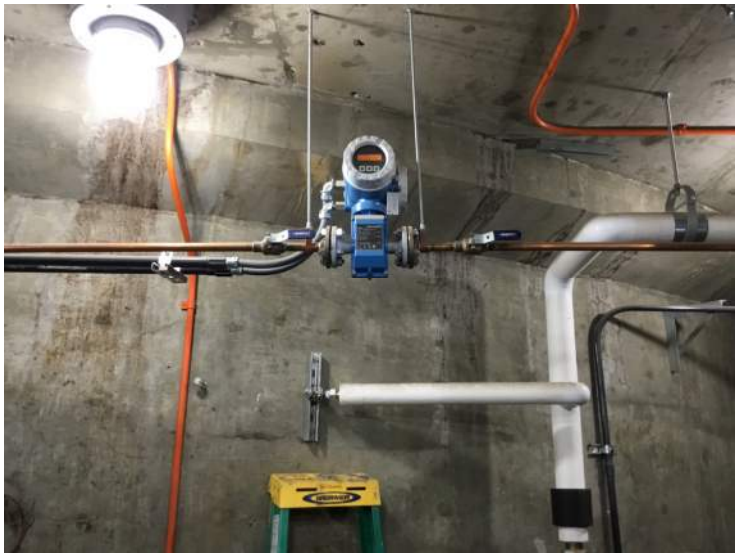
Equipment Name: 813 Boiler Gas Meter

Location: Top floor primary digester complex

Unit Process: 800 – Miscellaneous Site Utility Systems

Description: Blue and grey apperatus attached to small diameter copper pipe. It is supported on both sides to the celing. This unit meters gas as it is fed to the primary digester boiler.

Photos:



813 Boiler Gas Meter

Condition (1-5)	1
Criticality (1-4)	1
Serviceability (1-4)	1

Type	NEMA/Type4x
Quantity	1
Manufacturer	Endress Hauser
Model	-
Serial No.	-
Motor HP	N/A
Age	6yr
Flow	N/A

Equipment Name: 814 Washdown Heat Exchanger

Location: Primary digester complex

Unit Process: 800 – Miscellaneous Site Utility Systems

Description: Small plate-style heat exchanger which transfers heat from the closed hot water loop to the utility water system allowing for heated washdown water.

Photos:

814 Washdown Heat Exchanger

Condition (1-5)	1
Criticality (1-4)	1
Serviceability (1-4)	2

Type	Plate-Style Heat Exchanger
Quantity	1
Manufacturer	Bell and Gossett
Model	P20
Serial No.	158834-01
Motor HP	N/A
Age	6yr
Flow	N/A

Notes: Operators like this style of heat exchanger. Few problems, heat transfer is regulated by adding/removing plates from the system.

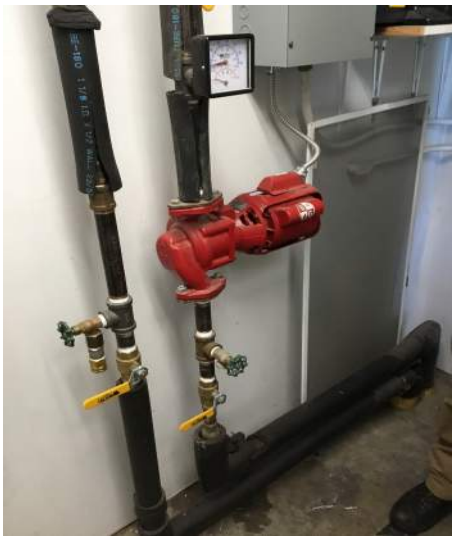
Equipment Name: 815 Admin Building Hot Water Pumps

Location: Admin building

Unit Process: 800 – Miscellaneous Site Utility Systems

Description: Booster pump which ensures proper flow and pressure to the admin building hot water system.

Photos:



815 Admin Building Hot Water Pumps

Condition (1-5)	2
Criticality (1-4)	2
Serviceability (1-4)	2

Type	Booster Pump
Quantity	1
Manufacturer	Bell & Gossett
Model	Series HV
Serial No.	102 210
Motor HP	0.167 (1/6)
Age	-
Flow	-

Equipment Name: 830 Utility Water System

Location: Dechlorination Building

Unit Process: 800 – Miscellaneous Site Utility Systems

Description: Three parallel pumps designed to take chlorinated water from the chlorine contact basin and distribute it through the plant.

Photos:

830 Utility Water System

Condition (1-5)	1
Criticality (1-4)	2
Serviceability (1-4)	1

Type	CR32-6-2 E-G-A-E-KUBE
Quantity	3
Manufacturer	Grundfos
Model	A97690656-P11022262
Serial No.	10-06 03C
Motor HP	25
Age	6 yr
Flow	158.5

Model	A97690656-P11022258
Serial No.	10-06-03A
Motor HP	25
Age	6 yr
Flow	158.5

Model	A97690656-P11022259
Serial No.	10-06 03B
Motor HP	25
Age	6 yr
Flow	158.5

Notes: The UT water pumps are on a skid that is hard to maintain and modify. System is lacking valves and loops that would allow isolation when necessary. Pressure defficiencies at the Headworks screens result in increased manual maintenance and decreased efficiency. Pressure surges occur at headworks.

Equipment Name: 832 Utility Water Bladder Tank

Location: Dechlorination Building

Unit Process: 800 – Miscellaneous Site Utility Systems

Description: Pressurized tank which ensures constant pressure through the utility water line.

Photos:

832 Utility Water Bladder Tank

Condition (1-5)	1
Criticality (1-4)	2
Serviceability (1-4)	1

Equipment Name: 833 Utility Water System Filter

Location: Dechlorination Building

Unit Process: 800 – Miscellaneous Site Utility Systems

Description: Two self-contained filtration units that filter water taken off of the chlorine contact basin.

Photos:

833 Utility Water System Filter

Condition (1-5)	3
Criticality (1-4)	2
Serviceability (1-4)	1

Type	-
Quantity	-
Manufacturer	Mueller
Model	-
Serial No.	-
Motor HP	-
Age	-
Flow	-

Notes: Operators would like a water meter in this network to track UT water usage. Current UT water system pumps and then filters the water.

Equipment Name: 850 Cogeneration - Iron Sponge

Location: Directly east of the primary digester complex

Unit Process: 800 – Miscellaneous Site Utility Systems

Description: The iron sponge consists of two large, insulated tanks that are grey in color. Their primary use is to filter out non-ideal constituants of the digester gas allowing for a cleaner burn.

Photos:

850 Cogeneration - Iron Sponge

Condition (1-5)	2
Criticality (1-4)	3
Serviceability (1-4)	2

Type	
Quantity	2
Manufacturer	Morfab Company
Model	
Serial No.	
Motor HP	-
Age	6yr
Flow	-

Equipment Name: 850 Cogeneration - Gas Chiller

Location: Within conditioning system complex

Unit Process: 800 – Miscellaneous Site Utility Systems

Description: Silver metal cylinder designed to take partially conditioned gas and reduce the overall temperature densifying the gas

Photos:

850 Cogeneration - Gas Chiller

Condition (1-5)	1
Criticality (1-4)	2
Serviceability (1-4)	2

Type	-
Quantity	1
Manufacturer	Elanco Inc
Model	MO65-24-O-V
Serial No.	IE45399284B
Motor HP	N/A
Age	6yr
Flow	N/A

Equipment Name: 850 Cogeneration - Blower

Location: Conditioning System Complex

Unit Process: 800 – Miscellaneous Site Utility Systems

Description: Small silver construct designed to pressurize conditioned gas for delivery to the microturbines

Photos:

850 Cogeneration - Blower

Condition (1-5)	1
Criticality (1-4)	4
Serviceability (1-4)	1

Type	Centrifugal Blower
Quantity	1
Manufacturer	Atlantic Blowers
Model	AB-602E
Serial No.	2242SL
Motor HP	5
Age	6yr
Flow	N/A

Equipment Name: 850 Cogeneration - Blower

Location: Conditioning System Complex

Unit Process: 800 – Miscellaneous Site Utility Systems

Description: Small silver construct designed to pressurize conditioned gas for delivery to the microturbines

Photos:

850 Cogeneration - Blower

Condition (1-5)	1
Criticality (1-4)	4
Serviceability (1-4)	1

Type	Centrifugal Blower
Quantity	1
Manufacturer	Atlantic Blowers
Model	AB-602E
Serial No.	2242SL
Motor HP	5
Age	6yr
Flow	N/A

Equipment Name: 850 Cogeneration - Siloxane Removal system

Location: Conditioning System Complex

Unit Process: 800 – Miscellaneous Site Utility Systems

Description: Small cylindrical equipment designed to remove volatile methylsiloxanes. Removal helps prevent scale build-up on critical equipment in the cogen process

Photos:

850 Cogeneration - Siloxane Removal system

Condition (1-5)	1
Criticality (1-4)	3
Serviceability (1-4)	1

Type	-
Quantity	2
Manufacturer	Morfab Company
Model	-
Serial No.	14279
Motor HP	-
Age	6yr
Flow	-

Equipment Name: 850 Cogeneration - Microturbines

Location: Directly south of solids electrical building, north of conditioning complex

Unit Process: 800 – Miscellaneous Site Utility Systems

Description: Two box-shaped microturbines designed to create electricity and hot water through the burning of conditioned digester gas

Photos:

850 Cogeneration - Microturbines

Condition (1-5)	2
Criticality (1-4)	3
Serviceability (1-4)	1

Type	Microturbine
Quantity	2
Manufacturer	Capstone
Model	65C-BG4-SU00
Serial No.	006351 006355
Motor HP	Max Power Output 65kW
Age	6yr
Flow	N/A

Notes: The first thing that the operators have to check on in the morning are these microturbines. They do not work particularly well. In the two days that we were at the plant there was an issue on the second day. The microturbines are not operating at their full capacity due to lack of gas storage in the system.

Equipment Name: 850 Cogeneration - Waste Heat Radiator

Location: Directly west of the Microturbines

Unit Process: 800 – Miscellaneous Site Utility Systems

Description: Black object designed to radiate any waste heat that is produced from the cogeneration process.

Photos:

850 Cogeneration - Waste Heat Radiator

Condition (1-5)	1
Criticality (1-4)	1
Serviceability (1-4)	1

Type	-
Quantity	1
Manufacturer	Rocore
Model	-
Serial No.	-
Motor HP	-
Age	6yr
Flow	-

Notes: Currently not in use. They need a 50 psi cap, but this piece only has an 8 psi cap. Turbines automatically radiate waste heat as part of their normal operation.

Equipment Name: 911 Admin Building HVAC

Location: SW corner of Admin Building

Unit Process: 900 – Miscellaneous Site Buildings

Description: Dual furnaces with two AC units outside on the south wall of the building.

Photos:

911 Admin Building HVAC

Condition (1-5)	3
Criticality (1-4)	2
Serviceability (1-4)	3

Type	-
Quantity	-
Manufacturer	-
Model	-
Serial No.	-
Motor HP	-
Age	48yr
Flow	-

Notes: The furnaces are aging. The space where they are located is small.

Equipment Name: 915 Laboratory

Location: Attached to Admin Building

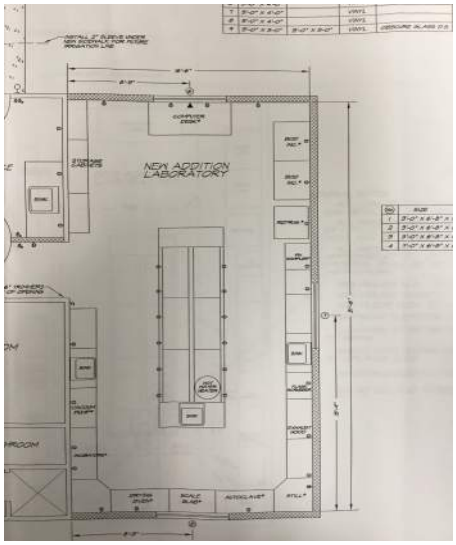
Unit Process: 900 – Miscellaneous Site Buildings

Description: The laboratory is a 16.5'x31.5' workspace with a secondary, detached space in a nearby room. It is lined with narrow counter tops and low cabinetry. It contains a central island which takes up much of the space.

Photos:

915 Laboratory

Condition (1-5)	3
Criticality (1-4)	2
Serviceability (1-4)	3



Type	-
Quantity	-
Manufacturer	-
Model	-
Serial No.	-
Motor HP	-
Age	48yr
Flow	-

Notes: Eyewash station is not OSHA approved. The counterspace is too narrow except for the one in the second photo. There is no lip on the countertops. Any spills that occur will continue onto the floor which presents a safety issue. There is no chemical shower.

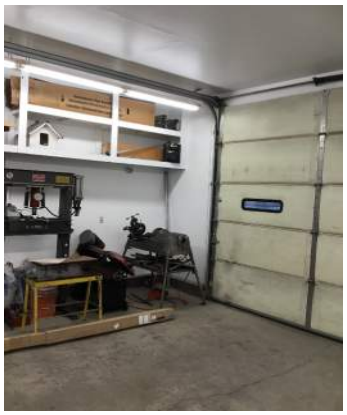
Equipment Name: 920 Welding and Parts Shop

Location: South of Primary Digestor

Unit Process: 900 – Miscellaneous Site Buildings

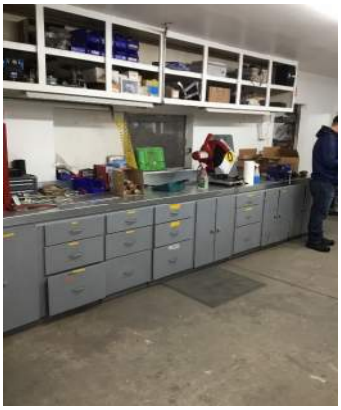
Description: Includes the welding shop, parts storage, and other miscellaneous storage.

Photos:



920 Welding and Parts Shop

Condition (1-5)	3
Criticality (1-4)	1
Serviceability (1-4)	1



Type	-
Quantity	-
Manufacturer	-
Model	-
Serial No.	-
Motor HP	-
Age	-
Flow	-

Notes: Constructed in 3 separate iterations/add-ons resulting in uneven flooring in some areas. Heater is broken and would need to be fixed to accommodate vac truck storage or metal shop in the future. Air compressor is loud and should be moved outside. Parts storage needs improvement - possible move to a separate, larger building where parts stored in other buildings can also be consolidated with these materials. Possibly turn current parts room into woodworking space. Operators would like to consolidate safety equipment storage, parts storage, and oil storage where oil is currently (chemical storage bldg) Possibly move chemical storage to this building to accommodate a containment system.

Equipment Name: 930 Main Shop

Location: Adjacent to Machine Shed

Unit Process: 900 – Miscellaneous Site Buildings

Description: Equipment storage shed currently holds miscellaneous equipment and the City's vacuum truck.

Photos:

930 Main Shop

Condition (1-5)	2
Criticality (1-4)	1
Serviceability (1-4)	1

Type	-
Quantity	-
Manufacturer	-
Model	-
Serial No.	-
Motor HP	-
Age	-
Flow	-

Notes: Potentially could absorb the adjacent bay and expand the building to be a larger, enclosed area.

Equipment Name: 940 Machine Shed

Location: Adjacent to Main Shop

Unit Process: 900 – Miscellaneous Site Buildings

Description: Bays for vehicle and miscellaneous equipment storage.

Photos:

940 Machine Shed

Condition (1-5)	2
Criticality (1-4)	1
Serviceability (1-4)	1

Type	-
Quantity	-
Manufacturer	-
Model	-
Serial No.	-
Motor HP	-
Age	-
Flow	-

Notes: Storing parts and wood in addition to plant trucks. Eventually would like to pour concrete floors in three bays without concrete flooring. Currently only the northern bay is concreted. Addition of roll up doors would allow for insulation/heat so that vac truck could be stored here. Idealy will run airline to welding shop.

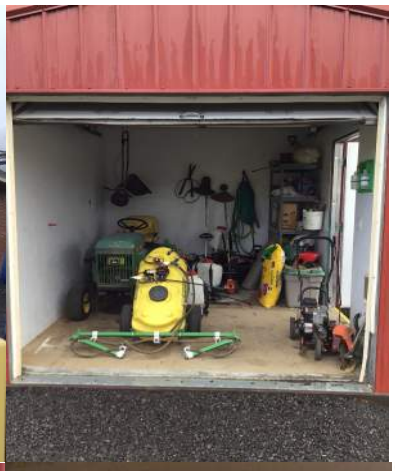
Equipment Name: 950 Lawn Equipment Shed

Location: South of East Secondary Clarifier

Unit Process: 900 – Miscellaneous Site Buildings

Description: Used to be dechlorination building but now is used for general lawn equipment storage.

Photos:


Equipment Name: 960 Chemical Storage Building

Location: South of East Secondary Clarifier

Unit Process: 900 - Miscellaneous Site Buildings

Description: This building currently houses chemicals like PAX14, Deformer, Polymer, Ferric acid, etc. Usually stores TWO totes max of each chemical. Houses some safety equipment and spare parts as well.

Photos:

960 Chemical Storage Building

Condition (1-5)	3
Criticality (1-4)	2
Serviceability (1-4)	1

Type	-
Quantity	-
Manufacturer	-
Model	-
Serial No.	-
Motor HP	-
Age	-
Flow	-

Notes: Does not have chemical containment installed, as required per safety regulations. A tote stand with containment is available but will not fit in existing building. Building is also lacking a shower and eyewash station. Operators would like to move all safety equipment/parts to this building or a new building in the area, and potentially move the chemicals to a different location. Building has no gutter - roof is leaking and damaging wood.

murraysmith

APPENDIX J
ADA REVIEW TECHNICAL MEMORANDUM

September 19, 2018

mwa architects

SAN FRANCISCO OAKLAND PORTLAND

Memorandum

To: Austin Rambin

From: David Williams

Project/No: Pendleton WTP – 201726.00

This is a review of the existing administrative facilities in regards to compliance with current ADA regulations and a recommendation of improvement options. The code gives priority on improvements starting with site access and progressing in a logical manner to the secondary interior components of universal accessibility.

ADMINISTRATION BUILDING

- Site Access and Parking

  As the roadway to the site is unpaved and the public access contains neither sidewalks nor parking, we are considering the on-site paving adjacent to the front gates as the point of entry and safety refuge.

  While there is a striped entry point in the parking area to the Administration Building, it isn't dedicated or associated with an accessible parking space. The parking area needs to be re-striped to accommodate a van space of 132" wide with a 60" cross stripe painted access aisle to the right side. The accessible space is to have a painted symbol on the pavement and a post mounted sign. The small number of vehicles coming to this site can limit the parking to one van accessible space.

- Building Entrance and Exit

  Sidewalk access from the parking space to the Administration building currently has several issues. To reach the front door it's necessary to either navigate a step or travel a walkway and short ramp that has a 1" lip at the landing. The porch has also settled and created a 1 inch drop outside the front

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door adding to the sill height. The short ramp south of the porch is within the limits to avoid a handrail, but the ramp has settled and created a 1" lip which is not to code. A maximum 1:20 ramp needs to be installed leading to the porch and then level to the front door. No rise or slanted edge threshold over 1/2 inch high is permitted along access route or at accessible doors sills.

- Corridor Passage

  The water fountain is not ADA compliant and partly blocks passage. Several room doors do not have compliant widths.

- Individual Rooms

  The Mechanical Room doesn't have a 3 ft. path and with the electrical and mechanical required setbacks, this area should be restricted to appropriate personnel and not required to be ADA accessible.

  Women's Toilet: The entry door is only 2'-4" and clearly too small. The room in general is too small for clearances or compliant 5 ft. diameter turning space. The fixtures are not compliant and the accessories such as handrails at the toilet, piping protection, towel and toilet paper dispensers are either missing or inappropriately located.

  Men's Locker Rm: The room is missing an ADA locker or ADA bench and doesn't have appropriate door side clearance to the Toilet-Shower Room.

  Men's Toilet-Shower Room: The clearances for fixtures, the toilet stall, the doors and general turning space is inadequate. The heights of the fixtures and toilet accessories are not to code. There are no handrails at the toilet or shower and no piping protection.

<u>OLD CONTROL /LABORATORY BUILDING</u>

- Building Entrance: Only a small rise at door prevents compliant access, easily fixed.

- Individual Rooms

Break Room: The sink is not ADA compliant or cabinets and countertop height.

Toilet Room: The door is too small for entry. No clearances are compliant with a 5 ft. diam. turning space or clearances for the fixtures or door. The toilet is missing handrails and the accessories are installed incorrectly for ADA. The sink should not be a vanity, but an accessible fixture with piping protection, correct height and appropriate mirror.

Women's Locker Room and Shower: The door is too small for entry. The shower is not compliant, there is no ADA locker and the accessories (coat hooks, mirror and shelf) are not located for access. The exterior exit door is lacking handle-side clearance.

Conclusions

1. While access to the administration building involves minor construction, the building layout and the intended uses are largely incapable of meeting the ADA rules without major renovation and expansion. While there is rationale for the Sample Room and Lab to have its ADA access from the front door that is in conflict with lab protocols. All the exterior doors should have ramp access as a matter of safety. The adjoining Break Room and Women's Facilities also are inadequate to meet ADA rules in the same way. This is in addition to the functional and ergonomic inadequacies of both buildings and their current uses.

****

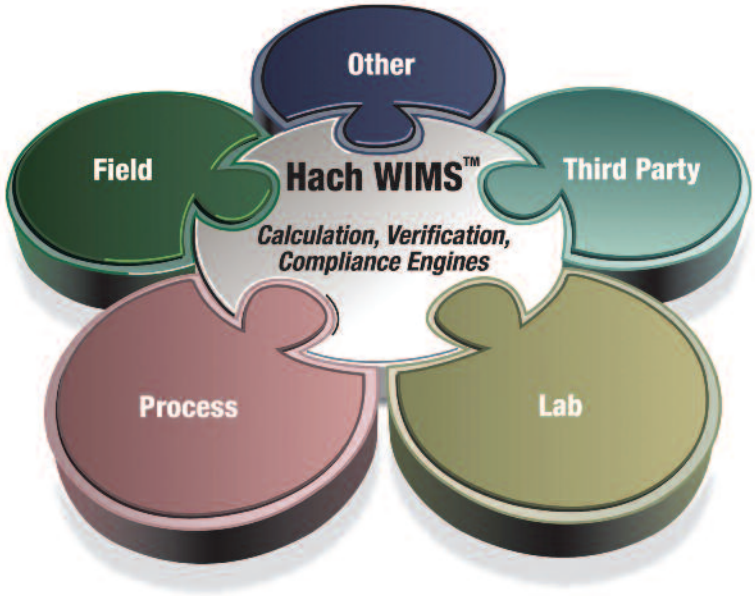
mwa architects

SAN FRANCISCO OAKLAND PORTLAND

murraysmith

APPENDIX K
HACH WIMS REPORTING SOLUTION

HACH WATER INFORMATION MANAGEMENT SOLUTION™ (HACH WIMS™)



Hach Water Information Management Solution (Hach WIMS) brings data from across your drinking water and wastewater systems to a central, secure location for a complete picture of your system helping you to confidently make informed decisions.

Easily Monitor and Manage Operations

- Enter data once into the system to increase data accuracy
- Increase efficiencies by automatically collecting your SCADA, LIMS and other data and storing it in a central, secure database
- Access your data instantly, locally or over the web, to make more informed decisions
- Quickly troubleshoot system upsets, compliance issues and other problems with a large set of tools
- Set up personalized dashboards to monitor key data and gain quick access to reports and graphs.
- The software flags problems so you know exactly where they occurred
- Powerful audit trails allow you to trust your data

Improve Operations to Save Time, Money and Energy

- Easily identify cost reduction opportunities by comparing data from throughout your operation
- Quickly compare data in unique ways to get new perspectives of your operation
- Configure graphs for trend analysis, correlations and control charting.
- Historical records are safely stored and always available

Efficient Reporting and Visualization Saves Valuable Time and Provides Insights

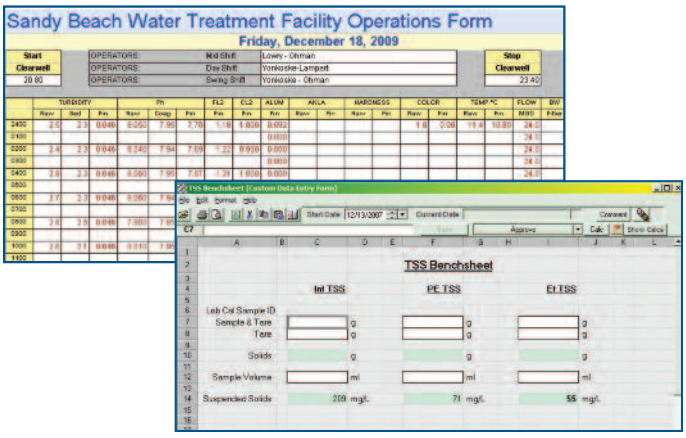
- Preprogrammed EPA and state report templates create paper and electronic regulatory reports (SWTR, DBR, NPDES, DMR, eDMR, MOR, SDWA, CCR, etc)
- Receive automatically scheduled reports on-screen, printed or delivered via email.
- Easily generate accurate business reports and graphs with a few keystrokes
- Over 100 built-in industry-specific formulas allow you to quickly and accurately perform complex calculation and easily handle data qualifiers

Configuration Options

- Configure Online and Multi-user solutions with more users, facilities, LIMS and SCADA interfaces, and enterprise database support to meet your specific needs.
- Add services and training for additional reports, dashboards, forms, etc and to learn how to perform more complex tasks

System Requirements and Ordering Information

- Hach WIMS software runs on Windows-based PC's and supports the latest operating systems
- Hach WIMS comes with a standard SQL database and supports Microsoft SQL server and Oracle databases
- Hach WIMS Online requires an Internet Connection
- For specific information on hardware and software requirements contact us at 1 800 677 0067 or visit us at www.hachwims.com



Data can be entered manually with user-defined data input forms or captured automatically.

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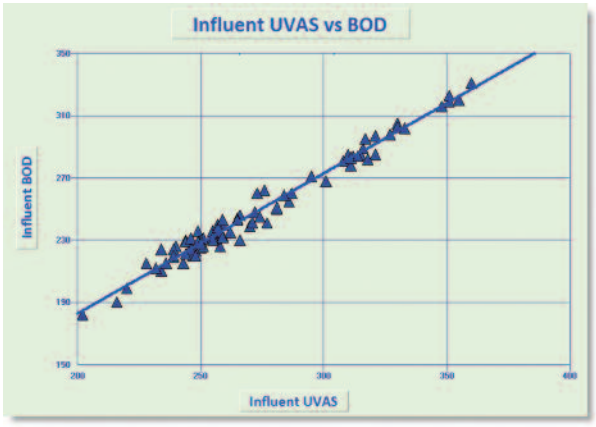
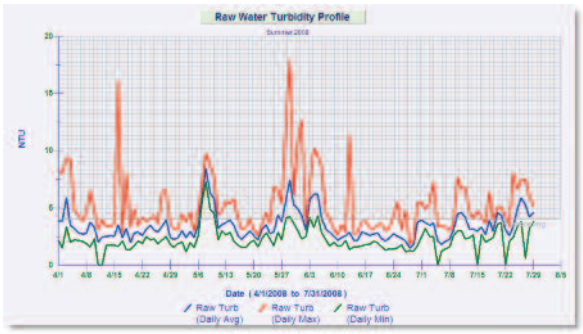
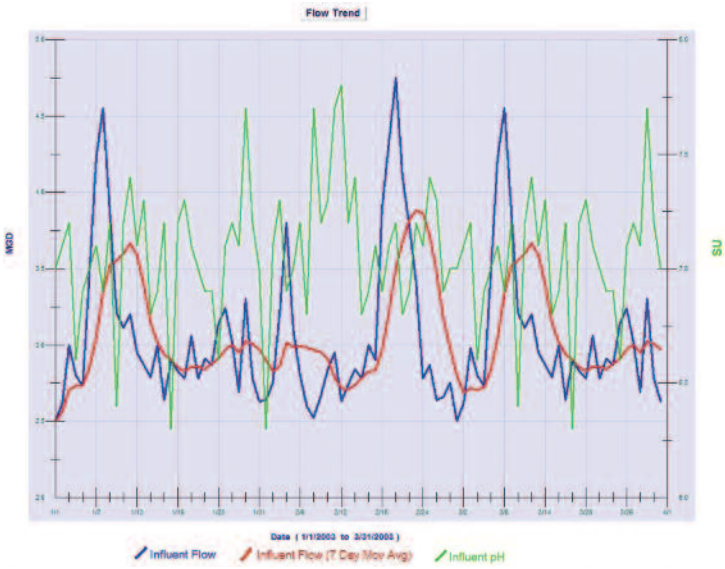
Be Right™







Readily analyze trends, correlations, probabilities and create control charts.

Additional Hach Integrated Information Management Products

Hach WIMS Lab Cal Module

Hach LAB Cal is a water laboratory data management system, specifically designed for drinking water and wastewater providing easy-to-use sample scheduling and tracking tools for effective lab data management. The visual environment takes the complexity out of managing your scheduled samples. Time-saving features, familiar formats, simple workflows, and pricing that is far less than traditional LIMS systems make Hach LAB Cal a very robust and cost-effective solution.

SCADA and LIMS Interfaces for Hach WIMS

Interfaces are available for all water and wastewater industry SCADA and LIMS systems. Hach SCADA and LIMS interfaces transfer data seamlessly and automatically to Hach WIMS.

Hach WIMS Portable Solutions

Hach WIMS Portable solution uses doForms™ on familiar Android, iPhone and iPad devices to allow field staff to collect data from anywhere, anytime.

Services

Hach offers a comprehensive set of services, such as training, programming, installation assistance, set up, configuration, and other specific customer requests to ensure successful use of Hach software.

Training

Hach training can be provided at a Hach Facility, at the customer site, or over the web. Training sessions can be tailored for each customer or provided for multiple customers in a structured classroom environment.

HACH COMPANY World Headquarters: Loveland, Colorado USA

United States: 800-677-0067 tel 970-669-2932 fax iimsales@hach.com
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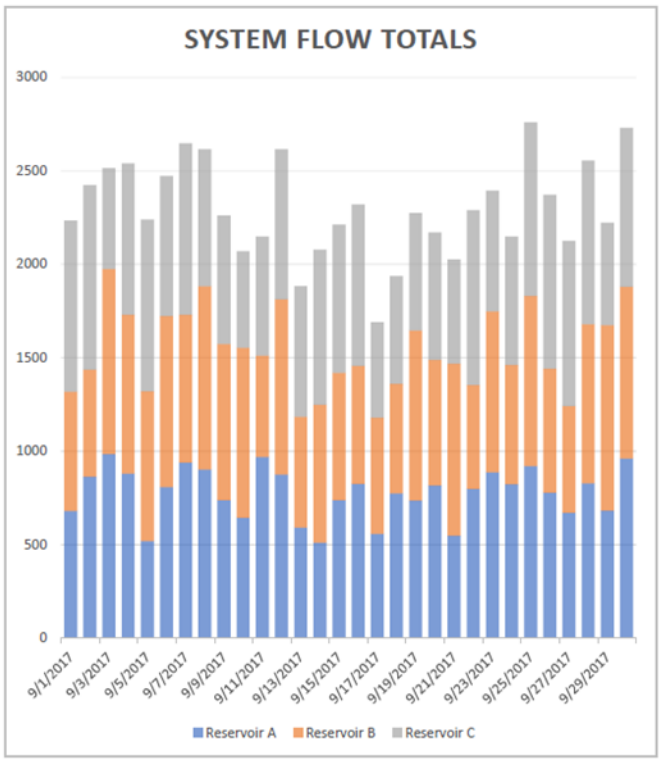
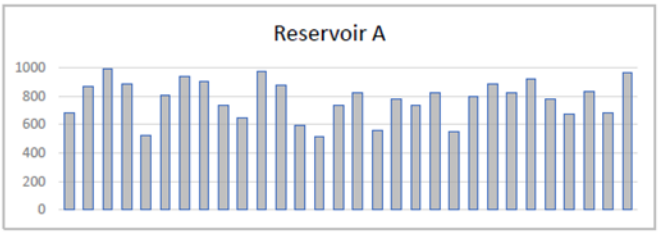
APPENDIX L
NON-PROPRIETARY REPORTING SOLUTION

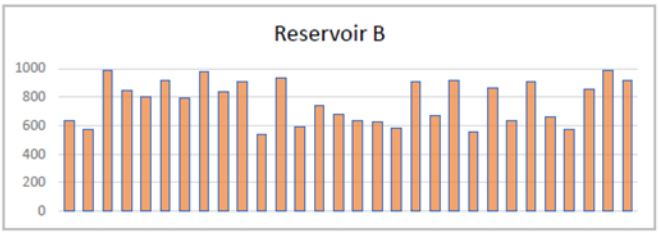
Reporting, Charting, and Dashboard Software for Scada and HMI systems (preliminary plan)

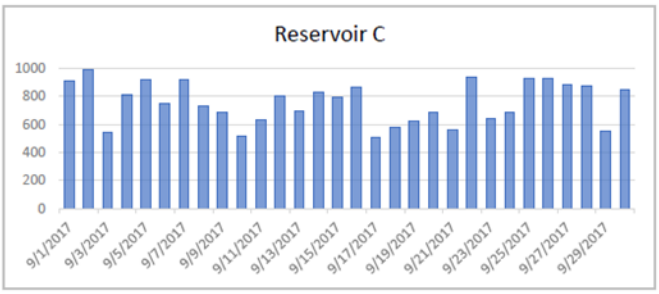
Reports will be "on-demand" based on any tag or any time range when chosen from drop down menus by the operator. No programming or setup is required as the user selects all options from drop-down menus that are filled with tags, descriptions, and data that are read from the current HMI project. No current software package offers this capability "out-of-the-box" (including Wonderware's Historian Server and Historian Client package that costs well over $10,000 or Rockwell's Historian SE / VantagePoint). The custom reporting will offer the following:

- User selectable date range for all reports shown below
- Weekly system flow total consumption report summarized by day
- Monthly system flow total consumption report summarized by day
- Yearly system flow total consumption report summarized by day with top 20 peak days
- Daily report for min/max/avg of all major system flows/levels/pressures on one page
- User selectable down menu for selecting any HMI tag with historical storage for these reports:
    - Daily report summarized by hour for min/max/avg (or) hourly total of one HMI tag
    - Monthly report summarized by hour for min/max/avg (or) hourly total of one HMI tag
    - Monthly report summarized by day for min/max/avg (or) daily total of one HMI tag
    - Yearly report summarized by day for min/max/avg (or) daily total of one HMI tag
    - Yearly report summarized by month for min/max/avg (or) monthly total of one HMI tag
- Reports will be dumped to Microsoft Excel with summary data in a grid with additional pages containing multiple charting styles for the user to choose from.
- Web based reports, charts, and dashboards will be available for workstations, tablets, and phones on the local network. Phase B release will include the ability to access web based reports over the internet.









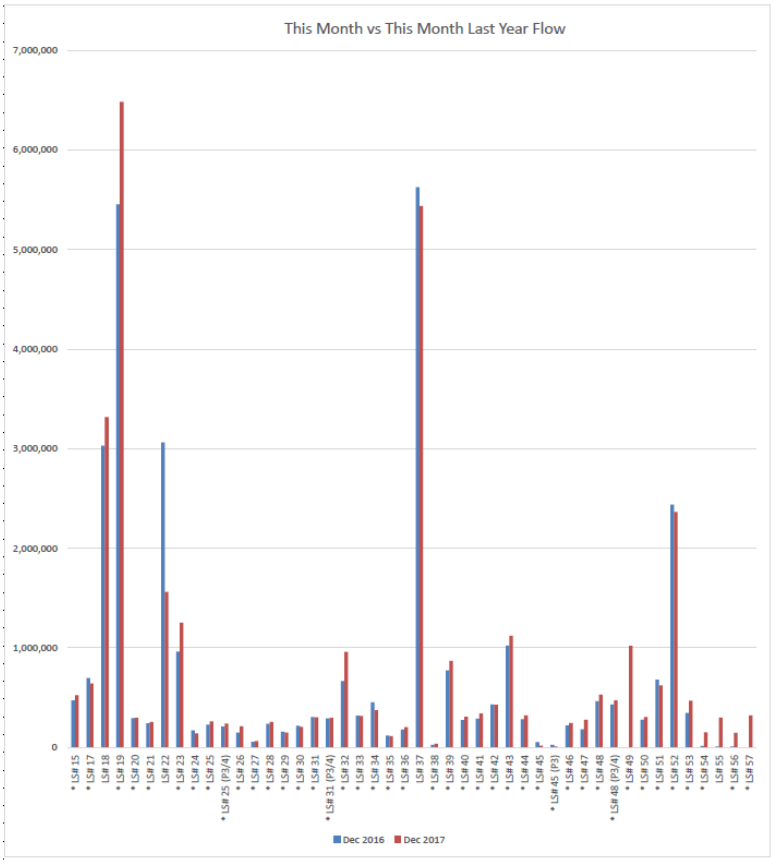
Selectable Max, Min, Avg

_12_AIT_101 pH

North Influent pH

Start Time	End Time
Feb 01 2016 12:00:00 AM	Mar 01 2016 12:00:00 AM

	Max	Avg	Min
2/1/2016	8.60	7.40	7.10
2/2/2016	8.56	7.36	7.06
2/3/2016	8.62	7.42	7.12
2/4/2016	8.59	7.39	7.09
2/5/2016	8.55	7.35	7.05
2/6/2016	8.61	7.41	7.11
2/7/2016	8.58	7.38	7.08
2/8/2016	8.64	7.44	7.14
2/9/2016	8.61	7.41	7.11
2/10/2016	8.67	7.47	7.17
2/11/2016	8.64	7.44	7.14
2/12/2016	8.70	7.50	7.20
2/13/2016	8.67	7.47	7.17
2/14/2016	8.64	7.44	7.14
2/15/2016	8.70	7.50	7.20
2/16/2016	8.67	7.47	7.17
2/17/2016	8.64	7.44	7.14
2/18/2016	8.70	7.50	7.20
2/19/2016	8.67	7.47	7.17
2/20/2016	8.64	7.44	7.14
2/21/2016	8.70	7.50	7.20
2/22/2016	8.67	7.47	7.17
2/23/2016	8.64	7.44	7.14
2/24/2016	8.70	7.50	7.20
2/25/2016	8.67	7.47	7.17
2/26/2016	8.63	7.43	7.13
2/27/2016	8.69	7.49	7.19
2/28/2016	8.66	7.46	7.16
2/29/2016	8.72	7.52	7.22
3/1/2016	8.69	7.49	7.19
3/2/2016	8.75	7.55	7.25
Monthly	8.75	7.45	7.05



Report Month	Report Year
December	2016

Average Levels and Analytical (8:00am cycle)

Date / Time	Effluent Level	Digester 1 Level	Digester 2 Level	Oxi Ditch DO	Oxi Ditch ORP	Digester 1 DO	Digester 1 ORP
12/01/16	1.1	14.9	20.6	1.2	86.0	0.6	269.2
12/02/16	1.0	13.2	20.6	1.3	92.6	0.6	252.3
12/03/16	1.0	12.7	20.7	1.3	97.2	0.5	241.2
12/04/16	1.1	13.8	20.6	1.2	92.3	0.6	213.4
12/05/16	1.1	15.1	20.6	1.2	88.7	0.6	211.5
12/06/16	1.0	16.3	20.6	1.4	90.0	0.2	194.5
12/07/16	1.0	17.6	20.6	1.6	102.2	0.1	146.6
12/08/16	1.0	19.0	20.6	1.1	77.4	0.3	280.6
12/09/16	1.0	18.8	20.7	1.0	79.3	0.3	272.5
12/10/16	1.0	17.1	20.5	1.0	72.5	0.2	299.3
12/11/16	1.0	18.2	20.6	0.9	48.3	0.3	293.3
12/12/16	1.0	19.5	20.6	0.8	28.8	0.4	319.6
12/13/16	1.0	17.8	17.7	0.8	27.0	0.5	350.9
12/14/16	1.0	16.1	18.4	0.9	31.9	0.8	375.9
12/15/16	1.0	16.0	19.9	0.9	34.3	0.9	395.6
12/16/16	1.0	16.9	20.8	0.9	34.1	0.4	350.3
12/17/16	1.0	15.5	20.6	1.1	55.9	0.4	295.2
12/18/16	1.0	16.4	20.5	1.3	75.2	0.3	282.8
12/19/16	1.0	18.2	20.7	1.1	51.4	0.2	225.0
12/20/16	1.0	17.4	20.6	0.9	38.5	0.3	250.6
12/21/16	1.0	16.0	20.6	0.8	28.6	0.5	287.0
12/22/16	1.0	15.6	20.6	0.8	22.7	0.6	317.9
12/23/16	1.0	15.8	20.6	0.7	12.1	0.7	317.8
12/24/16	1.0	17.5	20.7	0.9	18.6	0.3	254.0
12/25/16	1.0	19.0	20.6	1.0	19.9	0.2	183.9
12/26/16	1.0	20.6	20.8	1.1	30.9	0.3	148.3
12/27/16	1.0	21.0	20.9	0.8	23.5	0.2	195.9
Month Total	**1.0**	**16.9**	**20.4**	**1.0**	**54.1**	**0.4**	**267.6**

murraysmith

APPENDIX M
DEQ REVIEW COMMENTS

Austin Rambin

From: LAMB Bonnie <Bonnie.LAMB@state.or.us>
Sent: Wednesday, February 5, 2020 10:25 AM
To: Preston Van Meter; HESSE Todd; DANIELLO Paul
Cc: 'Bob Patterson'; Mark Milne; Kyle Willman; Jo Everano; Jutta Haliewicz; Austin Rambin
Subject: DEQ comments on City of Pendleton WWTRRF Facility Plan Update

Hi all – Please see below for DEQ's comments on the City's Facility Plan Update. Let us know if you have any questions. Thanks.
Bonnie

Bonnie Lamb
CWSRF Project Officer
475 NE Bellevue Dr., Suite 110
Bend, OR 97701-7415
(541) 633-2027
lamb.bonnie@deq.state.or.us

DEQ comments on City of Pendleton WWTRRF Facility Plan Update

General Comments

Permit and compliance items not specifically addressed in the plan.

- As of this writing, the renewed NPDES permit will authorize two surface water outfalls (Umatilla River and McKay Creek) plus a planned recycled water outfall.
- The city needs to plan to conduct a mixing zone study for the two surface water outfalls. The DEQ recommends that that a completed study be submitted *prior to* permit renewal so the data is available for the permit writer to evaluate potential pollutants of concern and to develop effluent limits.

Environmental Review

The CWSRF Facility Plan guidance (https://www.oregon.gov/deq/FilterDocs/FacilitiesPlansGuidelines.pdf) describes the environmental review process, as it pertains to facility planning. If funded by the CWSRF program, the City will need to go through a comprehensive environmental review process, demonstrating compliance with federal cross-cutters. While we do not expect this level of review to be included in a Facility Plan, we would like to see a brief description of the environmental resources present and any anticipated project impacts associated with the selected alternatives. And the recognition that a more thorough environmental review will likely need to be conducted prior to project implementation.

Executive Summary

Page ES-3, Temperature Compliance.

This section references the new court order to prepare new TMDLS in Oregon over the next 8 years, and indicates a completion date for the new Umatilla Temperature TMDL of November 27, 2027. This is incorrect. DEQ currently does not have any plans to revisit the Umatilla Basin TMDL. The TMDLs for the Walla Walla and Willow Creek Subbasins of the Umatilla Basin are the only Umatilla Subbasins that are included in the court settlement. Please correct this information, wherever it appears in the Facility Plan (such as Section 3.1.4), as well as the results this corrected information has on the analyses presented in the Plan.

The schedule has yet to be formalized but it is likely that the Pendleton NPDES permit will be renewed within the next two to five years and that the renewed permit will likely incorporate a compliance schedule for meeting final temperature limits. Concurrent with permit issuance, the present MAO will be terminated.

Per DEQ Water Quality Permitting Policy# WQP-007, the permit writer will evaluate and develop effluent temperature limits that are consistent with current water quality standards. Scenario E from the policy shown below will apply for renewing the Pendleton permit. Scenario D is also included because it is referenced in scenario E.

- **Scenario D. The receiving stream is impaired for temperature and there is a TMDL based on natural conditions criteria (or natural thermal potential).**

For permit renewals, permit writers will determine the thermal loads that are consistent with TMDL waste load allocations and compare it to the thermal loads based on BBNC with the human use allowance of 0.3°C (see OAR 340-041-0028(12)(b)(A)). The more stringent of the two loads must be addressed in the permit. The permit evaluation report should clearly describe how the temperature limits were developed. The additional mixing zone requirements in OAR 340-041-0053(2)(d) also will be applied to the permit.

- **Scenario E: The receiving stream is impaired for temperature and the TMDL was developed and approved with temperature criteria effective before December 2003.**
  Some of these TMDLs include waste load allocations based on site potential or system potential temperatures rather than BBNC. As permits are renewed, DEQ must demonstrate that permits are consistent with current water quality standards. Permits will be consistent with waste load allocations or include effluent limits based on BBNC and human use allowance, as in scenario C or D above.

Page ES-5, Biosolids Management, Paragraph 3.

> *"Future consideration is also recommended to produce Class A Biosolids, as there continues to be concern in Oregon about application of Class B Biosolids given emerging concerns about contaminants like per- and polyfluoroalkyl substances (PFAS) and other contaminants commonly present in municipal biosolids."*

Class A and B are pathogen reduction classifications. We are unclear how/whether changing to Class A treatment would eliminate non-biological pollutants. If Class A solids are produced, then there will be less restrictions and greater flexibility for the biosolids uses.

Page ES-15, Bullet 4, Phase.

> *"Phase 3 (2038-2040) WWTRRF Recycled Water Expansion: Upgrades to produce Class C Recycled Water and implement a water recycling program would be triggered by an update of the Umatilla River Temperature TMDL eliminating the NCC criteria and potentially resulting in a much lower excess thermal load limit than currently anticipated. It is anticipated the Umatilla Temperature TMDL will be updated in the next 8 years, after which new temperature limits would be included in the City's next NPDES permit renewal."*

The city should reprioritize the proposed 18-20 year scheduled implementation of the phase 3 upgrades. As described above, currently DEQ has no plans to revise the Umatilla Basin temperature TMDL. This TMDL was not part of the court settlement.

Section 2

Section 2.3.1 Existing Population. This section and Table 2-4 cite the PSU PRC 2018 Population Report, but include 2017 numbers in the table. There are new numbers that were published in July 1, 2018 (16,810) and July 1, 2019 (17,020). Since the Facility Plan population projections will need to be updated (see next comment), please update the Facility Plan to use the most recent PSU PRC population numbers.

Section 2.3.2 Population Projections. The CWSRF Facility Plan guidance (referenced under General Comments) requires that population projections need to use the PSU population research center numbers and reference the PSU PRC projection, not the values included in the City's Master Plan. The population estimates for Umatilla County can be found here:
https://www.pdx.edu/prc/sites/www.pdx.edu.prc/files/Umatilla_Report_Final.pdf.

Section 3

Section 3.1.2. MAO and Umatilla Mixing Zone Study.

- Department of Environmental Quality, not Dept. of Ecology.
- The dilution factor is described as less (1.3) at the edge of the RMZ than at the ZID (6.2). It looks like these numbers were probably reversed ZID 1.3 and RMZ 6.2.

Section 5

Please add a short assessment of I/I to this section to meet requirements of the CWSRF Facility Plan guidance (referenced under General Comments). This only needs to demonstrate that I/I is not excessive and therefore does not need to be addressed (which implies the WWTP projects are appropriate and not oversized due to I/I issues).

Section 5.2 Definitions: DEQ Guidelines.

The Guidelines for Making Wet-Weather and Peak Flow Projections for Sewage Treatment in Western Oregon (Oregon Department of Environmental Quality 1996) are appropriate for Western Oregon due to rainfall amounts, the type of precipitation and the soils all of which affect runoff characteristics and influences on I/I. This DEQ Western guidance for predicting peak wastewater flow is not appropriate to use for Pendleton.

Section 5.4 Evaluation of Existing WWTRRF Flow Data.

"*Monthly WWTRRF flows are relatively consistent throughout the summer and winter permit seasons. This is different from Western Oregon, where winter season flows are typically higher due to winter rainfall and minimal impacts from summer irrigation on groundwater elevations. Therefore, modification of DEQ Guidelines were required to develop reasonable flow projections for the City of Pendleton in Eastern Oregon*."

While irrigation can have an impact, differences in soils (much more clay soil in the Western Region) and much better drained soils and less precipitation in the Eastern Region result in different relationships between influent flow and precipitation. The flow regimes are different as stated in the Pendleton Facility Plan Update. Guidelines (Western Region) that are not applicable to the Pendleton area should not be modified for use. There is no reason to reference the DEQ Western Region Flow Projection guidelines in the facility plan, as the document itself states how they do not fit the flow regime in Pendleton. Please drop the references to the DEQ Western Region guide and rework the flow projections based on actual flow data, available population data for those flows, and population projections from the PSU PRC. Flow projections should include I/I analysis and a best estimate of I/I contributions to projected flows, e.g. whether I/I is expected to increase with population, remain static or some other basis for estimating total WW flow at the end of the 20 year planning window.

Section 5.5. Current Wastewater Flows

This section discards the flow data from the first half of 2017 because it was "*considerably higher than previous years*". We need to have a much better basis for discarding that data other than that it didn't fit the trend. Update this section with a more defensible rationale for discarding the early 2017 data.

The section on flow projections needs to be reworked removing reference to the DEQ Western region guidance as this is not appropriate (per the methodology "*The method is only applicable where precipitation strongly impacts sewage flows, as in Western Oregon*"). Please discuss with Todd if guidance is needed on an acceptable approach.

Figure 5-1.

This figure should have a note to explain what the cloud represents (discarded data) to accompany the text.

Figure 5-3

Is the period of analysis for this figure 5 years - 2013-2017? With this type of flow analysis, that would give 6 dry months / year x 5 years = 30 months of monthly peak flow to assess. This figure appears to have several more data point; what was the data used in this graph (some months with multiple peaks flows plotted)? The DEQ Western Region guidance directs facilities to use percent probabilities of exceedance due to much peakier flows, which isn't typically the case for the eastern region. One possible way of projecting flows for Eastern Region could be to take the maximum dry weather flow from each year (2013-17) divide that flow by the population estimate for the year (are the results, flow per capita, fairly consistent for peak dry weather flows?) for a per capita average and then project future dry weather peak flow based on per capita flow, population projections, and I/I analysis as appropriate. Or average annual flow and peaking factors could be another approach. The approach for Pendleton needs to be based on analysis of flow data, population data, I/I analysis and population projects. DAS indicated above, please drop any reference to the Western Region flow projection guidance and do not modify that approach for application to Pendleton as the Facility Plan mentions there's no meaningful correlation between precipitation and WW flow.

Section 5.5.3.2 Maximum Month Wet Weather Flow.

Figure 5-4 shows there is almost no correlation between rainfall and monthly wet weather flow, but the text states that "*The maximum monthly winter (wet) season rainfall quantity for the City of Pendleton used to estimate the MMWWF is 2.8 inches for the month of November, which was the maximum monthly accumulation in the Evaluation Period*". If there is no correlation between rainfall and flow, it is not appropriate to use rainfall to estimate flow. Analysis for a city like Pendleton should be based on flow analysis and populations to project future flows, not precipitation.

Section 5.6. Wastewater BOD and TSS Loads.

This section only uses one year of data to estimate average TSS and BOD loads per capita (2017). Please add text discussing whether this loading rate has changed over the period assessed or why this (look at trend in loads, flat, changing?) wasn't believed necessary. Update this section once flow projections are reworked without the DEQ Western Region precipitation approach.

Section 6

Section 6.2. Existing Wastewater Treatment Plant.

Please describe in more detail, the relationship of this Facility Plan to the Collection System Master Plan, which was adopted in May, 2015. That planning document will be five years old in a few months. For CWSRF project funding, the planning document which covers a project (or suite of projects) can be no more than five year old. Therefore, if the City

intends to seek funding for future collection system work, the Collection System Master Plan will need to be updated. We also noted that the first bulleted item included under "Next Steps" in Section 9.3.3 identifies "Update Wastewater Collection System Master Plan to determine total funding needed."
The document does need an I/I analysis as mentioned above for flow projections during the planning window.

Section 9

Section 9.3.2.4.1 CWSRF.
Please update the Primary Contact information for the CWSRF program to Bonnie Lamb, (541) 633-2027. Tiffany Yelton Bram is not the appropriate CWSRF contact person for DEQ's Eastern Region.

Table 9-4.
While not necessary, you could update the CWSRF interest rates in this table to reflect the current interest rates (Jan 1-March 31, 2020). Our rates are currently at an all-time low. Planning loans are currently at 0.69% and design/construction loans range from 0.69%-2.51%.

Section 9.3.3. Next Steps.
See our comment above under Section 6.2.

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PORTLAND, OR 97204

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