



US Army Corps
of Engineers
Baltimore District



Washington Aqueduct

U.S. ARMY Corps of Engineers

Annual Report of Water Analysis 2016

Prepared by:

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Plant Operations Branch
Washington Aqueduct
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A handwritten signature in black ink, appearing to read "James G. ...", with the date "April 2017" written to the right.

Approved by the Chief, Washington Aqueduct





WASHINGTON AQUEDUCT, US ARMY CORPS OF ENGINEERS ANNUAL REPORT OF WATER ANALYSIS (2016)

Potomac River Raw Water Supply

	Miscellaneous Physical Parameters									Inorganic Ions									Microorganisms						
	pH	ALKALINITY	CONDUCTIVITY	DISSOLVED SOLIDS	SUSPENDED SOLIDS	TOTAL SOLIDS	TEMPERATURE	TOTAL HARDNESS	TOTAL ORGANIC CARBON	TURBIDITY	TOTAL AMMONIA - N	BROMIDE	CHLORIDE	FLUORIDE	NITRATE - N	NITRITE - N	ORTHOPHOSPHATE - PO4	PERCHLORATE	SULFATE	TOTAL COLIFORM	E. COLI	GIARDIA Great Falls Intake	CRYPTOSPORIDIUM Great Falls Intake	GIARDIA Little Falls Intake	CRYPTOSPORIDIUM Little Falls Intake
	ppm	uS/cm	ppm	ppm	ppm	°F	ppm	ppm	NTU	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppb	ppm	MPN/100mL	MPN/100mL	cysts/L	Oocysts/L	cysts/L	Oocysts/L	
Jan	7.6	67	266	138	7	145	47	101	2.8	19	ND	ND	25	ND	1.9	ND	ND	0.4	23	4322	91	ND	ND	ND	ND
Feb	7.7	63	373	137	8	145	47	103	2.0	44	0.06	0.05	58	ND	2.0	ND	ND	0.4	22	140	4	ND	ND	ND	ND
Mar	7.7	75	316	180	4	184	55	114	1.8	10	ND	ND	34	ND	1.9	ND	ND	0.3	23	78	9	ND	ND	ND	ND
Apr	7.8	87	355	200	12	212	62	132	2.3	9	ND	ND	35	0.11	1.5	ND	ND	0.3	29	95	6	0.50	ND	0.60	0.30
May	7.6	67	275	114	ND	114	64	101	3.0	14	0.06	ND	26	ND	1.2	ND	ND	0.2	21	802	17	0.30	ND	0.10	0.20
Jun	7.7	76	289	144	12	156	77	114	3.1	12	ND	ND	23	ND	1.1	ND	ND	ND	27	1458	17	0.10	ND	0.40	ND
Jul	7.9	93	353	214	3	217	83	141	2.7	6	ND	0.05	31	0.12	0.9	ND	ND	0.3	34	1195	5	ND	ND	0.10	ND
Aug	8.0	87	255	229	2	231	82	129	3.1	10	0.05	0.05	32	0.12	0.8	ND	ND	0.4	36	1450	10	0.10	ND	0.10	ND
Sep	8.1	88	384	246	3	249	78	139	2.5	8	ND	0.06	35	0.14	0.3	ND	ND	0.5	48	896	16	ND	ND	ND	ND
Oct	8.1	101	396	253	7	260	65	150	3.3	8	0.05	0.05	33	0.15	1.0	ND	ND	1.8	47	187	5	ND	ND	ND	ND
Nov	8.1	125	468	254	2	256	55	180	2.6	4	0.06	0.05	39	0.16	0.8	ND	ND	0.3	51	50	3	ND	ND	ND	ND
Dec	8.0	112	427	243	ND	243	46	156	2.8	6	ND	0.06	41	0.14	1.2	ND	ND	0.3	45	3130	76	0.18	ND	0.84	ND

	Metals																								
	ALUMINIUM	ANTIMONY	ARSENIC	BARIUM	BERYLLIUM	CADMIUM	CALCIUM	CHROMIUM	COBALT	COPPER	IRON	LEAD	LITHIUM	MAGNESIUM	MANGANESE	MOLYBDENUM	NICKEL	SELENIUM	SILVER	SODIUM	STRONTIUM	THALLIUM	THORIUM	URANIUM	ZINC
	ppb	ppb	ppb	ppb	ppb	ppb	ppm	ppb	ppb	ppb	ppb	ppb	ppb	ppm	ppb	ppb	ppb	ppb	ppb	ppm	ppb	ppb	ppb	ppb	ppb
Jan	177	ND	0.3	32	ND	ND	31	ND	ND	1.2	162	ND	1.5	6	33	0.4	1.2	ND	ND	15	124	ND	ND	ND	3.2
Feb	556	ND	ND	37	ND	ND	31	ND	0.2	1.6	247	0.3	1.6	6	52	0.7	1.3	ND	ND	21	129	ND	ND	ND	3.5
Mar	296	ND	0.3	32	ND	ND	36	ND	0.3	1.2	355	0.4	1.4	6	37	0.4	1.1	ND	ND	17	99	ND	ND	ND	3.0
Apr	269	ND	0.5	39	ND	ND	39	ND	0.2	1.4	181	0.2	1.8	8	85	0.5	1.2	ND	ND	19	157	ND	ND	0.2	6.1
May	827	ND	ND	38	ND	ND	30	ND	0.7	2.5	121	1.2	1.9	7	79	0.3	2.5	ND	ND	15	87	ND	ND	ND	6.3
Jun	157	ND	ND	38	ND	ND	35	ND	ND	3.7	170	0.2	2.0	6	73	0.7	0.9	ND	ND	15	137	ND	ND	ND	3.8
Jul	196	ND	ND	40	ND	ND	42	ND	0.2	3.1	182	0.2	1.8	9	82	0.8	1.3	ND	ND	17	167	ND	ND	0.2	5.6
Aug	331	ND	0.2	42	ND	ND	37	ND	0.3	3.1	388	0.5	1.7	9	76	1.1	1.5	ND	ND	20	127	ND	0.7	ND	4.3
Sep	206	ND	0.6	38	ND	ND	35	ND	0.3	2.5	111	ND	2.8	13	37	1.2	1.1	ND	ND	23	199	ND	ND	0.3	2.7
Oct	320	ND	0.3	50	ND	ND	44	ND	ND	3.2	177	0.3	3.1	10	57	1.2	1.6	ND	ND	19	216	ND	ND	0.3	3.8
Nov	225	ND	0.7	43	ND	ND	51	ND	ND	2.0	81	ND	2.8	13	33	1.0	1.2	ND	ND	25	247	ND	ND	0.3	3.1
Dec	138	ND	ND	40	ND	ND	46	ND	ND	2.5	183	0.3	2.7	10	18	0.8	1.4	ND	ND	25	205	ND	ND	0.3	4.1

ppm = Parts Per Million
org/mL = Organisms per milliliter

ppb = Parts Per Billion
CFU/mL = Colony Forming Units per milliliter

ND = Not Detected
NTU = Nephelometric Turbidity Units

MPN/100mL = Most Probable Number per 100 milliliters
µS/cm = microSiemens per centimeter

"..." = No Analysis Required



WASHINGTON AQUEDUCT, US ARMY CORPS OF ENGINEERS ANNUAL REPORT OF WATER ANALYSIS (2016)

	Inorganic Ions										Metals																										
	TOTAL AMMONIA - N	BROMIDE	CHLORIDE	FLUORIDE	NITRATE - N	NITRITE - N	ORTHOPHOSPHATE - PO4	PERCHLORATE	SULFATE	ALUMINUM	ANTIMONY	ARSENIC	BARIUM	BERYLLIUM	CADMIUM	CALCIUM	CHROMIUM	COBALT	COPPER	IRON	LEAD	LITHIUM	MAGNESIUM	MANGANESE	MERCURY	MOLYBDENUM	NICKEL	SELENIUM	SILVER	SODIUM	STRONTIUM	THALLIUM	THORIUM	URANIUM	VANADIUM	ZINC	
EPA MCL*				4	10	1				6	10	2000	4	5		100									2			50					2		30		
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppb	ppm	ppb	ppb	ppb	ppb	ppb	ppb	ppm	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppm	ppb	ppb	ppb	ppb	ppb	ppb	ppm	ppb	ppb	ppb	ppb	ppb	ppb	

Dalecarlia Water Treatment Plant Finished Water

Jan	0.7	ND	30	0.6	2.0	ND	2.4	0.4	37	15	0.3	0.2	27	ND	ND	31	ND	ND	0.7	ND	ND	1.1	7	0.8	ND	0.7	0.7	ND	ND	21	125	ND	ND	ND	ND	ND
Feb	0.7	ND	40	0.6	2.1	ND	2.5	0.3	36	14	ND	ND	32	ND	ND	33	ND	ND	1.0	ND	ND	1.2	6	0.9	ND	0.6	0.8	ND	ND	26	149	ND	ND	ND	ND	0.9
Mar	0.3	ND	36	0.7	2.0	ND	2.5	0.4	34	17	0.4	ND	30	ND	ND	38	ND	ND	0.6	ND	ND	1.1	6	0.6	ND	1.0	0.9	ND	ND	21	103	ND	ND	ND	ND	0.6
Apr	ND	ND	39	0.7	1.5	ND	2.5	0.3	38	29	ND	ND	33	ND	ND	40	ND	ND	1.2	ND	ND	1.6	8	0.6	ND	1.0	0.8	ND	ND	24	157	ND	ND	ND	ND	0.6
May	0.8	ND	32	0.7	1.4	ND	2.5	0.3	36	29	0.4	0.2	37	ND	ND	36	ND	ND	1.1	ND	ND	2.0	6	0.9	ND	1.3	0.9	ND	ND	20	163	ND	ND	ND	ND	0.8
Jun	0.8	ND	28	0.7	1.1	ND	2.4	ND	39	40	ND	0.2	34	ND	ND	38	ND	ND	0.8	ND	ND	1.9	6	0.5	ND	ND	0.9	ND	ND	22	142	ND	ND	ND	ND	ND
Jul	0.8	ND	34	0.7	0.9	ND	2.5	0.4	47	35	0.3	0.3	40	ND	ND	44	ND	ND	0.9	ND	ND	1.8	9	0.9	ND	1.0	0.7	ND	ND	23	183	ND	ND	ND	ND	ND
Aug	0.7	ND	38	0.8	0.8	ND	2.4	0.3	50	28	ND	0.3	37	ND	ND	40	ND	ND	1.0	ND	ND	2.5	9	0.9	ND	0.8	0.9	ND	ND	23	134	ND	0.6	ND	ND	ND
Sep	0.8	ND	40	0.8	0.3	ND	2.4	0.6	60	78	ND	0.4	35	ND	ND	36	ND	ND	1.2	ND	ND	2.1	13	1.5	ND	1.1	0.9	ND	ND	27	202	ND	ND	ND	ND	ND
Oct	0.7	ND	37	0.7	1.0	ND	2.3	1.4	60	42	ND	0.3	48	ND	ND	47	ND	ND	1.2	ND	ND	2.5	10	1.2	ND	1.1	1.2	ND	ND	24	229	ND	ND	ND	ND	0.6
Nov	0.7	ND	44	0.7	0.7	ND	2.3	0.3	65	43	ND	0.3	41	ND	ND	53	ND	ND	1.2	ND	ND	2.5	12	0.9	ND	1.0	1.0	ND	ND	29	251	ND	ND	ND	ND	0.8
	0.7	ND	44	0.7	1.2	ND	2.3	0.3	60	27	ND	ND	36	ND	ND	48	ND	ND	1.0	ND	ND	2.7	11	0.6	ND	0.8	1.0	ND	ND	31	216	ND	ND	ND	ND	0.9

McMillan Water Treatment Plant Finished Water

Jan	0.8	ND	28	0.6	1.9	ND	2.5	0.4	40	15	ND	ND	29	ND	ND	28	ND	ND	6.0	ND	ND	1.1	6	ND	ND	0.4	0.9	ND	ND	20	127	ND	ND	ND	ND	ND
Feb	0.8	ND	45	0.6	1.9	ND	2.6	0.4	37	18	ND	ND	32	ND	ND	27	ND	ND	3.7	ND	ND	1.2	6	0.3	ND	0.4	0.8	ND	ND	31	145	ND	ND	ND	ND	0.8
Mar	0.4	ND	37	0.7	1.8	ND	2.6	0.3	35	15	ND	ND	29	ND	ND	26	ND	ND	3.5	ND	ND	1.2	5	0.2	ND	0.7	0.7	ND	ND	25	98	ND	ND	ND	ND	ND
Apr	ND	ND	40	0.7	1.4	ND	2.5	0.5	39	33	0.3	ND	31	ND	ND	36	ND	ND	3.9	ND	ND	1.4	8	ND	ND	1.2	0.9	ND	ND	24	149	ND	ND	ND	ND	ND
May	0.8	ND	33	0.6	1.3	ND	2.5	0.6	38	28	ND	ND	39	ND	ND	28	ND	ND	6.9	ND	ND	2.0	7	0.3	ND	ND	1.0	ND	ND	22	176	ND	ND	ND	ND	ND
Jun	0.8	ND	29	0.7	1.1	ND	2.5	ND	38	75	ND	ND	34	ND	ND	30	ND	ND	8.1	ND	ND	2.1	5	43	ND	ND	1.1	ND	ND	20	134	ND	ND	ND	ND	2.4
Jul	0.7	ND	34	0.7	0.9	ND	2.4	0.4	49	45	ND	ND	38	ND	ND	37	ND	ND	7.2	ND	ND	1.5	8	1.7	ND	0.7	0.6	ND	ND	23	173	ND	ND	ND	ND	ND
Aug	0.7	ND	37	0.8	0.8	ND	2.4	0.3	51	57	ND	0.3	42	ND	ND	36	ND	ND	7.5	ND	ND	2.3	10	0.6	ND	0.9	0.7	ND	ND	22	208	ND	ND	ND	ND	ND
Sep	0.8	ND	40	0.8	0.3	ND	2.4	1.1	60	60	ND	0.3	38	ND	ND	31	ND	ND	8.1	ND	ND	1.9	12	1.1	ND	1.1	0.7	ND	ND	27	208	ND	ND	ND	ND	0.5
Oct	0.8	ND	38	0.7	0.9	ND	2.4	0.8	60	33	ND	0.3	42	ND	ND	36	ND	ND	9.9	ND	ND	2.7	11	0.2	ND	1.0	1.1	ND	ND	27	217	ND	ND	ND	ND	ND
Nov	0.7	ND	43	0.7	0.7	ND	2.4	0.3	64	54	ND	0.2	41	ND	ND	43	ND	ND	11	ND	ND	2.4	12	ND	ND	0.9	1.0	ND	ND	28	241	ND	ND	ND	ND	ND
Dec	0.8	ND	40	0.7	1.1	ND	2.4	0.3	61	31	ND	ND	38	ND	ND	44	ND	ND	5.5	ND	ND	2.8	11	ND	ND	0.8	1.1	ND	ND	25	241	ND	ND	ND	ND	1.2

*EPA MCL = Environmental Protection Agency's Maximum Contaminant Level for regulated parameters

ppm = Parts Per Million

ppb = Parts Per Billion

ND = Not Detected

"..." = No Analysis Required



WASHINGTON AQUEDUCT, US ARMY CORPS OF ENGINEERS ANNUAL REPORT OF WATER ANALYSIS (2016)

EPA MCL*	Synthetic Organic Compounds																				Miscellaneous				Nitrosamines													
	METOLACHLOR	METRIBUZIN	MOLINATE	trans-NONACHLOR	OXAMYL	PARAQUAT	PARATHION	PENDIMETHALIN	PERMETHRIN	PENTACHLOROPHENOL	PHENANTHRENE	PICLORAM	PROPACHLOR	PYRENE	SIMAZINE	TERBACIL	TERBUTHYLAZINE	THIOBENCARB	TRIFLURALIN	TOXAPHENE	2,4,5-T	2,4,5-TP (SILVEX)	DIBROMOCHLOROPROPANE (DBCP)	ETHELYNE DIBROMIDE (EDB)	CYANIDE	2,3,7,8-TCDD (DIOXIN)	N-NITROSODIMETHYLAMINE (NDMA)	N-NITROSO-n-PROPYLAMINE (NDPA)	N-NITROSODIBUTYLAMINE (NDBA)	N-NITROSODIETHYLAMINE (NDEA)	N-NITROSOMETHYLETHYLAMINE (NMEA)	N-NITROSPYROLIDINE (NPYR)						
					200				1		500			4					3		50	200	50	0.2	30													
Units	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppt	ppt	ppm	ppq	ppt	ppt	ppt	ppt	ppt	ppt	ppt	ppt	ppt	ppt	ppt	ppt	

Dalecarlia Water Treatment Plant Finished Water

Jan	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND						
Feb	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---			
Mar	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---			
Apr	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND					
May	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
Jun	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
Jul	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				
Aug	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
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Oct	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
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McMillan Water Treatment Plant Finished Water

Jan	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	10.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND					
Feb	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
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Apr	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				
May	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
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Jul	0.07	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.07	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				
Aug	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
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Oct	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
Nov	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Dec	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

EPA MCL* = Environmental Protection Agency's Maximum Contaminant Level for regulated parameters

ppb = Parts Per Billion (µg/L)

ppt = Parts Per Trillion (ng/L)

ND = Not Detected

"---" = No Analysis Required