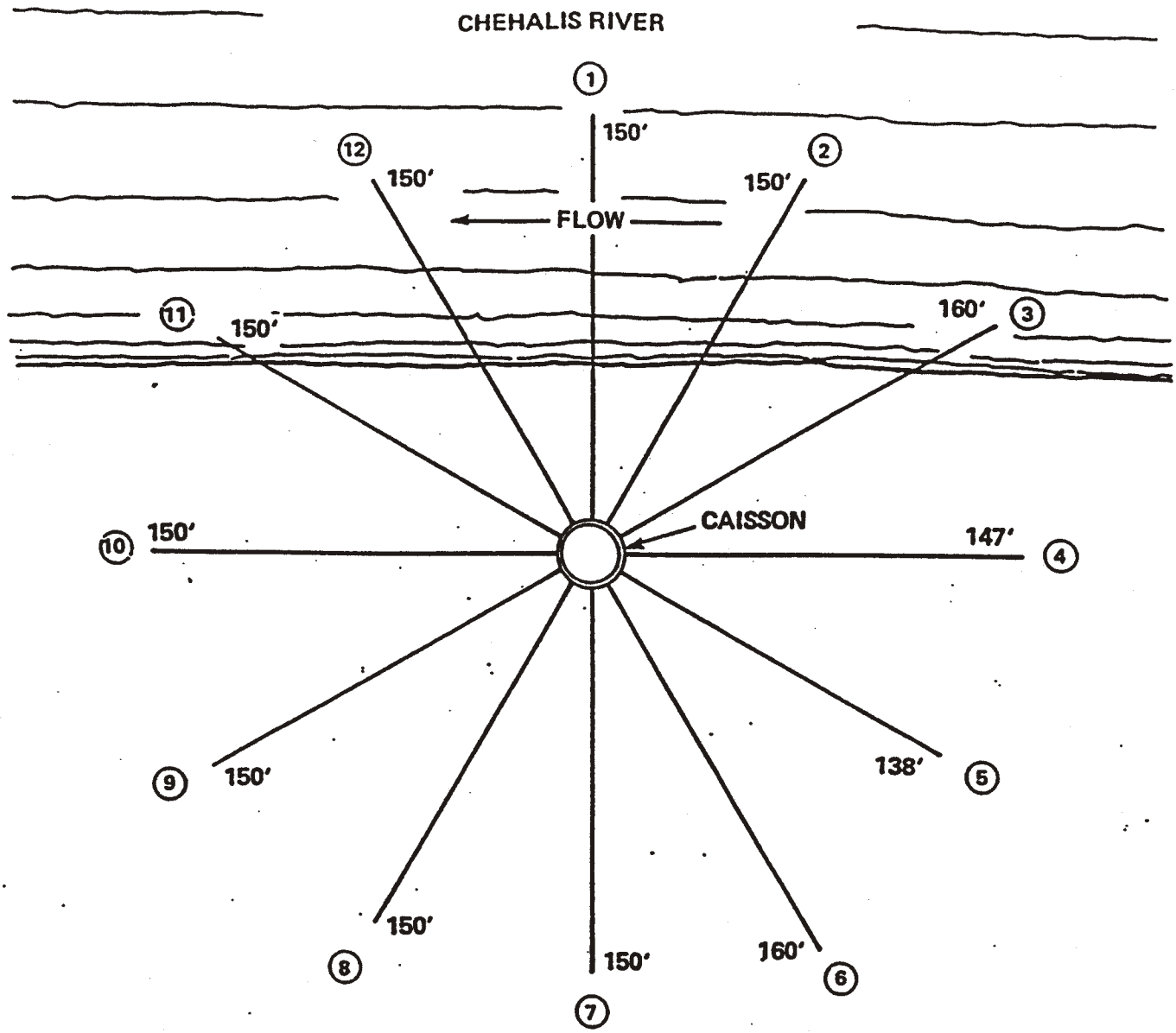
Appendix B

Ranney Well Water Quality Information

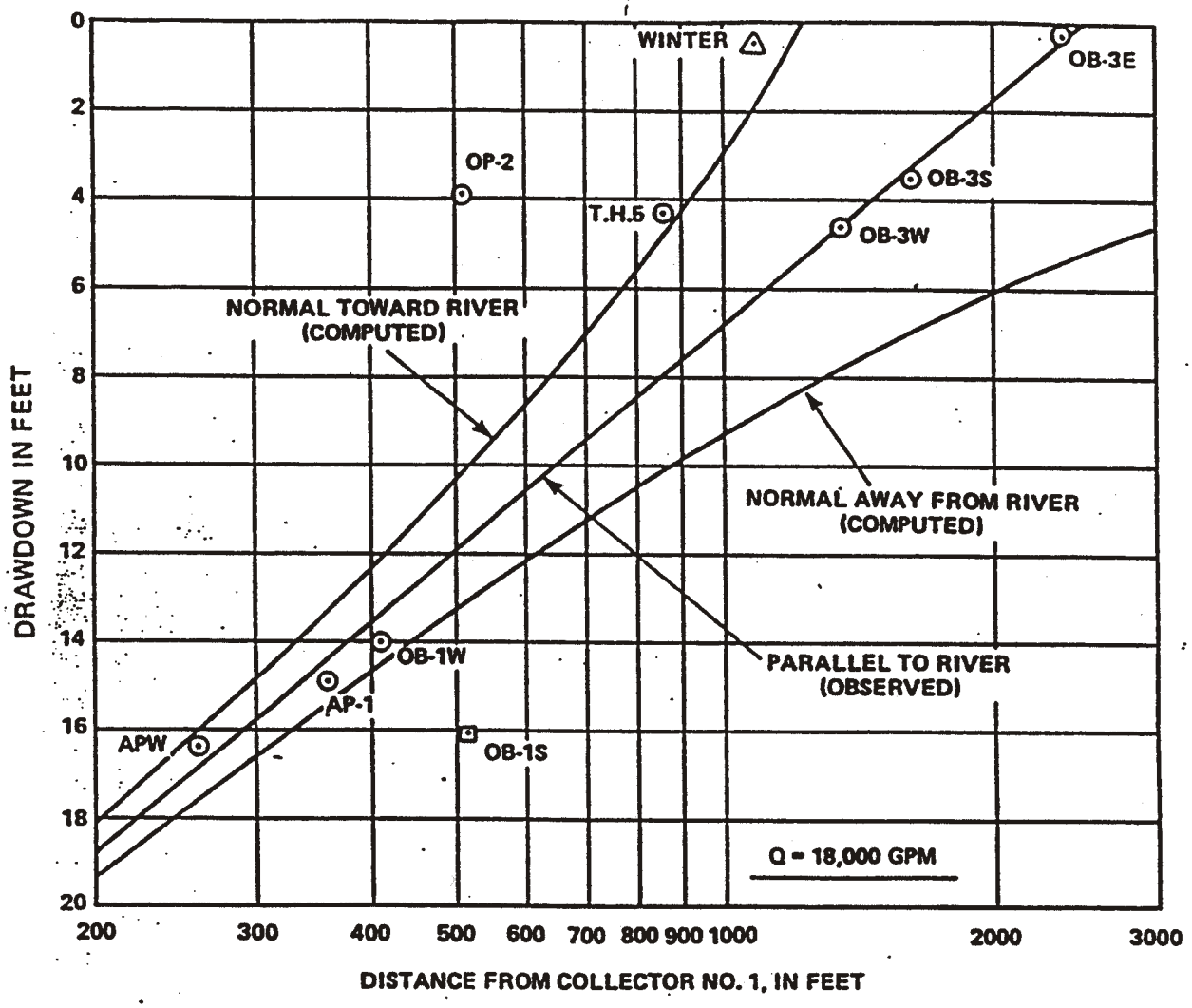


LATERAL PROJECTION DIAGRAM

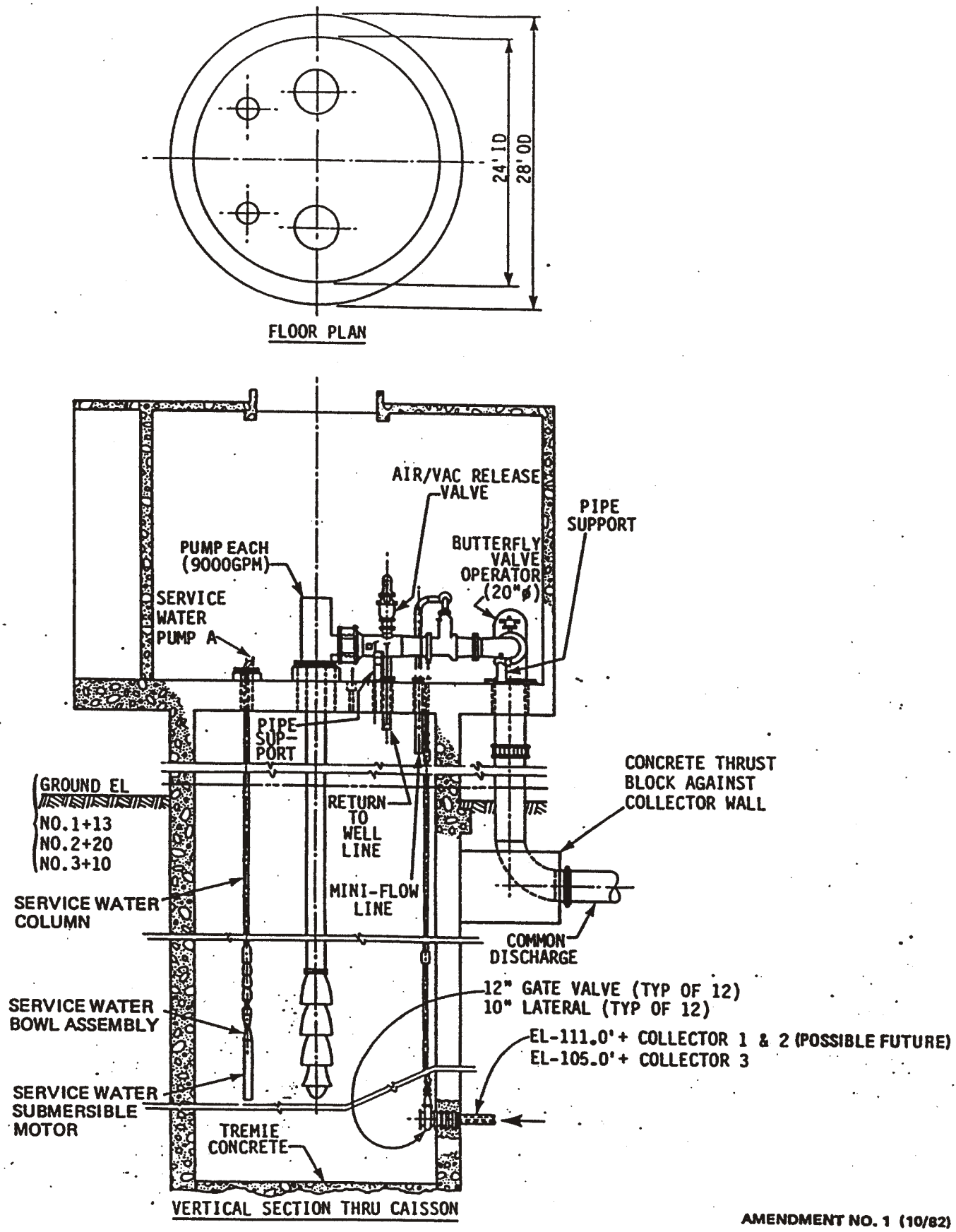
(1" = 60')

	ELEV. IN FEET (MSL)
TOP OF CAISSON	+ 20.0
GROUND	+ 13.0
LATERALS	–111.0
TOP OF PLUG	–116.0
CUTTING SHOE	–125.5

WASHINGTON PUBLIC POWER SUPPLY SYSTEM Nuclear Projects 3 & 5 FINAL SAFETY ANALYSIS REPORT	LATERAL PROJECTION DIAGRAM RANNEY COLLECTOR NO. 1	FIGURE 2.4-40



WASHINGTON PUBLIC POWER SUPPLY SYSTEM Nuclear Projects 3 & 5 FINAL SAFETY ANALYSIS REPORT	DISTANCE – DRAWDOWN GRAPH RANNEY COLLECTOR NO. 1	FIGURE 2.4-41



AMENDMENT NO. 1 (10/82)

WASHINGTON PUBLIC POWER SUPPLY SYSTEM Nuclear Projects 3 & 5 FINAL SAFETY ANALYSIS REPORT	HORIZONTAL GROUNDWATER COLLECTOR (RANNEY SYSTEM)	FIGURE 2.4-35

RANNEY WELL WATER QUALITY

Parameter	Well # Sample Date #1 Jan-31-89
Arsenic	<0.005
Barium	<0.02
Cadmium	<0.002
Chloride	ND
Chromium	<0.005
Color (Units)	ND
Copper	0.003
Fluoride	<0.2
Hardness	ND
Iron	0.10
Lead	<0.01
Manganese	0.004
Mercury	<0.001
Nickel	<0.01
Nitrate + Nitrite - N	0.73
pH	7.0
Selenium	<0.005
Silver	<0.002
Sodium	7
Specific Conductance (mho/cm)	140
Sulfate	5
Total Dissolved Solids	110
Turbidity (NTU)	ND
Zinc	0.027

ND = No Data

Reference: Supply System, 1989

RAW WELL WATER QUALITY

(WELL LOCATED AT THE CONFLUENCE OF THE SATSOP AND CHEHALIS RIVERS)

Parameter	Sample Date Sep-27-78	Jun-29-82	Jan-6-83	Jul-29-83	Apr-24-91	Jul-21-92
Arsenic	<0.010	<0.01	<0.01	<0.01	<0.010	<0.010
Barium	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
Cadmium	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Chloride	ND	17	<10	ND	<10	<10
Chromium	<0.010	<0.01	<0.01	<0.010	<0.010	<0.010
Color (Units)	<5	5	<5	ND	<5	<5
Copper	ND	ND	ND	ND	<0.3	0.020
Fluoride	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Hardness	50	32	39	34	0	30
Iron	<0.05	0.06	<0.05	<0.05	<0.05	3.80
Lead	0.017	<0.01	<0.01	<0.01	<0.005	<0.002
Manganese	<0.010	<0.01	<0.01	<0.010	0.028	0.045
Mercury	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nitrate + Nitrite - N	ND	ND	ND	ND	ND	ND
Nitrate - N	0.5	0.68	0.4	0.3	1.7	<0.2
Selenium	<0.003	<0.005	<0.005	<0.005	<100.000	<0.005
Silver	<0.010	<0.01	<0.01	<0.010	<0.010	<0.010
Sodium	ND	<10	<10	<10	<10	<10
Specific Conductance (mho/cm)	90	130	90	ND	140	78
Sulfate	ND	ND	ND	ND	<10	<10
Turbidity (NTU)	0.3	<0.5	0.8	ND	<0.5	6.0
Zinc	ND	ND	ND	ND	<0.3	<0.2

ND = No Data

Reference: Supply System, 1978 to 1992

DOMESTIC WELL WATER QUALITY IN THE VICINITY OF THE SATSOP POWER PLANT

Parameter	Well # / Sample Date: Saginaw Laydown Sep-12-79	Saginaw Laydown Oct-10-79	Saginaw Laydown Jun-18-80	Witner* Nov-80	Brumfield* Nov-80	Coker* Nov-80
Arsenic	<0.001	<0.004	<0.001	0.03	0.03	0.012
Barium	<0.10	<0.10	<0.10	0.03	0.02	0.04
Cadmium	<0.0001	0.0001	<0.0001	<0.01	<0.01	<0.01
Chloride	3.3	2.1	3.9	4.0	3.5	4.5
Chromium	<0.0005	<0.0005	<0.0005	<0.01	<0.01	<0.01
Color (Units)	10	10	25	2.3	<1	<1
Fluoride	0.122	0.109	0.18	0.1	0.1	0.1
Hardness	51	84	68	79	52	25
Iron	0.89	7.0	3.1	1.18	0.28	0.08
Lead	<0.001	0.007	0.003	0.003	0.007	0.005
Manganese	0.26	0.57	0.38	<0.01	<0.01	<0.01
Mercury	<0.0002	<0.0002	<0.0002	<0.0001	<0.0001	0.0001
Nitrate + Nitrite - N	<0.010	<0.010	<0.010	ND	ND	ND
Nitrate - N	ND	ND	ND	0.7	0.1	1.8
Selenium	<0.002	<0.002	<0.002	0.003	0.002	0.004
Silver	<0.0003	<0.0003	<0.0003	<0.01	<0.01	<0.01
Sodium	11.1	14.8	11.9	ND	ND	ND
Specific Conductance (mho/cm)	150	225	181	191	149	112
Sulfate	3.3	<1.0	<1.0	ND	ND	ND
Turbidity (NTU)	10	46	14	1.2	3.1	0.4

*Wells located in the vicinity of the Ranney well field.

ND = No Data

Reference: Supply System, 1979 to 1980

MAKEUP WELL WATER QUALITY[a]

Parameter	Concentration[b]
Biochemical Oxygen Demand	<1
Chemical Oxygen Demand	<5
Ammonia (as N)	<0.0005
Total Organic Carbon	<2
Bromide	0.30
Color (Color Units)	0
Fecal Coliform (MF) (colonies/100ml	<2
Fluoride	0.122
Nitrate + Nitrate (as N)	0.54
Total Organic Nitrogen (as N)	<0.50
Oil and Grease	<1
Total Phosphorus (as P)	0.240
Sulfate	2.7
Sulfide	<0.10
Surfactants (LAS-mg/l	<0.01
Gross Alpha (picocuries/l)	<0.60
Gross Beta (picocuries/l)	<10
Aluminum	<0.10
Boron	<0.01
Cobalt	<0.001
Molybdenum	<0.001
Tin	<0.03
Titanium	0.018
Antimony	<0.15
Arsenic	<0.001
Beryllium	<0.003
Silver	<0.0003
Thallium	0.008
Total Cyanide	<0.003
Phenol	<0.004
Iron	0.017
Maganese	<0.001
Barium	<0.10
Cadmium	<0.0001
Chromium	0.0006
Copper	<0.001
Lead	<0.001
Mercury	<0.0002
Nickel	0.002
Selenium	<0.002
Zinc	0.005
Magnesium	4.0

[a] Ranney Collector No. 1 test of November 25, 1980.
[b] Units of mg/l or as indicated.

ER-OL, 1982

CHEMICAL ANALYSES OF GROUNDWATER IN THE CHEHALIS RIVER BASIN[a]

Well Number	Owner or Tenant	Parts Per Million						Well Depth
		Hardness ($CaCO_3$)	Iron (Fe)	Sulfate (SO_4)	Chloride (Cl)	Nitrate (NO_3)	Dissolved Solids	
17/6-1C1	Chris Wheeler	22	0.04	4.4	3.0	3.5	67	76
17/6-4D1	City of Elma	24	0.00	2.1	4.0	1.9	58	40
17/7-7P1	Weyerhaeuser Timber Company	92	1.20	-	37.0	-	-	201
17/7-8Q1	"	60	0.50	-	11.0	-	-	141
17/7-9N1	"	51	0.30	-	20.2	-	-	160
17/7-9N2	"	50-54	0.03-0.11	-	9.5-12	-	-	102
17/7-9P1	"	50	0.20	-	11.0	-	-	153
17/7-11B1	Earl Richard	62	2.40	0.6	2.8	0.7	106	50
17/7-11E1	Robert Smith	76	0.73	0.6	3.2	0.2	119	36
17/7-11H1	Milton Larson	52	0.19	4.2	3.5	3.5	93	10
17/7-11K1	G. W. Streiter	58	0.29	4.0	4.0	0.6	108	51
17/7-11P1	Weyerhaeuser Timber Company	54	0.6-1.7	-	1.2	-	-	188
17/8-14K1	"	50	0.30	-	12-16	-	-	180
18/6-3H1	Erling Olson	52	0.33	2.6	3.5	0.1	100	98
18/12-27F1	Frank Minard	26	0.33	2.9	11.0	0.1	127	358

ER-OL, 1982

Laucks
Testing Laboratories, Inc.
940 South Harney St., Seattle, WA 98108 (206) 767-5060 FAX 767-5063

Chemistry, Microbiology, and Technical Services

REPORT ON SAMPLE: 9309633-02
Client Sample ID: Well #3

Date Received : 09/17/93 Collection Date : 09/13/93

Test	MCL		Results	Units
Antimony	0.006	<	0.0020	mg/L
Arsenic	0.05	<	0.010	mg/L
Barium	2.0	<	0.20	mg/L
Beryllium	0.004	<	0.0010	mg/L
Cadmium	0.005	<	0.0020	mg/L
Chromium	0.1	<	0.010	mg/L
Copper	1.0*	<	0.1	mg/L
Iron	0.3	<	0.10	mg/L
Lead	0.05*	<	0.002	mg/L
Manganese	0.05	<	0.010	mg/L
Mercury	0.002	<	0.0010	mg/L
Nickel	0.1	<	0.005	mg/L
Selenium	0.05	<	0.005	mg/L
Silver	0.1	<	0.001	mg/L
Thallium	0.002	<	0.0010	mg/L
Zinc	5.0		0.1	mg/L
Hardness			77	mg/L, as $CaCO_3$
Conductivity	700		160	Micromhos/cm, 25°C
Turbidity	1.0	<	0.5	NTU
Color	15.0	<	5.0	Color Units
Chloride	250	<	10	mg/L
Cyanide	0.2	<	0.01	mg/L
Fluoride	2.0	<	0.2	mg/L
Nitrate	10.0		0.9	mg/L
Nitrite	1.0	<	0.1	mg/L
Sulfate	250	<	10	mg/L

MCL = Maximum Contamination Level established for drinking water under current EPA and State of Washington regulations. No MCL has been established for hardness or sodium, although 20 mg/L is a recommended MCL for sodium.

* = This is the Washington State MCL. Federal action levels are 0.015 mg/L for lead and 1.3 mg/L for copper.

Reference: Supply System, 1993

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Laucks 85
Testing Laboratories, Inc.
940 South Harney St., Seattle, WA 98108 (206) 767-5060 FAX 767-5063

Chemistry, Microbiology, and Technical Services

REPORT ON SAMPLE: 9309633-01
Client Sample ID: Well #1

Date Received : 09/17/93 Collection Date : 09/13/93

Test	MCL		Results	Units
Antimony	0.006	<	0.0020	mg/L
Arsenic	0.05	<	0.010	mg/L
Barium	2.0	<	0.20	mg/L
Beryllium	0.004	<	0.0010	mg/L
Cadmium	0.005	<	0.0020	mg/L
Chromium	0.1	<	0.010	mg/L
Copper	1.0*	<	0.1	mg/L
Iron	0.3		0.16	mg/L
Lead	0.05*	<	0.002	mg/L
Manganese	0.05	<	0.010	mg/L
Mercury	0.002	<	0.0010	mg/L
Nickel	0.1	<	0.005	mg/L
Selenium	0.05	<	0.005	mg/L
Silver	0.1	<	0.001	mg/L
Sodium		<	10	mg/L
Thallium	0.002	<	0.0010	mg/L
Zinc	5.0		0.1	mg/L
Hardness			32	mg/L, as CaCO3
Conductivity	700		110	Micromhos/cm, 25°C
Turbidity	1.0		1.0	NTU
Color	15.0	<	5.0	Color Units
Chloride	250	<	10	mg/L
Cyanide	0.2	<	0.01	mg/L
Fluoride	2.0	<	0.2	mg/L
Nitrate	10.0		0.9	mg/L
Nitrite	1.0	<	0.1	mg/L
Sulfate	250	<	10	mg/L

MCL = Maximum Contamination Level established for drinking water under current EPA and State of Washington regulations. No MCL has been established for hardness or sodium, although 20 mg/L is a recommended MCL for sodium.

* = This is the Washington State MCL. Federal action levels are 0.07 mg/L for lead and 1.3 mg/L for copper.

Reference: Supply System, 1993

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MEANS AND RANGES OF PARAMETERS FOR METALS MONITORING PROGRAM AT WELL APW, 5 NOVEMBER 1980 - 28 OCTOBER 1981

		First Quarter, 5 November 1980 - 4 February 1981			Second Quarter, 11 February 1981 - 29 April 1981			Third Quarter, 6 May 1981 - 29 July 1981			Fourth Quarter, 5 August 1981 - 28 October 1981			Entire Year, 5 November 1980 - 28 October 1981			
		Mean	Range	No. of Samples	Mean	Range	No. of Samples	Mean	Range	No. of Samples	Mean	Range	No. of Samples	Mean	Range	No. of Samples	EPA (1980) Criteria
Chromium (µg/l)	T	0.6	<0.5-1.0	12	0.8	<0.5-1.2	11	0.5	<0.5-0.9	13	<0.5	<0.5-1.0	13	0.6	<0.5-1.2	49	
	D	0.6	<0.5-0.8	12	0.7	<0.5-1.2	11	<0.5	<0.5-0.6	13	<0.5	<0.5-1.0	13	0.5	<0.5-1.2	49	
Nickel (µg/l)	T	<1	<1-5	12	<1	<1-2	11	1	<1-10	13	<1	<1-1	13	<1	<1-10	49	60/1155
	D	<1	<1-5	12	<1	<1-1	11	<1	all <1	13	<1	all <1	13	<1	<1-5	49	
Iron (µg/l)	T	11	<1-60	12	23	2-90	11	17	1-80	13	14	<1-50	13	16	<1-90	49	1000
	D	4	<1-14	12	8	<1-26	11	13	<1-80	13	7	<1-40	13	8	<1-80	49	
Zinc (µg/l)	T	<5	all <5	12	<5	all <5	11	<5	all <5	13	<5	<5-7	13	<5	<5-7	49	47/193
	D	<5	all <5	12	<5	all <5	11	<5	all <5	13	<5	all <5	13	<5	all <5	49	
Copper (µg/l)	T	<1	<1-1	12	1	<1-7	11	<1	<1-2	13	<1	<1-3	13	<1	<1-7	49	5.6/12
	D	<1	all <1	12	<1	<1-4	11	<1	<1-1	13	<1	<1-1	13	<1	<1-4	49	
Cadmium (µg/l)	T	<0.1	all <0.1	3	<0.1	all <0.1	3	0.1	<0.1-0.2	3	<0.1	all <0.1	3	<0.1	<0.1-0.2	12	0.013/1.6
	D	<0.1	all <0.1	3	<0.1	all <0.1	3	<0.1	all <0.1	3	<0.1	all <0.1	3	<0.1	all <0.1	12	
Lead (µg/l)	T	<1	all <1	3	<1	all <1	3	<1	<1-1	3	<1	all <1	3	<1	<1-1	12	0.90/81
	D	<1	all <1	3	<1	all <1	3	<1	all <1	3	<1	all <1	3	<1	all <1	12	
Barium (µg/l)	T	2a/		1	6	2-12	3	2	2-3	3	6	3-11	3	4	2-12	10	
	D	2a/		1	3	2-4	3	2	all 2	3	5	3-10	3	3	2-10	10	
Manganese (µg/l)	T	2	<1-4	3	1	<1-2	3	<1	<1-1	3	<1	<1-1	3	1	<1-4	12	
	D	1	<1-3	3	1	<1-2	3	<1	all <1	3	<1	all <1	3	<1	<1-3	12	
Mercury (µg/l)	T	<0.2	all <0.2	3	0.2	<0.2-0.4	3	<0.2	all <0.2	3	0.3	<0.2-0.7	3	<0.2	<0.2-0.7	12	0.20/4.1
Selenium (µg/l)	T	<2	all <2	3	<2	all <2	3	<2	all <2	3	<2	all <2	3	<2	all <2	12	35/260
	D	<2	all <2	3	<2	all <2	3	<2	all <2	3	<2	all <2	3	<2	all <2	12	
Calcium (mg/l)	D	12.0		1	11.0		1	13.1		1	12.2		1	12.1	11.0-13.1	4	
Magnesium (mg/l)	D	3.9		1	4.4		1	4.1		1	4.8		1	4.3	3.9-4.8	4	
Potassium (mg/l)	D	0.71		1	0.67		1	0.65		1	0.77		1	0.70	0.65-0.77	4	

MEANS AND RANGES OF PARAMETERS FOR METALS MONITORING PROGRAM AT WELL APW, 5 NOVEMBER 1980 - 28 OCTOBER 1981

	First Quarter, 5 November 1980 - 4 February 1981			Second Quarter, 11 February 1981 - 29 April 1981			Third Quarter, 6 May 1981 - 29 July 1981			Fourth Quarter, 5 August 1981 - 28 October 1981			Entire Year, 5 November 1980 - 28 October 1981			
	Mean	Range	No. of Samples	Mean	Range	No. of Samples	Mean	Range	No. of Samples	Mean	Range	No. of Samples	Mean	Range	No. of Samples	EPA (1980) Criteria
Sodium D (mg/l)	6.5		1	5.6		1	6.2		1	5.7		1	6.0	5.6-6.5	4	
Hardness (mg/l as $CaCO_3$)	55		1	54	49-60	11	54	52-58	13	53	51-56	13	54	49-60	38	
Alkalinity (mg/l as $CaCO_3$)	64		1	56	56-57	11	55	53-58	13	56	51-58	13	56	51-64	38	20 (min)
Temperature (°C)	10.6	10.5-10.6	12	10.5	10.4-10.6	11	10.6	10.4-10.7	13	10.6	10.6-10.8	13	10.6	10.4-10.8	49	
pH	6.9b,d/	6.6-7.1	11	6.9b,d/	6.6-6.9	11	7.4b,c/ 6.9b,d/	7.4-7.5 all 6.9	8 5	7.3b,c/	7.2-7.4	13	7.4b,c/ 6.9b,c/	7.2-7.5 6.6-7.1	21 27	6.5-9.0
Conductivity (μmhos/cm at 25°C)	110		1	117	112-121	11	119	115-121	13	117	114-119	13	117	110-121	38	

a/ Two other barium samples were taken during this quarter but were analyzed using flame AA instead of graphite furnace AA due to an equipment malfunction. Both samples analyzed by flame AA were reported as <100 μg/l and are not included in this table due to the high detection limit.

b/ Median.

c/ A new pH electrode was used beginning on 10 June. The mean and range given are for the samples analyzed with the new electrode.

d/ Values for samples analyzed with old pH electrode (samples prior to 10 June).

MEANS AND RANGES OF PARAMETERS FOR METALS MONITORING PROGRAM AT INTAKE AREA, 5 NOVEMBER 1980 - 28 OCTOBER 1981

		First Quarter, 5 November 1980 - 4 February 1981			Second Quarter, 11 February 1981 - 29 April 1981			Third Quarter, 6 May 1981 - 29 July 1981			Fourth Quarter, 5 August 1981 - 28 October 1981			Entire Year, 5 November 1980 - 28 October 1981			
		Mean	Range	No. of Samples	Mean	Range	No. of Samples	Mean	Range	No. of Samples	Mean	Range	No. of Samples	Mean	Range	No. of Samples	EPA (1980) Criteria
Chromium (µg/l)	T	1.3	0.6-3.3	12	1.8	0.8-3.8	11	0.5	<0.5-0.8	13	1.4	<0.5-10.8	13	1.2	<0.5-10.8	49	
	D	0.7	<0.5-1.0	12	1.1	<0.5-3.3	12	<0.5	<0.5-0.6	13	<0.5	<0.5-0.6	13	0.6	<0.5-3.3	50	
Nickel (µg/l)	T	2	<1-4	12	2	<1-14	12	1	<1-3	13	1	<1-6	13	1	<1-14	50	37/720
	D	<1	<1-2	12	<1	<1-1	12	<1	all <1	13	<1	<1-3	13	<1	<1-3	50	
Iron (µg/l)	T	1063	200-2870	12	1397	300-7400	12	421	270-830	13	622	80-3905	13	861	80-7400	50	1000
	D	70	40-130	12	109	30-820	12	122	26-280	13	88	13-160	13	98	13-820	50	
Zinc (µg/l)	T	5	<5-21	12	<5	<5-24	12	<5	all <5	13	6	<5-37	13	<5	<5-37	50	47/115
	D	<5	<5-9	12	<5	all <5	12	<5	all <5	13	<5	<5-7	13	<5	<5-9	50	
Copper (µg/l)	T	2	<1-6	12	2	1-7	12	2	1-5	13	3	<1-8	13	2	<1-8	50	5.6/6.9
	D	<1	<1-2	12	1	<1-2	12	1	1-2	13	1	<1-3	13	1	<1-3	50	
Cadmium (µg/l)	T	<0.1	all <0.1	3	<0.1	all <0.1	3	<0.1	<0.1-0.1	3	0.2	<0.1-0.5	3	<0.1	<0.1-0.5	12	0.007/0.82
	D	<0.1	all <0.1	3	<0.1	all <0.1	3	<0.1	all <0.1	3	<0.1	all <0.1	3	<0.1	all <0.1	12	
Lead (µg/l)	T	<1	<1-1	3	<1	all <1	3	<1	<1-1	3	12	<1-36	3	4	<1-36	12	0.21/38
	D	<1	all <1	3	<1	all <1	3	<1	all <1	3	<1	all <1	3	<1	all <1	12	
Barium (µg/l)	T	8[a]		1	12	10-15	3	6	6-7	3	11	6-22	3	10	6-22	10	
	D	6[a]		1	8	6-9	3	5	4-5	3	8	6-12	3	7	4-12	10	
Manganese (µg/l)	T	26	18-30	3	33	20-39	3	23	21-25	3	35	11-80	3	29	11-80	12	
	D	8	6-9	3	12	6-19	3	8	7-9	3	9	7-10	3	9	6-19	12	
Mercury (µg/l)	T	<0.2	all <0.2	3	0.4	<0.2-0.9	3	0.7	<0.2-1.3	3	0.3	<0.2-0.7	3	0.4	<0.2-1.3	12	0.20/4.1
Selenium (µg/l)	T	<2	all <2	3	<2	all <2	3	<2	all <2	3	<2	all <2	3	<2	all <2	12	35/260
	D	<2	all <2	3	<2	all <2	3	<2	all <2	3	<2	all <2	3	<2	all <2	12	
Calcium (mg/l)	D	6.0		1	4.5		1	8.4		1	7.6		1	6.6	4.5-8.4	4	
Magnesium (mg/l)	D	1.6		1	1.5		1	2.2		1	2.4		1	1.9	1.5-2.4	4	
Potassium (mg/l)	D	0.47		1	0.45		1	0.50		1	0.76		1	0.55	0.45-0.76	4	

MEANS AND RANGES OF PARAMETERS FOR METALS MONITORING
PROGRAM AT DISCHARGE AREA, 5 NOVEMBER 1980 - 28 OCTOBER 1981

	First Quarter, 5 November 1980 - 4 February 1981			Second Quarter, 11 February 1981 - 29 April 1981			Third Quarter, 6 May 1981 - 29 July 1981			Fourth Quarter, 5 August 1981 - 28 October 1981			Entire Year, 5 November 1980 - 28 October 1981			
	Mean	Range	No. of Samples	Mean	Range	No. of Samples	Mean	Range	No. of Samples	Mean	Range	No. of Samples	Mean	Range	No. of Samples	EPA (1980) Criteria
Sodium D (mg/l)	4.5		1	3.0		1	5.4		1				4.3	3.0-5.4	3	
Hardness (mg/l as $CaCO_3$)	27		1	21		1	36		1	33		1	29	21-36	4	
Alkalinity (mg/l as $CaCO_3$)	27		1	20		1	34		1	31		1	28	20-34	4	20 (min)
Temperature (°C)	5.1		1	10.7		1	17.8		1	13.4		1	11.8	5.1-17.8	4	
pH	6.7b/		1	6.5b/		1	7.4a/		1	7.3a/		1	7.4a/ 6.6b/	7.3-7.4 6.5-6.7	2 2	6.5-9.0
Conductivity (μmhos/cm at 25°C)	72		1	60		1	88		1	82		1	76	60-88	4	

a/ A new pH electrode was used beginning on 10 June. The mean and range given are for the samples analyzed with the new electrode.

b/ Values for samples analyzed with old pH electrode (samples prior to 10 June).

Note: Refer to Rurther Explanatory Notes on page 16.

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MEANS AND RANGES OF PARAMETERS FOR METALS MONITORING PROGRAM AT SOUTH ELMA BRIDGE, 5 NOVEMBER 1980 - 28 OCTOBER 1981

	First Quarter, 5 November 1980 - 4 February 1981			Second Quarter, 11 February 1981 - 29 April 1981			Third Quarter, 6 May 1981 - 29 July 1981			Fourth Quarter, 5 August 1981 - 28 October 1981			Entire Year, 5 November 1980 - 28 October 1981			
	Mean	Range	No. of Samples	Mean	Range	No. of Samples	Mean	Range	No. of Samples	Mean	Range	No. of Samples	Mean	Range	No. of Samples	EPA (1980) Criteria
Sodium (mg/l) D	5.2		1	3.6		1	6.4		1	5.2		1	5.1	3.6-6.4	4	
Hardness (mg/l as $CaCO_3$)	32		1	25		1	38		1	36		1	33	25-38	4	
Alkalinity (mg/l as $CaCO_3$)	29		1	21		1	38		1	34		1	30	21-38	4	20 (min)
Temperature (°C)	5.0		1	10.7		1	18.9		1	14.0		1	12.2	5.0-18.9	4	
pH	6.6b/		1	6.7b/		1	7.7a/		1	7.6a/		1	7.6a/ 6.6b/	7.6-7.7 6.6-6.7	2 2	6.5-9.0
Conductivity (μmhos/cm at 25°C)	80		1	64		1	97		1	89		1	82	64-97	4	

a/ A new pH electrode was used beginning on 10 June. The mean and range given are for the samples analyzed with the new electrode.

b/ Values for samples analyzed with old pH electrode (samples prior to 10 June).

Envirosphere, 1982

MEANS AND RANGES OF PARAMETERS FOR METALS MONITORING
PROGRAM AT SOUTH ELMA BRIDGE, 5 NOVEMBER 1980 - 28 OCTOBER 1981

		First Quarter, 5 November 1980 - 4 February 1981			Second Quarter, 11 February 1981 - 29 April 1981			Third Quarter, 6 May 1981 - 29 July 1981			Fourth Quarter, 5 August 1981 - 28 October 1981			Entire Year, 5 November 1980 - 28 October 1981			
		Mean	Range	No. of Samples	Mean	Range	No. of Samples	Mean	Range	No. of Samples	Mean	Range	No. of Samples	Mean	Range	No. of Samples	EPA (1980) Criteria
Chromium (µg/l)	T	1.0		1	2.0		1	<0.5		1	1.0		1	1.1	<0.5-2.0	4	
	D	0.5		1	2.0		1	<0.5		1	0.6		1	0.8	<0.5-2.0	4	
Nickel (µg/l)	T	<1		1	<1		1	2		1	<1		1	<1	<1-2	4	41/794
	D	<1		1	<1		1	1		1	<1		1	<1	<1-1	4	
Iron (µg/l)	T	450		1	595		1	330		1	360		1	434	330-595	4	1000
	D	60		1	130		1	330		1	140		1	165	60-330	4	
Zinc (µg/l)	T	<5		1	<5		1	<5		1	<5		1	<5	all <5	4	47/128
	D	<5		1	<5		1	<5		1	<5		1	<5	all <5	4	
Copper (µg/l)	T	1		1	3		1	6		1	<1		1	3	<1-6	4	5.6/7.8
	D	<1		1	1		1	1		1	<1		1	<1	<1-1	4	
Calcium (mg/l)	D	6.8		1	4.5		1	8.4		1	7.6		1	6.8	4.5-8.4	4	
Magnesium (mg/l)	D	2.0		1	1.8		1	2.3		1	2.6		1	2.2	1.8-2.6	4	
Potassium (mg/l)	D	0.55		1	0.45		1	0.55		1	0.77		1	0.58	0.45-0.77	4	

MEANS AND RANGES OF PARAMETERS FOR METALS MONITORING PROGRAM AT INTAKE AREA, 5 NOVEMBER 1980 - 28 OCTOBER 1981

	First Quarter, 5 November 1980 - 4 February 1981			Second Quarter, 11 February 1981 - 29 April 1981			Third Quarter, 6 May 1981 - 29 July 1981			Fourth Quarter, 5 August 1981 - 28 October 1981			Entire Year, 5 November 1980 - 28 October 1981			
	Mean	Range	No. of Samples	Mean	Range	No. of Samples	Mean	Range	No. of Samples	Mean	Range	No. of Samples	Mean	Range	No. of Samples	EPA (1980) Criteria
Sodium (mg/l)	4.3		1	3.2		1	5.4		1	4.6		1	4.4	3.2-5.4	4	
Hardness (mg/l as $CaCO_3$)	27		1	28	22-36	12	28	22-34	13	31	24-38	13	29	22-38	39	
Alkalinity (mg/l as $CaCO_3$)	24		1	22	14-28	12	29	23-35	13	33	26-38	13	28	14-38	39	20 (min)
Temperature (°C)	7.6	4.7-11.0	12	8.6	4.1-10.7	12	14.0	9.8-17.8	13	14.4	9.0-20.4	13	11.3	4.1-20.4	50	
pH	6.7[b,d]	6.4-7.0	11	6.6[b,d]	6.3-6.9	12	7.4[b,c] 6.8[b,d]	7.3-7.5 6.7-6.8	8 5	7.2[b,c]	6.9-7.5	13	7.3[b,c] 6.7[b,d]	6.9-7.5 6.3-7.0	21 28	6.5-9.0
Conductivity (μmhos/cm at 25°C)	71		1	66	52-76	12	75	65-88	13	81	65-89	13	74	52-89	39	

a/ Two other barium samples were taken during this quarter but were analyzed using flame AA instead of graphite furnace AA due to an equipment malfunction. Both samples analyzed by flame AA were reported as <100 μg/l and are not included in this table due to the high detection limit.

b/ Median.

c/ A new pH electrode was used beginning on 10 June. The mean and range given are for the samples analyzed with the new electrode.

d/ Values for samples analyzed with old pH electrode (samples prior to 10 June).

MEANS AND RANGES OF PARAMETERS FOR METALS MONITORING
PROGRAM AT DISCHARGE AREA, 5 NOVEMBER 1980 - 28 OCTOBER 1981

		First Quarter, 5 November 1980 - 4 February 1981			Second Quarter, 11 February 1981 - 29 April 1981			Third Quarter, 6 May 1981 - 29 July 1981			Fourth Quarter, 5 August 1981 - 28 October 1981			Entire Year, 5 November 1980 - 28 October 1981			
		Mean	Range	No. of Samples	Mean	Range	No. of Samples	Mean	Range	No. of Samples	Mean	Range	No. of Samples	Mean	Range	No. of Samples	EPA (1980) Criteria
Chromium (ug/l)	T	1.2		1	2.1		1	<0.5		1	0.5		1	1.0	<0.5-2.1	4	
	D	1.2		1	1.3		1	<0.5		1				0.9	<0.5-1.3	3	
Nickel (ug/l)	T	<1		1	<1		1	<1		1	<1		1	<1	all <1	4	37/720
	D	<1		1	<1		1	<1		1				<1	all <1	3	
Iron (ug/l)	T	350		1	1260		1	240		1	200		1	512	200-1260	4	1000
	D	70		1	50		1	200		1				107	50-200	3	
Zinc (ug/l)	T	<5		1	<5		1	<5		1	<5		1	<5	all <5	4	47/115
	D	<5		1	<5		1	<5		1				<5	all <5	3	
Copper (ug/l)	T	1		1	2		1	1		1	1		1	1	1-2	4	5.6/6.9
	D	1		1	<1		1	1		1				<1	<1-1	3	
Calcium (mg/l)	D	6.1		1	4.2		1	8.2		1				6.2	4.2-8.2	3	
Magnesium (mg/l)	D	1.9		1	1.5		1	2.2		1				1.9	1.5-2.2	3	
Potassium (mg/l)	D	0.50		1	0.45		1	0.50		1				0.48	0.45-0.50	3	