original 007/005 #5
cc: priscilla

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DIVISION OF
OIL GAS & MINING

0006

January 11, 1993

Mr. Don Ostler, Director
Division of Water Quality
Department of Environmental Quality
P. O. Box 144870
Salt Lake City, Utah 84114-4870

Dear Mr. Ostler:

RE: SKYLINE MINES - CHRONIC TOXICITY TESTING

The attached reports are submitted in response to an agreement reached with members of your staff in a meeting held on September 16, 1992, and as formally requested in correspondence dated September 30, 1992. We are pleased to report that the criteria for chronic whole effluent toxicity testing for both the Ceriodaphnia sp. and Pimephales promelas (fathead minnow) were successfully met. We regret the delay in completing these tests. The laboratory problems encountered were beyond our control.

Sincerely.

Keith W. Welch for

Glen A. Zumwalt
Vice President/General Manager

Keith Welch:gb

cc: Keith Welch
Byron Haddock - DWQM

Attachments

Utah Fuel Company
A SUBSIDIARY OF THE COASTAL CORPORATION
P O BOX 719 • HELPER UT 84526 • 801 637-7925 • FAX 801 637-7929
SALT LAKE 801 596-7111

FORD ANALYTICAL LABORATORIES

CHEMICAL AND BACTERIOLOGICAL ANALYSIS

CHRONIC WHOLE EFFLUENT TOXICITY REPORT

PIMEPHALES (Fathead Minnow)

LAB NUMBER 28601

PERMITTEE UTAH FUEL NPDES NUMBER UT-0023540

TEST ANIMAL / AGE Fathead Minnows / 5 day SAMPLE SKYLINE MINE EFFLUENT

112392FH 1400 30 NOV 92

TEST START 1500 4 DEC 92 TEST END 1300 12 DEC 92 DILUTION WATER LAB WATER

HARDNESS CONTROL 700 RECEIVING - EFFLUENT 700

CHLORINE CONTROL 0 RECEIVING - EFFLUENT 0

TEST CONDITIONS

4 sets of 5 Fathead Larvae (Pimephales promelas) were exposed to diluted Effluent at 5 concentrations for 7 days. Survival and growth at the end of test period were measured and statistically evaluated.

Animal Age at test start:	5 days old
Population Density:	40 fish/L
Food:	Newly hatched Brine Shrimp Nauplii (0.15mL/container twice Daily)
Aeration:	None
Dissolved Oxygen:	6.6 - 7.8
Water Replacement:	Changed Daily
Temperature:	25°C ± 1°C
Photo Period:	16 Hours Light/8 Hours Dark
pH:	7.2 - 8.0
Water:	20% Mineral Water (Perrier) in D.I. Water
Sample Concentrations:	6.25 %, 12.5 %, 25.0 %, 50.0 %, and 100.0 %, Effluent in diluted mineral water.

Results:

There was NO Significant effect on growth. (Results ANOVA-Dunnett's Test)

NOEC (Growth) = 100.0 %

LOEC (Growth) = Not Determined

There was NO Significant effect on survival. (Results of Fishers Exact Test)

NOEC (Survival) = 100.0 %

LOEC (Survival) = Not Determined

Enclosed are data sheets and statistical reports

Respectfully submitted,

Marion Andersen

40 West Louise Avenue • Salt Lake City, Utah 84115 • PHONE (801) 466-8761 • FAX (801) 466-8763

CHRONIC WEIGHT DATA

CLIENT	LAB NO.	DATE
UTAH FUEL	28601	2 DEC 92

SAMPLE	ORGANISM
EFFLUENT	FATHEAD 5 Day 112392 FH

DRYING TIME	DRYING TEMPERATURE	ANALYST
12 hours	105 C	NATASHA

	REP	TARE WT. (g)	TOT DRY WEIGHT	FISH WEIGHT	NO. FISH	WEIGHT /FISH	MEAN WEIGHT
INITIAL	A	1.0102	1.0134	0.0032	5	0.00064	0.00044
	B	1.0002	1.0017	0.0015	5	0.00030	
	C	1.0053	1.0080	0.0027	5	0.00054	
	D	0.9974	0.9988	0.0014	5	0.00028	

EFFLUENT CONCENTRATION	REP	TARE WT. (g)	TOT DRY WEIGHT	FISH WEIGHT	NO. FISH	WEIGHT /FISH	MEAN WEIGHT
CONTROL	A	1.0048	1.0088	0.0040	5	0.00080	0.00078
	B	1.0021	1.0061	0.0040	5	0.00080	
	C	1.0043	1.0080	0.0037	5	0.00074	
	D	1.0055	1.0093	0.0038	5	0.00076	
6.25% Effint	A	0.9993	1.0033	0.0040	5	0.00080	0.00083
	B	1.0017	1.0040	0.0023	3	0.00077	
	C	1.0043	1.0083	0.0040	5	0.00080	
	D	1.0040	1.0088	0.0048	5	0.00096	
12.5% Effint	A	1.0003	1.0036	0.0033	4	0.00083	0.00080
	B	1.0018	1.0048	0.0030	4	0.00075	
	C	1.0062	1.0096	0.0034	4	0.00085	
	D	1.0028	1.0067	0.0039	5	0.00078	
25% Effluent	A	0.9998	1.0027	0.0029	3	0.00097	0.00084
	B	1.0059	1.0087	0.0028	3	0.00093	
	C	1.0065	1.0102	0.0037	5	0.00074	
	D	1.0009	1.0045	0.0036	5	0.00072	
50% Effluent	A	1.0032	1.0071	0.0039	4	0.00098	0.00084
	B	1.0076	1.0126	0.0050	5	0.00100	
	C	1.0069	1.0097	0.0028	4	0.00070	
	D	1.0010	1.0045	0.0035	5	0.00070	
100% Effint	A	1.0020	1.0067	0.0047	5	0.00094	0.00076
	B	1.0043	1.0079	0.0036	4	0.00090	
	C	0.9996	1.0025	0.0029	5	0.00058	
	D	1.0048	1.0072	0.0024	4	0.00060	

COMMENTS Testing Began 1500 on 2 December.

CHRONIC FATHEAD DATA SHEET 3

PERMITTEE UTAH FUEL NPDES NUMBER LAB NUMBER 28601

SAMPLE SKYLINE MINE EFFLUENT

DAY	CONTROL		6.25 %		12.5 %		25.0 %		50.0 %		100.0 %	

DISSOLVED OXYGEN %

	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW
1	7.5	7.2	7.0	6.8	7.2	7.1	7.7	7.6	7.5	7.4	7.8	7.6
2	7.8	8.1	7.6	7.2	7.5	7.1	7.5	7.3	7.7	7.5	7.8	7.7
3	7.7	7.8	7.5	6.8	7.7	6.6	7.3	6.6	7.8	6.9	7.7	6.8
4	7.8	7.9	7.7	6.8	7.3	6.6	7.7	6.9	7.5	6.9	7.6	6.6
5	7.7	7.3	7.7	6.6	7.5	6.6	7.4	7.1	7.5	6.9	7.7	6.7
6	7.6	8.5	7.6	7.9	7.0	8.1	7.5	8.1	7.2	7.8	7.3	7.1
7	7.8	7.9	7.7	7.4	7.1	7.2	7.7	7.5	7.3	7.6	7.7	6.8
8	7.7	7.9	7.7	7.2	7.1	7.1	7.6	7.4	7.3	7.1	7.6	6.7
9												
10												

TEMPERATURE °C

1	24.6	24.5	24.6	24.3	24.7	24.0	24.6	24.0	24.6	24.0	24.6	24.0
2	24.8	24.8	24.5	25.0	24.5	25.0	24.8	24.8	24.7	24.6	24.5	24.7
3	24.6	24.2	24.6	24.3	24.6	24.3	24.6	24.5	24.5	24.5	24.6	24.8
4	24.7	24.6	24.4	24.6	24.7	24.8	24.7	24.7	24.7	24.7	24.4	24.6
5	24.6	24.5	24.5	24.2	24.6	24.1	24.6	24.0	24.6	24.0	24.6	24.0
6	24.6	24.3	24.6	24.0	24.6	24.0	24.6	24.0	24.6	23.7	24.6	23.7
7	24.6	24.3	24.6	24.0	24.6	24.1	24.5	24.0	24.6	24.2	24.6	24.1
8	24.7	24.5	24.6	24.3	24.6	24.3	24.6	24.3	24.7	24.0	24.6	24.0
9												
10												

pH

1	7.2	7.2	7.0	6.9	7.0	7.0	7.0	7.0	6.9	7.0	6.9	7.0
2	7.2	7.3	7.0	7.1	7.1	7.1	7.0	7.1	7.1	7.1	6.9	7.0
3	7.3	7.3	7.1	7.0	7.2	7.0	7.1	7.0	7.3	7.0	7.0	7.1
4	7.2	7.3	7.1	7.1	7.2	7.0	7.2	7.3	7.2	7.0	7.2	7.0
5	7.4	7.2	7.3	7.0	7.2	7.0	7.3	7.0	7.2	7.1	7.2	6.9
6	7.2	7.2	7.0	7.0	7.0	7.0	7.0	7.0	7.2	7.1	7.0	6.9
7	7.2	7.2	7.0	7.0	7.0	7.0	7.0	7.0	7.1	7.1	6.9	6.9
8	7.3	7.2	7.0	7.0	7.1	7.0	7.0	7.0	7.1	7.1	7.0	6.9
9												
10												

CHRONIC GROWTH FATHEAD MINNOW-UTAH FUEL-SKYLINE
File: F:\TOX\28601.FHG Transform: ARC SINE(SQUARE ROOT(Y))

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	CONTROL	4	1.036	1.107	1.077
2	6.25 %	4	1.071	1.369	1.164
3	12.5 %	4	1.047	1.173	1.112
4	25.0 %	4	1.013	1.397	1.187
5	50.0 %	4	0.991	1.429	1.189
6	100.0 %	4	0.866	1.323	1.081

CHRONIC GROWTH FATHEAD MINNOW-UTAH FUEL-SKYLINE
File: F:\TOX\28601.FHG Transform: ARC SINE(SQUARE ROOT(Y))

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	CONTROL	0.001	0.036	0.018
2	6.25 %	0.019	0.138	0.069
3	12.5 %	0.003	0.058	0.029
4	25.0 %	0.037	0.192	0.096
5	50.0 %	0.053	0.231	0.116
6	100.0 %	0.057	0.239	0.119

TITLE: CHRONIC GROWTH FATHEAD MINNOW-UTAH FUEL-SKYLINE
FILE: F:\TOX\28601.FHG
TRANSFORM: ARC SINE(SQUARE ROOT(Y)) NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	CONTROL	1	0.8000	1.1071
1	CONTROL	2	0.8000	1.1071
1	CONTROL	3	0.7400	1.0357
1	CONTROL	4	0.7600	1.0588
2	6.25 %	1	0.8000	1.1071
2	6.25 %	2	0.7700	1.0706
2	6.25 %	3	0.8000	1.1071
2	6.25 %	4	0.9600	1.3694
3	12.5 %	1	0.8300	1.1458
3	12.5 %	2	0.7500	1.0472
3	12.5 %	3	0.8500	1.1731
3	12.5 %	4	0.7800	1.0826
4	25.0 %	1	0.9700	1.3967
4	25.0 %	2	0.9300	1.3030
4	25.0 %	3	0.7400	1.0357
4	25.0 %	4	0.7200	1.0132
5	50.0 %	1	0.9800	1.4289
5	50.0 %	2	1.0000	1.3453
5	50.0 %	3	0.7000	0.9912
5	50.0 %	4	0.7000	0.9912
6	100.0 %	1	0.9400	1.3233
6	100.0 %	2	0.9000	1.2490
6	100.0 %	3	0.5800	0.8657
6	100.0 %	4	0.6000	0.8861

CHRONIC GROWTH FATHEAD MINNOW-UTAH FUEL-SKYLINE
File: F:\TOX\28601.FHG Transform: ARC SINE(SQUARE ROOT(Y))

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.053	0.011	0.379
Within (Error)	18	0.513	0.029	
Total	23	0.566		

Critical F value = 2.77 (0.05,5,18)
Since F < Critical F FAIL TO REJECT Ho:All groups equal

CRITICAL FISHERS VALUE (20,20,20) (p=0.05) IS 15. b VALUE IS 16.
Since b is greater than 15 there is no significant difference between CONTROL and TREATMENT at the 0.05 level.

FISHERS EXACT TEST

IDENTIFICATION	NUMBER OF ALIVE	NUMBER OF DEAD	TOTAL ANIMALS
CONTROL	20	0	20
50.0 %	18	2	20
TOTAL	38	2	40

CRITICAL FISHERS VALUE (20,20,20) (p=0.05) IS 15. b VALUE IS 18.
Since b is greater than 15 there is no significant difference between CONTROL and TREATMENT at the 0.05 level.

FISHERS EXACT TEST

IDENTIFICATION	NUMBER OF ALIVE	NUMBER OF DEAD	TOTAL ANIMALS
CONTROL	20	0	20
100.0 %	18	2	20
TOTAL	38	2	40

CRITICAL FISHERS VALUE (20,20,20) (p=0.05) IS 15. b VALUE IS 18.
Since b is greater than 15 there is no significant difference between CONTROL and TREATMENT at the 0.05 level.

SUMMARY OF FISHERS EXACT TESTS

GROUP	IDENTIFICATION	NUMBER EXPOSED	NUMBER DEAD	SIG (P=.05)
	CONTROL	20	0	
1	6.25 %	20	2	
2	12.5 %	20	3	
3	25.0 %	20	4	
4	50.0 %	20	2	
5	100.0 %	20	2	

FISHERS EXACT TEST

IDENTIFICATION	NUMBER OF ALIVE	NUMBER OF DEAD	NUMBER OF TOTAL ANIMALS
CONTROL	20	0	20
6.25 %	18	2	20
TOTAL	38	2	40

CRITICAL FISHERS VALUE (20,20,20) (p=0.05) IS 15. b VALUE IS 18.
Since b is greater than 15 there is no significant difference between CONTROL and TREATMENT at the 0.05 level.

FISHERS EXACT TEST

IDENTIFICATION	NUMBER OF ALIVE	NUMBER OF DEAD	NUMBER OF TOTAL ANIMALS
CONTROL	20	0	20
12.5 %	17	3	20
TOTAL	37	3	40

CRITICAL FISHERS VALUE (20,20,20) (p=0.05) IS 15. b VALUE IS 17.
Since b is greater than 15 there is no significant difference between CONTROL and TREATMENT at the 0.05 level.

FISHERS EXACT TEST

IDENTIFICATION	NUMBER OF ALIVE	NUMBER OF DEAD	NUMBER OF TOTAL ANIMALS
CONTROL	20	0	20
25.0 %	16	4	20

CHRONIC GROWTH FATHEAD MINNOW-UTAH FUEL-SKYLINE
File: F:\TOX\28601.FHG Transform: ARC SINE(SQUARE ROOT(Y))

Bartletts test for homogeneity of variance

Calculated B statistic = 10.82
Table Chi-square value = 15.09 (alpha = 0.01)
Table Chi-square value = 11.07 (alpha = 0.05)

Average df used in calculation ==> df (avg n - 1) = 3.00
Used for Chi-square table value ==> df (#groups-1) = 5

Data PASS homogeneity test at 0.01 level. Continue analysis.

NOTE: If groups have unequal replicate sizes the average replicate size is used to calculate the B statistic (see above).

CHRONIC GROWTH FATHEAD MINNOW-UTAH FUEL-SKYLINE
File: F:\TOX\28601.FHG Transform: ARC SINE(SQUARE ROOT(Y))

Shapiro Wilks test for normality

D = 0.513

W = 0.933

Critical W (P = 0.05) (n = 24) = 0.916
Critical W (P = 0.01) (n = 24) = 0.884

Data PASS normality test at P=0.01 level. Continue analysis.

FORD ANALYTICAL LABORATORIES

CHEMICAL AND BACTERIOLOGICAL ANALYSIS

CHRONIC WHOLE EFFLUENT TOXICITY REPORT

CERIODAPHNIA

LAB NUMBER 28602

PERMITTEE UTAH FUEL

NPDES NUMBER UT-0023540

TEST ANIMAL / AGE CERIODAPHNIA < 24 HOUR

SAMPLE SKYLINE MINE EFFLUENT
1400 30 NOV 92

TEST START 1500 4 DEC 92 TEST END 1300 12 DEC 92

DILUTION WATER LAB WATER

HARDNESS CONTROL 700 RECEIVING - EFFLUENT 700

CHLORINE CONTROL 0 RECEIVING - EFFLUENT 0

TEST CONDITIONS

10 Ceriodaphnia dubia neonates were exposed to Effluent at 5 concentrations for 8 days. Survival and reproduction at the end of test period were measured and statistically evaluated.

Animal Age at test start:	< 24 hours
Population Density:	1 Neonate/25 mL
Food:	YCT + Algae Suspension (0.1 mL / day)
Aeration:	None
Dissolved Oxygen:	6.6 - 8.5
Water Replacement:	Changed Daily
Temperature:	25°C ± 1°C
Photo Period:	16 Hours Light/8 Hours Dark
pH:	6.9 - 7.4
Control Water:	20% Mineral Water (Perrier) in D.I. Water
Receiving Water:	None supplied with sample
Sample Concentrations:	100.0 %, 50.0 %, 25.0 %, 12.5 % and 6.25 % Effluent diluted in Lab Water (20 % Mineral).

Results:

There was NO Significant effect on reproduction. (Results ANOVA-Dunnett's Test)

NOEC (Reproduction) = 100.0 %

LOEC (Reproduction) = Not Determined

There was NO Significant effect on survival. (Results of Fishers Exact Test)

NOEC (Survival) = 100.0 %

LOEC (Survival) = Not Determined

Enclosed are data sheets and statistical reports

Respectfully submitted,

Marion Andersen

40 West Louise Avenue • Salt Lake City, Utah 84115 • PHONE (801) 466-8761 • FAX (801) 466-8763

CHRONIC CERIODAPHNIA DATA SHEET 1

PERMITTEE UTAH FUEL NPDES NUMBER LAB NUMBER 28602

SAMPLE SKYLINE MINE EFFLUENT

CONTROL OFFSPRING

	A	B	C	D	E	F	G	H	I	J	MEAN	TOTAL
1	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0
4	3	0	0	0	5	0	2	0	0	0	1	10
5	2	6	1	0	0	0	2	4	1	0	1.6	16
6	4	0	0	4	6	8	0	0	5	6	3.3	33
7	0	8	7	0	0	0	6	8	1	2	3.2	32
8	8	3	6	10	8	8	2	1	8	6	5.6	56
9												
10												
Tot	17	17	14	14	19	16	12	13	15	14	15.2	152

6.25 % OFFSPRING

1	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	2	0	0	0	0	0.2	2
4	1	0	2	1	0	0	0	1	0	2	0.7	7
5	0	2	0	2	2	6	2	0	2	3	1.9	19
6	4	0	4	3	3	0	0	6	5	0	2.5	25
7	6	5	0	0	5	8	3	0	5	5	3.7	37
8	5	7	7	10	5	0	9	8	4	5	6.0	60
9												
10												
TOT	16	14	13	16	15	16	14	15	16	15	15.0	150

12.5 % OFFSPRING

1	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	1	0	0	0	0	0.1	1
4	1	1	1	1	2	0	1	1	1	0	0.9	9
5	3	2	0	3	0	5	0	0	0	2	1.5	15
6	0	3	7	4	4	3	4	6	3	5	3.9	39
7	4	0	0	0	0	0	6	0	4	5	1.9	19
8	7	10	8	6	7	7	5	8	7	5	7.0	70
9												
10												
TOT	15	16	16	14	13	16	16	15	15	17	15.3	153

CHRONIC CERIODAPHNIA DATA SHEET 2

PERMITTEE UTAH FUEL NPDES NUMBER LAB NUMBER 28602

SAMPLE SKYLINE MINE EFFLUENT

25.0 % OFFSPRING

	A	B	C	D	E	F	G	H	I	J	MEAN	TOTAL
1	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0
3	0	2	1	0	0	0	0	2	0	0	0.5	5
4	0	0	0	1	1	2	1	0	1	1	0.7	7
5	2	6	6	0	0	0	2	4	0	0	2.0	20
6	0	0	4	6	3	4	3	5	7	4	3.6	36
7	3	8	6	0	4	0	0	6	0	6	3.3	33
8	9	0	0	8	7	7	10	0	8	5	5.4	54
9												
10												
TOT	14	16	17	15	15	13	16	17	16	16	15.5	155

50.0 % OFFSPRING

1	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	1	0	0.1	1
4	1	2	1	1	0	1	0	0	0	1	0.7	7
5	3	X	0	0	2	1	2	2	1	0	1.1	11
6	0		7	4	3	6	0	4	6	6	3.6	36
7	4		0	6	3	0	7	5	0	0	2.5	25
8	10		8	7	9	8	7	6	8	8	7.1	71
9												
10												
TOT	18	2	16	18	17	16	16	17	16	15	15.1	151

100.0 % OFFSPRING

1	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0
3	0	1	0	0	0	1	0	0	0	0	0.2	2
4	1	0	1	1	0	0	2	1	1	1	0.8	8
5	0	4	0	1	2	5	4	0	0	2	1.8	18
6	7	3	6	1	5	3	7	7	4	3	5.0	50
7	0	0	0	2	5	0	X	0	6	0	1.3	13
8	8	7	8	9	5	7		8	5	10	7.4	74
9												
10												
TOT	16	15	15	14	17	16	13	16	16	16	15.4	154

CHRONIC CERIODAPHNIA DATA SHEET 3

PERMITTEE UTAH FUEL NPDES NUMBER LAB NUMBER 28602

SAMPLE SKYLINE MINE EFFLUENT

DAY	CONTROL		6.25 %		12.5 %		25.0 %		50.0 %		100.0 %	
	DISSOLVED OXYGEN %											
	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW
1	7.82	8.12	7.61	7.9	7.68	7.9	7.62	7.94	7.92	8.02	7.98	8.04
2	7.85	8.06	7.62	7.92	7.52	7.72	7.58	7.76	7.73	7.76	7.82	7.67
3	7.75	8.04	7.52	7.88	7.78	7.16	7.39	7.54	7.84	7.49	7.77	7.84
4	7.82	8.00	7.78	7.96	7.36	7.28	7.73	7.81	7.56	7.59	7.67	7.93
5	7.75	8.01	7.71	7.80	7.52	7.16	7.49	7.72	7.59	7.85	7.75	7.88
6	7.69	7.95	7.65	7.92	7.05	7.25	7.55	7.62	7.26	7.32	7.38	7.52
7	7.82	7.98	7.78	7.96	7.16	7.28	7.78	7.78	7.36	7.42	7.75	7.77
8	7.75	7.82	7.71	7.8	7.1	7.16	7.62	7.68	7.3	7.35	7.62	7.68
9												
10												
	TEMPERATURE °C											
1	24.6	21.4	24.6	21.3	24.7	21.4	24.6	21.4	24.6	21.4	24.6	21.3
2	24.8	22.0	24.5	22.0	24.5	22.2	24.8	21.9	24.7	22.8	24.5	22.4
3	24.6	22.4	24.6	22.4	24.6	22.4	24.6	22.4	24.5	22.4	24.6	23.0
4	24.7	22.3	24.4	22.6	24.7	22.1	24.7	22.5	24.7	22.7	24.4	22.5
5	24.6	22.3	24.5	22.3	24.6	22.3	24.6	22.4	24.6	22.3	24.6	22.3
6	24.6	22.1	24.6	22.1	24.6	22.2	24.6	22.2	24.6	22.1	24.6	22.1
7	24.6	22.1	24.6	22.1	24.6	22.1	24.5	22.1	24.6	22.2	24.6	22.1
8	24.7	22.3	24.6	22.2	24.6	22.3	24.6	22.3	24.7	22.3	24.6	22.3
9												
10												
	pH											
1	7.2	7.2	7.0	6.9	7.0	7.0	7.0	7.0	6.9	7.0	6.9	7.0
2	7.2	7.3	7.0	7.1	7.1	7.1	7.0	7.1	7.1	7.1	6.9	7.0
3	7.3	7.3	7.1	7.0	7.2	7.0	7.1	7.0	7.3	7.0	7.0	7.1
4	7.2	7.3	7.1	7.1	7.2	7.0	7.2	7.3	7.2	7.0	7.2	7.0
5	7.4	7.2	7.3	7.0	7.2	7.0	7.3	7.0	7.2	7.1	7.2	6.9
6	7.2	7.2	7.0	7.0	7.0	7.0	7.0	7.0	7.2	7.1	7.0	6.9
7	7.2	7.2	7.0	7.0	7.0	7.0	7.0	7.0	7.1	7.1	6.9	6.9
8	7.3	7.2	7.0	7.0	7.1	7.0	7.0	7.0	7.1	7.1	7.0	6.9
9												
10												