BRAY CURITIS PERCENT DISSIMILARITY (PD) INDICES

BENTHOS PD

PD VALUE	SAMPLE SITE					
	S120	S340	S650	S1000	S2000	S3500
S120	–					
S340	1.00	–				
S650	0.96	0.73	–			
S1000	0.95	0.66	0.13	–		
S2000	0.97	0.84	0.30	0.41	–	
S3500	0.72	1.00	0.70	0.80	0.79	–

PHYTOPLANKTON DIATOMS PD

PD VALUE	SAMPLE SITE					
	S120	S340	S650	S1000	S2000	S3500
S120	–					
S340	0.22	–				
S650	0.25	0.27	–			
S1000	0.19	0.25	0.24	–		
S2000	0.21	0.29	0.22	0.23	–	
S3500	0.46	0.45	0.48	0.41	0.46	–

ZOOPLANKTON PD

PD VALUE	SAMPLE SITE					
	S120	S340	S650	S1000	S2000	S3500
S120	–					
S340	0.34	–				
S650	0.11	0.39	–			
S1000	0.45	0.60	0.39	–		
S2000	NA	NA	NA	NA	–	
S3500	NA	NA	NA	NA	NA	–

FLOAT PERIPHYTON DIATOMS PD

PD VALUE	SAMPLE SITE					
	S120	S340	S650	S1000	S2000	S3500
S120	–					
S340	0.14	–				
S650	0.24	0.25	–			
S1000	0.24	0.31	0.31	–		
S2000	NA	NA	NA	NA	–	
S3500	NA	NA	NA	NA	NA	–

FLOAT PERIPHYTON NON–DIATOMS PD

PD VALUE	SAMPLE SITE					
	S120	S340	S650	S1000	S2000	S3500
S120	–					
S340	1.00	–				
S650	0.79	1.00	–			
S1000	0.72	0.54	0.69	–		
S2000	NA	NA	NA	NA	–	
S3500	NA	NA	NA	NA	NA	–

EPIPSAMMON PD

PD VALUE	SAMPLE SITE					
	S120	S340	S650	S1000	S2000	S3500
S120	–					
S340	0.22	–				
S650	0.33	0.24	–			
S1000	0.27	0.28	0.34	–		
S2000	NA	NA	NA	NA	–	
S3500	NA	NA	NA	NA	NA	–

SHORE PERIPHYTON PD

PD VALUE	SAMPLE SITE							
	A1	A2	A3	A4	W1	W2	W3	W4
A1	–							
A2	0.35	–						
A3	0.25	0.11	–					
A4	0.30	0.33	0.29	–				
W1	0.60	0.48	0.55	0.62	–			
W2	0.53	0.53	0.47	0.55	0.24	–		
W3	0.68	0.65	0.65	0.6	0.38	0.38	–	
W4	0.41	0.39	0.33	0.44	0.21	0.16	0.42	–

APPENDIX C
BIOLOGICAL ASSESSMENT

ALGAL BIOASSAY SUMMARY DATA

ALGAL BIOASSAY STATISTICAL ANALYSES

DATA

TABLE 2. SUMMARY OF SELENASTRUM ALGAL BIOMASS AND ANALYTICAL DATA

Parameter	Units	TEST EXPOSURES													
		Control (a)		Effluent		S120 (TRMT C)		S340 (TRMT B)		S3500 (TRMT A)		95/5 (b) (TRMT D)		97.5/2.5(c) (TRMT E)	
		Initial	Day 8	Initial	Day 8	Initial	Day 8	Initial	Day 8	Initial	Day 8	Initial	Day 8	Initial	Day 8
CHEMICAL PARAMETERS															
pH	s.u.	7.51	9.40	7.74	–	8.05	8.55	8.05	8.55	8.18	8.55	8.33	8.54	7.95	8.54
Alkalinity (C_aCO_3)	mg/L	14	44	98	–	84	101	86	100	91	100	87	101	91	100
Hardness (C_aCO_3)	mg/L	46	47	242	–	138	141	133	140	132	141	139	141	134	138
Ammonia Nitrogen	mg/L	< 0.01	< 0.01	0.05	–	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.06	< 0.01	< 0.01	< 0.01
Nitrite	mg/L	< 0.02	0.19	< 0.02	–	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Nitrate	mg/L	8.6	1.98	2.4	–	0.27	0.27	0.22	0.28	0.19	0.2	0.30	0.37	0.25	0.26
TKN	mg/L		1.16		–		0.63		0.76		0.84		0.51		0.67
Total Nitrogen	mg/L	0.35	3.14	1.78	–	0.20	0.9	0.48	1.04	0.08	1.04	0.20	0.88	0.14	0.93
Total Phosphorus	mg/L	0.77	1.09	0.05	–	0.53	0.08	0.22	1.13	0.01	1.26	0.36	< 0.01	0.02	0.51
Chloride	mg/L	12	14	284	–	29	30	17	19	11	12	27	27	19	20
Sulfate	mg/L	34	32	356	–	54	43	36	33	30	25	48	44	34	36
Total Calcium	mg/L	1.67	1.73	61	–	34	33	32	31	31	32	32	32	31	31
Total Magnesium	mg/L	10	11	21	–	12	12	12	12	11	12	12	12	12	12
Total Potassium	mg/L	2.05	1.44	7.8	–	1.59	1.44	1.34	1.12	1.20	1.09	1.47	1.32	1.33	1.21
BIOMASS PARAMETERS															
Average Cell Counts	cells/mL	2,000	6,525,000	–	–	2,000	11,667	2,000	8,333	2,000	31,667	2,000	3,333	2,000	5,000
Average Dry Weight	mg/L	0.083	86.2	–	–	0.083	3.2	0.083	1.2	0.083	2.3	0.083	1.4	0.083	1.2
Average Chlorophyll-a	µg/L	0.304	66.4	–	–	0.304	2.7	0.304	2.3	0.304	1.1	0.304	0.86	0.304	0.64

(a) USEPA control algal medium for Selenastrum toxicity tests (USEPA 600/4-89/001).
(c) Mixture consists of 95 percent S3500 and 5 percent effluent.
(c) Mixture consists of 97.5 percent S3500 and 2.5 percent effluent.
NC = Not Conducted
Note: Biological data are means of three replicate exposures

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TABLE 1. SUMMARY OF SCENEDESMUS ALGAL BIOMASS AND ANALYTICAL DATA

Parameter	Units	TEST EXPOSURES													
		Control (a)		Effluent		S120 (TRMT C)		S340 (TRMT B)		S3500 (TRMT A)		95/5 (b) (TRMT D)		97.5/2.5(c) (TRMT E)	
		Initial	Day 8	Initial	Day 8	Initial	Day 8	Initial	Day 8	Initial	Day 8	Initial	Day 8	Initial	Day 8
CHEMICAL PARAMETERS															
pH	s.u.	7.51	8.60	7.74	–	8.05	8.54	8.05	8.57	8.18	8.57	8.33	8.56	7.95	8.55
Alkalinity (C_aCO_3)	mg/L	14	104	96	–	84	97	88	100	91	106	87	98	91	100
Hardness (C_aCO_3)	mg/L	46	48	242	–	138	128	133	121	132	115	139	119	134	123
Ammonia Nitrogen	mg/L	< 0.01	< 0.01	0.05	–	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.06	< 0.01	< 0.01	< 0.01
Nitrite	mg/L	< 0.02	< 0.02	< 0.02	–	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Nitrate	mg/L	8.6	0.03	2.4	–	0.27	0.03	0.22	0.03	0.19	0.03	0.30	0.03	0.25	0.03
TKN	mg/L		1.48		–		0.96		0.97		0.96		0.63		0.61
Total Nitrogen	mg/L	0.35	1.51	1.78	–	0.20	0.99	0.48	1.00	0.08	1.01	0.20	0.66	0.14	0.64
Total Phosphorus	mg/L	0.77	0.17	0.05	–	0.53	3.61	0.22	0.34	0.01	0.50	0.36	0.03	0.02	0.41
Chloride	mg/L	12	13	284	–	29	26	17	18	11	12	27	23	19	19
Sulfate	mg/L	34	33	356	–	54	33	36	32	30	26	46	28	34	28
Total Calcium	mg/L	1.67	1.59	61	–	34	27	32	24	31	23	32	27	31	25
Total Magnesium	mg/L	10	10	21	–	12	12	12	12	11	11	12	12	12	12
Total Potassium	mg/L	2.05	1.27	7.8	–	1.59	1.34	1.34	1.14	1.20	1.01	1.47	1.28	1.33	1.15
BIOMASS PARAMETERS															
Average Cell Counts	cells/mL	2,000	1,050,000	–	–	2,000	13,333	2,000	10,000	2,000	11,667	2,000	15,000	2,000	6,667
Average Dry Weight	mg/L	0.148	207.1	–	–	0.148	34.3	0.148	35.1	0.148	36.9	0.148	35	0.148	33.4
Average Chlorophyll-a	µg/L	1.5	104.8	–	–	1.5	10.1	1.5	11.0	1.5	14.1	1.5	17.3	1.5	16.8

(a) USEPA control algal medium for Selenastrum toxicity tests (USEPA 600/4-89/001).
(c) Mixture consists of 95 percent S3500 and 5 percent effluent.
(c) Mixture consists of 97.5 percent S3500 and 2.5 percent effluent.
NC = Not Conducted
Note: Biological data are means of three replicate exposures

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TABLE 4. SCENEDESMUS AVERAGE CELL COUNTS BY DAY

DAY	EXPOSURES					
	CONTROL	S120 (C)	S340 (B)	S3500 (A)	97.5/25 (E)	95/5 (D)
INITIAL	2000	2000	2000	2000	2000	2000
1	NC	NC	NC	NC	NC	NC
2	NC	NC	NC	NC	NC	NC
3	36,667	6,667	15,000	5,000	13,333	5,000
4	101,667	3,333	0	10,000	8,333	16,667
5	116,667	13,333	6,667	15,000	10,000	8,333
6	100,000	13,333	10,000	8,333	11,667	6,667
7	168,333	5,000	6,667	10,000	1,667	1,667
8	105,000	13,333	10,000	11,667	6,667	15,000

NOTES:

NC = Not Counted. All replicates were not counted following examination of replicates which showed that cell densities were too sparse to allow for meaningful data.

Values of zero do not indicate that algal were dead, only that the replicate samples evaluated did not contain algae which were within the microcope counting field.

TABLE 3. ALGAL ASSAY NUTRIENT AND BIOLOGICAL PARAMETER SUMMARY

Parameter	Units	Control Calc.	Control Meas.	Effluent	S120	S340	S3500	Observed L. Michigan	97.5/2.5 S3500	95/5 S3500
Water Chemistry										
Ammonia Nitrogen	mg/L	<	0.01	0.05 <	0.01 <	0.01 <	0.01 <	0.01 <	0.01	0.06
Nitrite	mg/L	<	0.02 <	0.02 <	0.02 <	0.02 <	0.02 <	0.02 <	0.02 <	0.02
Nitrate	mg/L		8.6	2.4	0.27	0.22	0.19	0.22	0.25	0.30
TKN (Organic Nitrogen + Ammonia)	mg/L		0.35	1.78	0.20	0.48	0.06	–	0.14	0.20
Total Nitrogen	mg/L		8.97	4.2	0.49	0.72	0.27	–	0.41	0.52
TSIN	mg/L		8.63	2.47	0.3	0.25	0.22	0.25	0.28	0.38
Total Phosphorus	mg/L		0.77*	0.05	0.53	0.22	0.01	0.0071–0.0147	0.02	0.36
Orthophosphate	mg/L		0.77	–	–	–	–	0.0012–0.0019	–	–
Chloride	mg/L		12	284	29	17	11	12.8	19	27
Sulfate	mg/L		34		54	36	30	22	34	48
Algae–Cells/mL										
Selenastrum			6,525,000	NC	11,667	8,333	31,667		5,000	3,333
Scenedesmus			1,050,000	NC	13,333	10,000	11,667		6,667	15,000
Algae–Dry Wt. mg/L										
Selenastrum			88.2	NC	3.2	1.2	2.3		1.2	1.4
Scenedesmus			207.1	NC	34.3	35.1	36.9		33.4	35

* This will essentially all be Ortho–P.

NC = Not Conducted

TABLE 5. SELENASTRUM AVERAGE CELL COUNTS BY DAY

DAY	EXPOSURES					
	CONTROL	S120 (C)	S340 (B)	S3500 (A)	97.5/25 (E)	95/5 (D)
INITIAL	2000	2000	2000	2000	2000	2000
1	NC	NC	NC	NC	NC	NC
2	NC	NC	NC	NC	NC	NC
3	278,333	0	0	0	0	0
4	685,000	23,333	10,000	28,333	21,667	8,333
5	1,528,333	41,667	8,333	15,000	18,333	11,667
6	3,366,667	20,000	5,000	3,333	1,667	5,000
7	6,291,667	8,333	15,000	20,000	5,000	10,000
8	6,525,000	11,667	8,333	31,667	5,000	3,333

NOTES:

NC = Not Counted. All replicates were not counted following examination of replicates which showed that cell densities were too sparse to allow for meaningful data.

Values of zero do not indicate that algal were dead, only that the replicate samples evaluated did not contain algae which were within the microcope counting field.

STATISTICS

TITLE: 3149 ALGAL EXP SELENASTRUM CELL COUNTS DAY 8 LOG(X+1)

FILE: FSECCL

TRANSFORM: NATURAL LOG(Y) NUMBER OF GROUPS: 5

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	TRMT A ($3500)	1	65001.0000	11.0822
1	TRMT A ($3500)	2	15001.0000	9.6159
1	TRMT A ($3500)	3	15001.0000	9.6159
2	TRMT B ($340)	1	10001.0000	9.2104
2	TRMT B ($340)	2	10001.0000	9.2104
2	TRMT B ($340)	3	5001.0000	8.5174
3	TRMT C ($120)	1	10001.0000	9.2104
3	TRMT C ($120)	2	5001.0000	8.5174
3	TRMT C ($120)	3	20001.0000	9.9035
4	TRMT D (5%)	1	5001.0000	8.5174
4	TRMT D (5%)	2	5001.0000	8.5174
4	TRMT D (5%)	3	1.0000	0.0000
5	TRMT E (2.5%)	1	10001.0000	9.2104
5	TRMT E (2.5%)	2	1.0000	0.0000
5	TRMT E (2.5%)	3	5001.0000	8.5174

TITLE: 3149 ALGAL EXP SCENEDESMUS CELL COUNTS DAY 8 LOG(X-1)

FILE: FSCCCL

TRANSFORM: NATURAL LOG(Y) NUMBER OF GROUPS: 5

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	TRMT A	1	10001.0000	9.2104
1	TRMT A	2	10001.0000	9.2104
1	TRMT A	3	15001.0000	9.6159
2	TRMT B	1	15001.0000	9.6159
2	TRMT B	2	5001.0000	8.5174
2	TRMT B	3	10001.0000	9.2104
3	TRMT C	1	15001.0000	9.6159
3	TRMT C	2	10001.0000	9.2104
3	TRMT C	3	15001.0000	9.6159
4	TRMT D	1	10001.0000	9.2104
4	TRMT D	2	20001.0000	9.9035
4	TRMT D	3	15001.0000	9.6159
5	TRMT E	1	10001.0000	9.2104
5	TRMT E	2	5001.0000	8.5174
5	TRMT E	3	5001.0000	8.5174

£: 3149 ALGAL EXP SELENASTRUM CHLOROPHYLL-a (µg/L) DAY 8

FILE: FSECX8

TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 5

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	TRMT A ($3500)	1	0.5300	0.5300
1	TRMT A ($3500)	2	1.5000	1.9000
1	TRMT A ($3500)	3	0.9300	0.9300
2	TRMT B ($340)	1	3.2000	3.2000
2	TRMT B ($340)	2	3.1000	3.1000
2	TRMT B ($340)	3	0.4400	0.4400
3	TRMT C ($120)	1	2.6000	2.6000
3	TRMT C ($120)	2	1.6000	1.6000
3	TRMT C ($120)	3	3.8800	3.8800
4	TRMT D (5%)	1	0.9900	0.9900
4	TRMT D (5%)	2	0.7900	0.7900
4	TRMT D (5%)	3	0.7900	0.7900
5	TRMT E (2.5%)	1	0.5300	0.5300
5	TRMT E (2.5%)	2	1.1000	1.1000
5	TRMT E (2.5%)	3	0.2000	0.2000

S: 3149 ALGAL EXP SCENEDESMUS CHLOROPHYLL-a (Ig/L) DAY 8

FILE: FSCCA8

TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 5

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	TRMT A ($3500)	1	16.3000	16.3000
1	TRMT A ($3500)	2	17.6000	17.6000
1	TRMT A ($3500)	3	8.4000	8.4000
2	TRMT B ($340)	1	8.5000	8.5000
2	TRMT B ($340)	2	3.4000	3.4000
2	TRMT B ($340)	3	21.2000	21.2000
3	TRMT C ($120)	1	6.3000	6.3000
3	TRMT C ($120)	2	6.1000	6.1000
3	TRMT C ($120)	3	17.9000	17.9000
4	TRMT D (5%)	1	24.4000	24.4000
4	TRMT D (5%)	2	12.4000	12.4000
4	TRMT D (5%)	3	15.0000	15.0000
5	TRMT E (2.5%)	1	15.6000	15.6000
5	TRMT E (2.5%)	2	17.0000	17.0000
5	TRMT E (2.5%)	3	17.7000	17.7000

S: 3149 ALGAL EXP SELENASTRUM DRY WEIGHT (mg/L) DAY 8

FILE: FSEDW8

TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 5

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	TRMT A (S3500)	1	4.3000	4.3000
1	TRMT A (S3500)	2	1.2000	1.2000
1	TRMT A (S3500)	3	1.4000	1.4000
2	TRMT B (S340)	1	1.4000	1.4000
2	TRMT B (S340)	2	0.9000	0.9000
2	TRMT B (S340)	3	1.3000	1.3000
3	TRMT C (S120)	1	1.6000	1.6000
3	TRMT C (S120)	2	1.3000	1.3000
3	TRMT C (S120)	3	6.6000	6.6000
4	TRMT D (5%)	1	1.5000	1.5000
4	TRMT D (5%)	2	1.3000	1.3000
4	TRMT D (5%)	3	1.3000	1.3000
5	TRMT E (2.5%)	1	0.7000	0.7000
5	TRMT E (2.5%)	2	1.5000	1.5000
5	TRMT E (2.5%)	3	1.4000	1.4000

1: 3149 ALGAL EXP SCENEDESMUS DRY WEIGHT (mg/L) DAY 8

FILE: FSCDW8

TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 5

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	TRMT A ($3500)	1	40.1000	40.1000
1	TRMT A ($3500)	2	35.8000	35.8000
1	TRMT A ($3500)	3	34.9000	34.9000
2	TRMT B ($340)	1	36.5000	36.5000
2	TRMT B ($340)	2	35.0000	35.0000
2	TRMT B ($340)	3	33.7000	33.7000
3	TRMT C ($120)	1	33.7000	33.7000
3	TRMT C ($120)	2	33.7000	33.7000
3	TRMT C ($120)	3	35.5000	35.5000
4	TRMT D (5%)	1	37.1000	37.1000
4	TRMT D (5%)	2	33.2000	33.2000
4	TRMT D (5%)	3	34.6000	34.6000
5	TRMT E (2.5%)	1	32.3000	32.3000
5	TRMT E (2.5%)	2	34.6000	34.6000
5	TRMT E (2.5%)	3	33.3000	33.3000

3149 ALGAL EXP SELENASTRUM (TRMT D vs. TRMT C) CHL-a

File: SET1CHA Transform: NO TRANSFORM

t-test of Solvent and Blank Controls Ho:GRP1 MEAN = GRP2 MEAN

GRP1 (SOLVENT CRTL) MEAN =	0.8570	CALCULATED t VALUE =	-2.7855
GRP2 (BLANK CRTL) MEAN =	2.6967	DEGREES OF FREEDOM =	4
DIFFERENCE IN MEANS =	-1.8397		

TABLE t VALUE (0.05 (2), 4) = 2.776** SIGNIFICANT DIFFERENCE at alpha=0.05

TABLE t VALUE (0.01 (2), 4) = 4.604 NO significant difference at alpha=0.01

3149 ALGAL EXP SELENASTRUM (TRMT D vs. TRMT C) CHL-a

File: SET1CHA Transform: NO TRANSFORM

t-test of Solvent and Blank Controls Ho:GRP1 MEAN = GRP2 MEAN

GRP1 (SOLVENT CRTL) MEAN =	0.8570	CALCULATED t VALUE =	-2.7855
GRP2 (BLANK CRTL) MEAN =	2.6967	DEGREES OF FREEDOM =	4
DIFFERENCE IN MEANS =	-1.8397		

TABLE t VALUE (0.05 (2), 4) = 2.776** SIGNIFICANT DIFFERENCE at alpha=0.05

TABLE t VALUE (0.01 (2), 4) = 4.604 NO significant difference at alpha=0.01

3149 SELENASTRUM (TRMT D vs. TRMT C) DRY WEIGHT (mg/L)

File: SETDC Transform: NO TRANSFORM

t-test of Solvent and Blank Controls Ho:GRP1 MEAN = GRP2 MEAN

GRP1 (SOLVENT CRTL) MEAN =	1.3667	CALCULATED t VALUE =	-1.0464
GRP2 (BLANK CRTL) MEAN =	3.1667	DEGREES OF FREEDOM =	4
DIFFERENCE IN MEANS =	-1.8000		

TABLE t VALUE (0.05 (2), 4) = 2.776 NO significant difference at alpha=0.05

TABLE t VALUE (0.01 (2), 4) = 4.604 NO significant difference at alpha=0.01

3149 ALGAL EXP SELENASTRUM (TRMT E vs. TRMT B) CHL-a

File: SET2CHA Transform: NO TRANSFORM

t-test of Solvent and Blank Controls Ho:GRP1 MEAN = GRP2 MEAN

GRP1 (SOLVENT CRTL) MEAN =	0.6377	CALCULATED t VALUE =	-1.7197
GRP2 (BLANK CRTL) MEAN =	2.2467	DEGREES OF FREEDOM =	4
DIFFERENCE IN MEANS =	-1.6090		

TABLE t VALUE (0.05 (2), 4) = 2.776 NO significant difference at alpha=0.05

TABLE t VALUE (0.01 (2), 4) = 4.604 NO significant difference at alpha=0.01

3149 SELENASTRUM (TRMT E vs. TRMT B) DRY WEIGHT (mg/L)

File: SETEB Transform: NO TRANSFORM

t-test of Solvent and Blank Controls Ho:GRP1 MEAN = GRP2 MEAN

GRP1 (SOLVENT CRTL) MEAN =	1.2000	CALCULATED t VALUE =	0.0000
GRP2 (BLANK CRTL) MEAN =	1.2000	DEGREES OF FREEDOM =	4
DIFFERENCE IN MEANS =	0.0000		

TABLE t VALUE (0.05 (2), 4) = 2.776 NO significant difference at alpha=0.05

TABLE t VALUE (0.01 (2), 4) = 4.604 NO significant difference at alpha=0.01

3149 SELENASTRUM (TRMT E vs. TRMT B) DRY WEIGHT (mg/L)

File: SETEB Transform: NO TRANSFORM

t-test of Solvent and Blank Controls Ho:GRP1 MEAN = GRP2 MEAN

GRP1 (SOLVENT CRTL) MEAN =	1.2000	CALCULATED t VALUE =	0.0000
GRP2 (BLANK CRTL) MEAN =	1.2000	DEGREES OF FREEDOM =	4
DIFFERENCE IN MEANS =	0.0000		

TABLE t VALUE (0.05 (2), 4) = 2.776 NO significant difference at alpha=0.05

TABLE t VALUE (0.01 (2), 4) = 4.604 NO significant difference at alpha=0.01

3149 ALGAL EXP SCENEDESMUS (TRMT D vs. TRMT C) CHL-a

File: SCT1CHA Transform: NO TRANSFORM

t-test of Solvent and Blank Controls Ho:GRP1 MEAN = GRP2 MEAN

GRP1 (SOLVENT CRTL) MEAN =	17.2667	CALCULATED t VALUE =	1.3422
GRP2 (BLANK CRTL) MEAN =	10.1033	DEGREES OF FREEDOM =	4
DIFFERENCE IN MEANS =	7.1633		

TABLE t VALUE (0.05 (2), 4) = 2.776 NO significant difference at alpha=0.05

TABLE t VALUE (0.01 (2), 4) = 4.604 NO significant difference at alpha=0.01

3149 SCENEDESMUS (TRMT D vs. TRMT C) DRY WEIGHT (mg/L)

File: SCTDC Transform: NO TRANSFORM

t-test of Solvent and Blank Controls Ho:GRP1 MEAN = GRP2 MEAN

GRP1 (SOLVENT CRTL) MEAN =	34.9667	CALCULATED t VALUE =	0.5173
GRP2 (BLANK CRTL) MEAN =	34.3000	DEGREES OF FREEDOM =	4
DIFFERENCE IN MEANS =	0.6667		

TABLE t VALUE (0.05 (2), 4) = 2.776 NO significant difference at alpha=0.05

TABLE t VALUE (0.01 (2), 4) = 4.604 NO significant difference at alpha=0.01

3149 ALGAL EXP SCENEDESMUS (TRMT E vs. TRMT B) CHL-a
File: SCT2CHA Transform: NO TRANSFORM

t-test of Solvent and Blank Controls Ho:GRP1 MEAN = GRP2 MEAN

GRP1 (SOLVENT CRTL) MEAN =	16.7667	CALCULATED t VALUE =	1.0761
GRP2 (BLANK CRTL) MEAN =	11.0333	DEGREES OF FREEDOM =	4
DIFFERENCE IN MEANS =	5.7333		

TABLE t VALUE (0.05 (2), 4) = 2.776 NO significant difference at alpha=0.05
TABLE t VALUE (0.01 (2), 4) = 4.604 NO significant difference at alpha=0.01

3149 ALGAL EXP SCENEDESMUS (TRMT E vs. TRMT B) CHL-a
File: SCT2CHA Transform: NO TRANSFORM

t-test of Solvent and Blank Controls Ho:GRP1 MEAN = GRP2 MEAN

GRP1 (SOLVENT CRTL) MEAN =	16.7667	CALCULATED t VALUE =	1.0761
GRP2 (BLANK CRTL) MEAN =	11.0333	DEGREES OF FREEDOM =	4
DIFFERENCE IN MEANS =	5.7333		

TABLE t VALUE (0.05 (2), 4) = 2.776 NO significant difference at alpha=0.05
TABLE t VALUE (0.01 (2), 4) = 4.604 NO significant difference at alpha=0.01

3149 ALGAL EXP SCENEDESMUS (TRMT E vs. TRMT B) CHL-a
File: SCT2CHA Transform: NO TRANSFORM

t-test of Solvent and Blank Controls Ho:GRP1 MEAN = GRP2 MEAN

GRP1 (SOLVENT CRTL) MEAN =	16.7667	CALCULATED t VALUE =	1.0761
GRP2 (BLANK CRTL) MEAN =	11.0333	DEGREES OF FREEDOM =	4
DIFFERENCE IN MEANS =	5.7333		

TABLE t VALUE (0.05 (2), 4) = 2.776 NO significant difference at alpha=0.05
TABLE t VALUE (0.01 (2), 4) = 4.604 NO significant difference at alpha=0.01

3149 ALGAL EXP SCENEDESMUS (TRMT E vs. TRMT B) CHL-a
File: SCT2CHA Transform: NO TRANSFORM

t-test of Solvent and Blank Controls Ho:GRP1 MEAN = GRP2 MEAN

GRP1 (SOLVENT CRTL) MEAN =	16.7667	CALCULATED t VALUE =	1.0761
GRP2 (BLANK CRTL) MEAN =	11.0333	DEGREES OF FREEDOM =	4
DIFFERENCE IN MEANS =	5.7333		

TABLE t VALUE (0.05 (2), 4) = 2.776 NO significant difference at alpha=0.05
TABLE t VALUE (0.01 (2), 4) = 4.604 NO significant difference at alpha=0.01

3149 SCENEDESMUS (TRMT E vs. TRMT B) DRY WEIGHT (mg/L)

File: SCTEB Transform: NO TRANSFORM

t-test of Solvent and Blank Controls Ho:GRP1 MEAN = GRP2 MEAN

GRP1 (SOLVENT CRTL) MEAN =	33.4000	CALCULATED t VALUE =	-1.5507
GRP2 (BLANK CRTL) MEAN =	35.0667	DEGREES OF FREEDOM =	4
DIFFERENCE IN MEANS =	-1.6667		

TABLE t VALUE (0.05 (2), 4) = 2.776 NO significant difference at alpha=0.05

TABLE t VALUE (0.01 (2), 4) = 4.604 NO significant difference at alpha=0.01

3149 ALGAL EXP SCENEDESMUS CHLOROPHYLL-a (Ig/L) DAY 8

File: FSCCA8 Transform: NO TRANSFORMATION

Iletts test for homogeneity of variance

Calculated B statistic = 5.08

Table Chi-square value = 13.28 (alpha = 0.01)

Table Chi-square value = 9.49 (alpha = 0.05)

Average df used in calculation ==> df (avg n - 1) = 2.00

Used for Chi-square table value ==> df (#groups-1) = 4

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).

3149 ALGAL EXP SCENEDESMUS CHLOROPHYLL-a (µg/L) DAY 8

F ': FSCCA8 Transform: NO TRANSFORMATION

Shapiro Wilks test for normality

D = 390.900

W = 0.949

Critical W (P = 0.05) (n = 15) = 0.881

Critical W (P = 0.01) (n = 15) = 0.835

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

3149 ALGAL EXP SCENEDESMUS CHLOROPHYLL-a (µg/L) DAY 8

File: FSCCA8 Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	4	126.717	31.679	0.810
Within (Error)	10	390.900	39.090	
Total	14	517.617		

Critical F value = 3.48 (0.05,4,10)

Since F < Critical F FAIL TO REJECT Ho:All groups equal

3149 ALGAL EXP SCENEDESMUS CHLOROPHYLL-a (µg/L) DAY 8

File: FSCCA8 Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	TRMT A ($3500)	3	6.400	17.600	14.200
2	TRMT B ($340)	3	3.400	21.200	11.033
3	TRMT C ($120)	3	6.100	17.900	10.100
4	TRMT D (5%)	3	12.400	24.400	17.267
5	TRMT E (2.5%)	3	15.600	17.700	16.767

3149 ALGAL EXP SCENEDESMUS CHLOROPHYLL-a (µg/L) DAY 8

File: FSCCA8 Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	TRMT A ($3500)	24.790	4.979	2.875
2	TRMT B ($340)	84.023	9.166	5.292
3	TRMT C ($120)	45.640	6.756	3.900
	TRMT D (5%)	39.853	6.313	3.645
.	TRMT E (2.5%)	1.143	1.069	0.617

3149 ALGAL EXP SCENEDESMUS DRY WEIGHT (mg/L) DAY 8

File: FSCDW8 Transform: NO TRANSFORMATION

ro Wilks test for normality

D = 32.000

W = 0.940

Critical W (P = 0.05) (n = 15) = 0.881

Critical W (P = 0.01) (n = 15) = 0.835

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

3149 ALGAL EXP SCENEDESMUS CHLOROPHYLL-a (Ïg/L) DAY 8

File: FSCCA8 Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	TRMT A (S3500)	14.100	14.100		
2	TRMT B (S340)	11.033	11.033	0.601	
3	TRMT C (S120)	10.100	10.100	0.764	
4	TRMT D (5%)	17.267	17.267	-0.620	
5	TRMT E (2.5%)	16.767	16.767	-0.522	

Dunnett table value = 2.47 (1 Tailed Value, P=0.05, df=10,4)

3149 ALGAL EXP SCENEDESMUS CHLOROPHYLL-a (Ïg/L) DAY 8

File: FSCCA8 Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	TRMT A (S3500)	3			
2	TRMT B (S340)	3	12.609	89.4	3.067
	TRMT C (S120)	3	12.609	89.4	4.000
.	TRMT D (5%)	3	12.609	89.4	-3.167
5	TRMT E (2.5%)	3	12.609	89.4	-2.667

3149 ALGAL EXP SCENEDESMUS DRY WEIGHT (mg/L) DAY 8

File: FSCDW8 Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	TRMT A ($3500)	3	34.900	40.100	36.933
2	TRMT B ($340)	3	33.700	36.500	35.067
3	TRMT C ($120)	3	33.700	35.500	34.300
4	TRMT D (5%)	3	33.200	37.100	34.967
5	TRMT E (2.5%)	3	32.300	34.600	33.400

3149 ALGAL EXP SCENEDESMUS DRY WEIGHT (mg/L) DAY 8

File: FSCDW8 Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	TRMT A ($3500)	7.723	2.779	1.605
2	TRMT B ($340)	1.963	1.401	0.809
3	TRMT C ($120)	1.080	1.039	0.600
	TRMT D (5%)	3.903	1.976	1.141
	TRMT E (2.5%)	1.330	1.153	0.666

3149 ALGAL EXP SCENEDESMUS DRY WEIGHT (mg/L) DAY 8

File: FSCDW8 Transform: NO TRANSFORMATION

Bartlett test for homogeneity of variance

Calculated B statistic = 2.29

Table Chi-square value = 13.28 (alpha = 0.01)

Table Chi-square value = 9.49 (alpha = 0.05)

Average df used in calculation ==> df (avg n - 1) = 2.00

Used for Chi-square table value ==> df (#groups-1) = 4

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).

3149 ALGAL EXP SCENEDESMUS DRY WEIGHT (mg/L) DAY 8

File: FSCDW8 Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	TRMT A (S3500)	36.933	36.933		
2	TRMT B (S340)	35.067	35.067	1.278	
3	TRMT C (S120)	34.300	34.300	1.603	
4	TRMT D (5%)	34.967	34.967	1.346	
5	TRMT E (2.5%)	33.400	33.400	2.419	

Dunnett table value = 2.47 (1 Tailed Value, P=0.05, df=10,4)

3149 ALGAL EXP SCENEDESMUS DRY WEIGHT (mg/L) DAY 8

File: FSCDW8 Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	TRMT A (S3500)	3			
2	TRMT B (S340)	3	3.608	9.8	1.867
	TRMT C (S120)	3	3.608	9.8	2.633
.	TRMT D (5%)	3	3.608	9.8	1.967
5	TRMT E (2.5%)	3	3.608	9.8	3.533

3149 ALGAL EXP SCENEDESMUS DRY WEIGHT (mg/L) DAY 8

File: FSCDW8 Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	4	20.313	5.078	1.587
Within (Error)	10	32.000	3.200	
Total	14	52.313		

Critical F value = 3.48 (0.05,4,10)

Since F < Critical F FAIL TO REJECT Ho:All groups equal

3149 ALGAL EXP SCENEDESMUS CELL COUNTS DAY 8 LOG(X+1)

File: FSCCCL Transform: NATURAL LOG(Y)

Bartletts test for homogeneity of variance

Calculated B statistic = 1.83

Table Chi-square value = 13.28 (alpha = 0.01)

Table Chi-square value = 9.49 (alpha = 0.05)

Average df used in calculation ==> df (avg n - 1) = 2.00

Used for Chi-square table value ==> df (#groups-1) = 4

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).

3149 ALGAL EXP SCENEDESMUS CELL COUNTS DAY 8 LOG(X+1)

File: FSCCCL Transform: NATURAL LOG(Y)

Shapiro Wilks test for normality

D = 1.399

W = 0.972

Critical W (P = 0.05) (n = 15) = 0.881

Critical W (P = 0.01) (n = 15) = 0.835

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

3149 ALGAL EXP SCENEDESMUS CELL COUNTS DAY 8 LOG(X+1)

File: FSCCCL Transform: NATURAL LOG(Y)

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	4	1.317	0.329	2.350
Within (Error)	10	1.399	0.140	
Total	14	2.716		

. Critical F value = 3.48 (0.05,4,10)

Since F < Critical F FAIL TO REJECT Ho:All groups equal

3149 ALGAL EXP SCENEDESMUS CELL COUNTS DAY 8 LOG(X+1)
File: FSCCCL Transform: NATURAL LOG(Y)

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	TRMT A	3	9.210	9.616	9.346
2	TRMT B	3	8.517	9.616	9.115
3	TRMT C	3	9.210	9.616	9.481
4	TRMT D	3	9.210	9.904	9.577
5	TRMT E	3	8.517	9.210	8.748

3149 ALGAL EXP SCENEDESMUS CELL COUNTS DAY 8 LOG(X+1)
File: FSCCCL Transform: NATURAL LOG(Y)

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	TRMT A	0.055	0.234	0.135
2	TRMT B	0.309	0.555	0.321
3	TRMT C	0.055	0.234	0.135
4	TRMT D	0.121	0.348	0.201
5	TRMT E	0.160	0.400	0.231

3149 ALGAL EXP SELENASTRUM CHLOROPHYLL-a (µg/L) DAY 8

File: FSECA8 Transform: NO TRANSFORMATION

Shapiro Wilks test for normality

D = 8.886

W = 0.948

Critical W (P = 0.05) (n = 15) = 0.881

Critical W (P = 0.01) (n = 15) = 0.835

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

3149 ALGAL EXP SCENEDESMUS CELL COUNTS DAY 8 LOG(X+1)

File: FSCCCL Transform: NATURAL LOG(Y)

DUNNETTS TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	TRMT A	9.346	11667.667		
2	TRMT B	9.115	10001.000	0.756	
3	TRMT C	9.481	13334.333	-0.442	
4	TRMT D	9.577	15001.000	-0.756	
5	TRMT E	8.748	6667.667	1.955	

Dunnett table value = 2.47 (1 Tailed Value, P=0.05, df=10,4)

3149 ALGAL EXP SCENEDESMUS CELL COUNTS DAY 8 LOG(X+1)

File: FSCCCL Transform: NATURAL LOG(Y)

DUNNETTS TEST - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	TRMT A	3			
2	TRMT B	3	6065.237	52.0	1666.667
3	TRMT C	3	6065.237	52.0	-1666.667
4	TRMT D	3	6065.237	52.0	-3333.333
5	TRMT E	3	6065.237	52.0	5000.000

3149 ALGAL EXP SELENASTRUM CHLOROPHYLL-a (µg/L) DAY 8

File: FSECA8 Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	TRMT A (S3500)	3	0.530	1.900	1.120
2	TRMT B (S340)	3	0.440	3.200	2.247
3	TRMT C (S120)	3	1.600	3.880	2.693
4	TRMT D (5%)	3	0.790	0.990	0.857
5	TRMT E (2.5%)	3	0.280	1.100	0.637

3149 ALGAL EXP SELENASTRUM CHLOROPHYLL-a (µg/L) DAY 8

File: FSECA8 Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	TRMT A (S3500)	0.456	0.704	0.407
2	TRMT B (S340)	2.451	1.565	0.904
3	TRMT C (S120)	1.326	1.143	0.660
	TRMT D (5%)	0.013	0.115	0.067
	TRMT E (2.5%)	0.177	0.420	0.243

3149 ALGAL EXP SELENASTRUM CHLOROPHYLL-a (µg/L) DAY 8
File: FSECA8 Transform: NO TRANSFORMATION

Bartlett test for homogeneity of variance

Calculated B statistic = 8.33
Table Chi-square value = 13.28 (alpha = 0.01)
Table Chi-square value = 9.49 (alpha = 0.05)

Average df used in calculation ==> df (avg n - 1) = 2.00
Used for Chi-square table value ==> df (#groups-1) = 4

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).

3149 ALGAL EXP SELENASTRUM CHLOROPHYLL-a (µg/L) DAY 8

File: FSECA8 Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	TRMT A ($3500)	1.120	1.120		
2	TRMT B ($340)	2.247	2.247	-1.463	
3	TRMT C ($120)	2.693	2.693	-2.044	
4	TRMT D (5%)	0.857	0.857	0.342	
5	TRMT E (2.5%)	0.637	0.637	0.628	

Dunnett table value = 2.47 (1 Tailed Value, P=0.05, df=10,4)

3149 ALGAL EXP SELENASTRUM CHLOROPHYLL-a (µg/L) DAY 8

File: FSECA8 Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	TRMT A ($3500)	3			
2	TRMT B ($340)	3	1.902	169.8	-1.127
	TRMT C ($120)	3	1.902	169.8	-1.573
4	TRMT D (5%)	3	1.902	169.8	0.263
5	TRMT E (2.5%)	3	1.902	169.8	0.483

3149 ALGAL EXP SELENASTRUM CHLOROPHYLL-a (µg/L) DAY 8

File: FSECA8 Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	4	9.854	2.463	2.771
Within (Error)	10	8.886	0.889	
Total	14	18.740		

Critical F value = 3.48 (0.05,4,10)

Since F < Critical F FAIL TO REJECT Ho:All groups equal

3149 ALGAL EXP SELENASTRUM DRY WEIGHT (mg/L) DAY 8
File: FSEDW8 Transform: NO TRANSFORMATION

Bartlett's test for homogeneity of variance

Calculated B statistic = 16.32
Table Chi-square value = 13.28 (alpha = 0.01)
Table Chi-square value = 9.49 (alpha = 0.05)

Average df used in calculation ==> df (avg n - 1) = 2.00
Used for Chi-square table value ==> df (#groups-1) = 4

Data FAIL homogeneity test at 0.01 level. Try another transformation.

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

3149 ALGAL EXP SELENASTRUM DRY WEIGHT (mg/L) DAY 8

File: FSEDW8 Transform: NO TRANSFORMATION

Ird Wilks test for normality

D = 24.293

W = 0.873

Critical W (P = 0.05) (n = 15) = 0.881

Critical W (P = 0.01) (n = 15) = 0.835

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

3149 ALGAL EXP SELENASTRUM DRY WEIGHT (mg/L) DAY 8

File: FSEDW8 Transform: NO TRANSFORMATION

DXON RANK SUM TEST W/ BONFERRONI ADJUSTMENT - Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	REPS	SIG
1	TRMT A ($3500)	2.300				
2	TRMT B ($340)	1.200	8.50	None	3	
3	TRMT C ($120)	1.167	12.00	None	3	
4	TRMT D (5%)	1.367	10.00	None	3	
5	TRMT E (2.5%)	1.200	9.50	None	3	

Critical values use k = 4, are 1 tailed, and alpha = 0.05

3149 ALGAL EXP SELENASTRUM DRY WEIGHT (mg/L) DAY 8

File: FSEDW8 Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	TRMT A ($3500)	3	1.200	4.300	2.300
2	TRMT B ($340)	3	0.900	1.400	1.200
3	TRMT C ($120)	3	1.300	6.600	3.167
4	TRMT D (5%)	3	1.300	1.500	1.367
5	TRMT E (2.5%)	3	0.700	1.500	1.200

3149 ALGAL EXP SELENASTRUM DRY WEIGHT (mg/L) DAY 8

File: FSEDW8 Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	TRMT A ($3500)	3.010	1.735	1.002
2	TRMT B ($340)	0.070	0.265	0.153
3	TRMT C ($120)	8.863	2.977	1.719
	TRMT D (5%)	0.013	0.115	0.067
.	TRMT E (2.5%)	0.190	0.436	0.252

3149 ALGAL EXP SELENASTRUM CELL COUNTS DAY 8 LOG(X+1)

File: FSECCL Transform: NATURAL LOG(Y)

Bartletts test for homogeneity of variance

Calculated B statistic = 13.56

Table Chi-square value = 13.28 (alpha = 0.01)

Table Chi-square value = 9.49 (alpha = 0.05)

Average df used in calculation ==> df (avg n - 1) = 2.00

Used for Chi-square table value ==> df (#groups-1) = 4

Data FAIL homogeneity test at 0.01 level. Try another transformation.

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

3149 ALGAL EXP SELENASTRUM CELL COUNTS DAY 8 LOG(X+1)

File: FSECCL Transform: NATURAL LOG(Y)

Shapiro Wilks test for normality

D = 103.698

W = 0.840

Critical W (P = 0.05) (n = 15) = 0.881

Critical W (P = 0.01) (n = 15) = 0.835

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

3149 ALGAL EXP SELENASTRUM CELL COUNTS DAY 8 LOG(X+1)

File: FSECCL Transform: NATURAL LOG(Y)

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	TRMT A ($3500)	3	9.616	11.082	10.105
2	TRMT B ($340)	3	8.517	9.210	8.979
3	TRMT C ($120)	3	8.517	9.904	9.210
4	TRMT D (5%)	3	0.000	8.517	5.678
5	TRMT E (2.5%)	3	0.000	9.210	5.909

3149 ALGAL EXP SELENASTRUM CELL COUNTS DAY 8 LOG(X+1)

File: FSECCL Transform: NATURAL LOG(Y)

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	TRMT A ($3500)	0.717	0.847	0.489
2	TRMT B ($340)	0.160	0.400	0.231
3	TRMT C ($120)	0.480	0.693	0.400
4	TRMT D (5%)	24.182	4.918	2.839
5	TRMT E (2.5%)	26.319	5.129	2.962

3149 ALGAL EXP SELENASTRUM CELL COUNTS DAY 8 LOG(X+1)

File: FSECCL Transform: NATURAL LOG(Y)

WILCOXON RANK SUM TEST W/ BONFERRONI ADJUSTMENT - Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	REPS	SIG
1	TRMT A ($3500)	10.105				
2	TRMT B ($340)	8.979	6.00	None	3	
3	TRMT C ($120)	9.210	8.00	None	3	
4	TRMT D (5%)	5.678	6.00	None	3	
5	TRMT E (2.5%)	5.909	6.00	None	3	

Critical values use k = 4, are 1 tailed, and alpha = 0.05

ATTACHMENT 6

STORET SYSTEM RETRIEVAL

FOR WHITING INTAKE

171410 LM W
41 40 45.0 087 29 17.0 2
WHITING PUBLIC WATER INTAKE CRIB
18089 INDIANA LAKE
LAKE MICHIGAN 084991
CALUMET-BURNS DITCH COMPLEX
21IND 04040001004 0004.240 ON
0000 FEET DEPTH

TMT/INTAKE/LAKE

	PARAMETER			MEDIUM	RMK	NUMBER	MEAN	VARIANCE	STAN DEV	MAXIMUM	MINIMUM	BEG DATE	END DATE
00010	WATER	TEMP	CENT	WATER		98	11.28400	52.51700	7.246900	26.0	.0	82/01/26	91/01/16
00076	TURB	TRBIDMTR	HACH FTU	WATER		85	11.18000	192.4800	13.87400	88.0	.7	82/01/26	90/11/27
00095	CNDUCTVY	AT 25C	MICROMHO	WATER		96	265.9000	2709.100	52.04900	400	116	82/01/26	90/06/05
00300	DO		MG/L	WATER		14	10.85900	2.409600	1.552300	13.3	8.6	84/05/15	90/06/05
00310	BOD	5 DAY	MG/L	WATER		81	1.023500	.0088198	.0939140	1.7	1.0	82/01/26	93/08/02
00335	COD	LOWLEVEL	MG/L	WATER		124	8.491900	9.845500	3.137800	20.0	4.0	82/01/26	93/11/17
00400	PH		SU	WATER		89	7.917800	.1007600	.3174300	8.50	6.40	82/01/26	90/06/05
00403	PH	LAB	SU	WATER		125	7.864800	.0665010	.2578800	8.5	6.8	82/01/26	93/11/17
00410	T ALK	CACO3	MG/L	WATER		125	113.2100	28.01600	5.293000	141	94	82/01/26	93/11/17
00500	RESIDUE	TOTAL	MG/L	WATER		122	191.0300	4580.900	67.68200	863	17	82/01/26	93/11/17
00530	RESIDUE	TOT NFLT	MG/L	WATER		45	28.06700	2878.600	53.65300	219	1	82/01/26	92/05/19
00556	OIL-GRSE	FREON-GR	MG/L	WATER		44	3.011400	2.083800	1.443600	6.70	1.00	82/01/26	89/12/12
00610	NH3+NH4-	N TOTAL	MG/L	WATER		124	.1008900	.0002276	.0150860	.200	.010	82/01/26	93/11/17
00625	TOT KJEL	N	MG/L	WATER		124	.2887900	.0081529	.0902930	.700	.100	82/01/26	93/11/17
00630	NO2&NO3	N-TOTAL	MG/L	WATER		124	.3741900	.1300600	.3606400	4.00	.10	82/01/26	93/11/17
00665	PHOS-TOT		MG/L P	WATER		124	.0513710	.0397290	.1993200	2.250	.030	82/01/26	93/11/17
00680	T ORG C	C	MG/L	WATER		38	3.165800	1.805000	1.343500	9.2	1.5	82/01/26	85/06/20
00720	CYANIDE	CN-TOT	MG/L	WATER		123	.0054959	.0000184	.0042950	.050	.005	82/01/26	93/11/17
00900	TOT HARD	CACO3	MG/L	WATER		125	143.8700	80.10500	8.950100	176	124	82/01/26	93/11/17
00910	CALCIUM	CACO3	MG/L	WATER		80	94.52500	50.20700	7.085700	130.0	74.0	85/11/21	92/12/15
00916	CALCIUM	CA-TOT	MG/L	WATER		2	95.00000	2.000000	1.414200	96.0	94.0	93/08/02	93/11/17
00920	MGNSIUM	CACO3	MG/L	WATER		37	51.05400	126.3900	11.24200	76.0	20.0	85/11/21	89/05/23
00929	SODIUM	NA,TOT	MG/L	WATER		124	6.882200	1.696400	1.302500	14.00	4.80	82/01/26	93/08/02
00937	PTSSIUM	K,TOT	MG/L	WATER		43	1.704700	.3533300	.5944100	5.00	1.20	82/01/26	85/12/19
00940	CHLORIDE	TOTAL	MG/L	WATER		125	11.65200	3.936400	1.984100	22	5	82/01/26	93/11/17
00945	SULFATE	SO4-TOT	MG/L	WATER		122	24.95100	6.329000	2.515800	32	19	82/01/26	93/11/17
00951	FLUORIDE	F,TOTAL	MG/L	WATER		125	.1360000	.0028063	.0529740	.40	.10	82/01/26	93/11/17
00955	SILICA	DISOLVED	MG/L	WATER		112	1.444700	8.006800	2.829600	30.0	.1	82/06/10	93/11/17
01002	ARSENIC	AS,TOT	UG/L	WATER		123	.9382100	.0340280	.1844700	2	.6	82/01/26	93/08/02
01007	BARIUM	BA,TOT	UG/L	WATER		77	19.81800	2.808900	1.676000	23	10	86/05/22	93/08/02
01012	BERYLIUM	BE,TOT	UG/L	WATER		13	1.876900	.0902570	.3004300	2.00	1.20	89/03/28	93/08/02
01027	CADMIUM	CD,TOT	UG/L	WATER		125	2.000000	.0000000	.0000000	2	.2	82/01/26	93/08/02
01032	CHROMIUM	HEX-VAL	UG/L	WATER		123	10.00000	.0000000	.0000000	10	10	82/01/26	93/11/17
01034	CHROMIUM	CR,TOT	UG/L	WATER		124	10.85500	110.8400	10.52800	120	4	82/01/26	93/08/02
01042	COPPER	CU,TOT	UG/L	WATER		125	8.832000	115.4200	10.74300	58	4	82/01/26	93/08/02
01045	IRON	FE,TOT	UG/L	WATER		122	277.0200	98996.00	314.6400	1500	20	82/01/26	93/08/02
01046	IRON	FE,DISS	UG/L	WATER		51	45.88200	956.7100	30.93100	170	20	86/05/22	92/03/25
01051	LEAD	PB,TOT	UG/L	WATER		125	8.224000	12.74000	3.569300	41	6	82/01/26	93/08/02
01055	MANGNESE	MN	UG/L	WATER		125	40.00800	25650.00	160.1600	1800.0	6.0	82/01/26	93/08/02

171410 LM W
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18089 INDIANA LAKE
LAKE MICHIGAN 084991
CALUMET-BURNS DITCH COMPLEX
211ND 04040001004 0004.240 ON
0000 FEET DEPTH

/NTRTMT/INTAKE/LAKE

	PARAMETER		MEDIUM	RMK	NUMBER	MEAN	VARIANCE	STAN DEV	MAXIMUM	MINIMUM	BEG DATE	END DAT:
34320	CHRYSENE	TOTWUG/L	WATER		10	4.150000	4.225000	2.055500	10.000	3.500	89/03/28	92/11/17
34336	DIETHYLP HTHALATE	TOTWUG/L	WATER		10	1.900000	8.100000	2.846100	10.000	1.000	89/03/28	92/11/17
34341	DIMETHYL PHTHALAT	TOTWUG/L	WATER		10	1.900000	8.100000	2.846100	10.000	1.000	89/03/28	92/11/17
34346	12DIPHEN YLHYDRAZ	TOTWUG/L	WATER		10	2.800000	6.400000	2.529800	10.000	2.000	89/03/28	92/11/17
34376	FLUORANT HENE	TOTWUG/L	WATER		10	1.900000	8.100000	2.846100	10.000	1.000	89/03/28	92/11/17
34381	FLUORENE	TOTWUG/L	WATER		10	1.900000	8.100000	2.846100	10.000	1.000	89/03/28	92/11/17
34386	HEXACHLO ROCYCLOP	TOTWUG/L	WATER		10	4.600000	3.600000	1.897400	10.000	4.000	89/03/28	92/11/17
34396	HEXACHLO ROETHANE	TOTWUG/L	WATER		10	4.600000	3.600000	1.897400	10.000	4.000	89/03/28	92/11/17
34403	INDENO(1 23CD)PYR	TOTWUG/L	WATER		10	4.150000	4.225000	2.055500	10.000	3.500	89/03/28	92/11/17
34408	ISPHRONE	TOTUG/L	WATER		10	1.900000	8.100000	2.846100	10.000	1.000	89/03/28	92/11/17
34423	METHYLEN ECHLORID	TOTWUG/L	WATER		9	6.000000	9.000000	3.000000	14.000	5.000	89/03/28	92/11/17
34428	NITROSOD IPROPYLA	TOTWUG/L	WATER		10	6.400000	1.600000	1.264900	10.000	6.000	89/03/28	92/11/17
34447	NITROBEN ZENE	TOTWUG/L	WATER		10	3.250000	5.625000	2.371700	10.000	2.500	89/03/28	92/11/17
34461	PHENANTH RENE	TOTWUG/L	WATER		9	1.000000	.0000000	.0000000	1.000	1.000	89/03/28	92/04/21
34469	PYRENE	TOTWUG/L	WATER		10	1.900000	8.100000	2.846100	10.000	1.000	89/03/28	92/11/17
34475	TETRACHL OROETHYL	TOTWUG/L	WATER		9	1.000000	.0000000	.0000000	1.000	1.000	89/03/28	92/11/17
34488	TRICHLOR OFLUOROM	TOTWUG/L	WATER		9	1.000000	.0000000	.0000000	1.000	1.000	89/03/28	92/11/17
34496	11DICHLO ROETHANE	TOTWUG/L	WATER		9	1.000000	.0000000	.0000000	1.000	1.000	89/03/28	92/11/17
34501	11DICHLO ROETHYLE	TOTWUG/L	WATER		9	1.000000	.0000000	.0000000	1.000	1.000	89/03/28	92/11/17
34506	111TRICH LOROETHA	TOTWUG/L	WATER		9	1.000000	.0000000	.0000000	1.000	1.000	89/03/28	92/11/17
34511	112TRICH LOROETHA	TOTWUG/L	WATER		9	1.000000	.0000000	.0000000	1.000	1.000	89/03/28	92/11/17
34516	1122TETR ACHLOROE	TOTWUG/L	WATER		9	1.000000	.0000000	.0000000	1.000	1.000	89/03/28	92/11/17
34521	BENZO(GH I)PERYLE	TOTWUG/L	WATER		10	4.150000	4.225000	2.055500	10.000	3.500	89/03/28	92/11/17
34526	BENZO(A) ANTHRACE	TOTWUG/L	WATER		10	3.700000	4.900000	2.213600	10.000	3.000	89/03/28	92/11/17
34536	12DICHLO ROBENZEN	TOTWUG/L	WATER		10	1.900000	8.100000	2.846100	10.000	1.000	89/03/28	92/11/17
34541	12DICHLO ROPROPAN	TOTWUG/L	WATER		9	1.000000	.0000000	.0000000	1.000	1.000	89/03/28	92/11/17
34546	12DICHLO ROETHENE	TOTWUG/L	WATER		9	1.000000	.0000000	.0000000	1.000	1.000	89/03/28	92/11/17
34551	124TRICH LOROBENZ	TOTWUG/L	WATER		10	2.800000	6.400000	2.529800	10.000	2.000	89/03/28	92/11/17
34556	DIBENZ(A H)ANTHRA	TOTWUG/L	WATER		10	4.150000	4.225000	2.055500	10.000	3.500	89/03/28	92/11/17
34566	13DICHLO ROBENZEN	TOTWUG/L	WATER		10	2.800000	6.400000	2.529800	10.000	2.000	89/03/28	92/11/17
34571	14DICHLO ROBENZEN	TOTWUG/L	WATER		10	1.900000	8.100000	2.846100	10.000	1.000	89/03/28	92/11/17
34581	2CHLORON APHTHALE	TOTWUG/L	WATER		10	1.900000	8.100000	2.846100	10.000	1.000	89/03/28	92/11/17
34586	2CHLOROP HENOL	TOTWUG/L	WATER		10	4.420000	3.844100	1.960600	10.000	3.800	89/03/28	92/11/17
34591	2NITROPH ENOL	TOTWUG/L	WATER		10	1.900000	8.100000	2.846100	10.000	1.000	89/03/28	92/11/17
34596	DINOCTPH	TOTUG/L	WATER		10	16.75000	1035.000	32.17200	98.000	1.500	89/03/28	92/11/17
34601	24DICHLO ROPHENOL	TOTWUG/L	WATER		10	5.320000	2.704100	1.644400	10.000	4.800	89/03/28	92/11/17
34606	24DIMETH YLPHENOL	TOTWUG/L	WATER		10	5.320000	2.704100	1.644400	10.000	4.800	89/03/28	92/11/17
34611	24DINITR OTOLUENE	TOTWUG/L	WATER		10	2.800000	6.400000	2.529800	10.000	2.000	89/03/28	92/11/17
34616	24DINITR OPHENOL	TOTWUG/L	WATER		10	3.940000	54.75600	7.399700	25.000	1.600	89/03/28	92/11/17

171410 LM W
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	PARAMETER	MEDIUM	RMK	NUMBER	MEAN	VARIANCE	STAN DEV	MAXIMUM	MINIMUM	BEG DATE	END DATE
34621	246TRICH LOROPHEN	TOTWUG/L WATER		10	6.580000	1.444000	1.201700	10.000	6.200	89/03/28	92/11/17
34626	26DINITR OTOLUENE	TOTWUG/L WATER		10	2.800000	6.400000	2.529800	10.000	2.000	89/03/28	92/11/17
34636	4BROMOPH ENYLPHEN	TOTWUG/L WATER		10	2.800000	6.400000	2.529800	10.000	2.000	89/03/28	92/11/17
34641	4CHLOROP HENYLPHE	TOTWUG/L WATER		10	2.350000	7.225000	2.687900	10.000	1.500	89/03/28	92/11/17
34646	4NITROPH ENOL	TOTWUG/L WATER		10	7.360000	38.41600	6.198100	25.000	5.400	89/03/28	92/11/17
34696	NAPTHALE NE T	OTWUG/L WATER		10	1.900000	8.100000	2.846100	10.000	1.000	89/03/28	92/11/17
34699	T1,3-DCP TOT WAT	UG/L WATER		9	1.000000	.0000000	.0000000	1.000	1.000	89/03/28	92/11/17
34704	C1,3-DCP TOT WAT	UG/L WATER		9	1.000000	.0000000	.0000000	1.000	1.000	89/03/28	92/11/17
34705	C1,3-DCP DISS WAT	UG/L WATER		1	1.000000			1.000	1.000	89/03/28	89/03/28
39032	PCP	TOT UG/L WATER		10	2.620000	6.724000	2.593100	10.000	1.800	89/03/28	92/11/17
39100	B2ETHHXL PHTHALAT	TOT UG/L WATER		10	23.18000	1450.300	38.08300	110.000	1.500	89/03/28	92/11/17
39110	DNB PHTH TOTAL	UG/L WATER		10	1.370000	.9023300	.9499100	4.000	1.000	89/03/28	92/11/17
39180	TRICHLOR ETHYLENE	TOT UG/L WATER		9	1.000000	.0000000	.0000000	1.000	1.000	89/03/28	92/11/17
39330	ALDRIN	TOT UG/L WATER		10	.0200000	.0000000	.0000000	.020	.020	89/03/28	92/11/17
39337	ALPHABHC	TOTUG/L WATER		10	.0100000	.0000000	.0000000	.010	.010	89/03/28	92/11/17
39338	BETA BHC	TOTUG/L WATER		10	.0300000	.0000000	.0000000	.030	.030	89/03/28	92/11/17
39340	GAMMABHC LINDANE	TOT.UG/L WATER		10	.0100000	.0000000	.0000000	.010	.010	89/03/28	92/11/17
39350	CHLRDANE TECH&MET	TOT UG/L WATER		10	.5000000	.0000000	.0000000	.500	.500	89/03/28	92/11/17
39360	DDD WHL SMPL	UG/L WATER		10	.0500000	.0000000	.0000000	.050	.050	89/03/28	92/11/17
39365	DDE WHL SMPL	UG/L WATER		10	.0500000	.0000000	.0000000	.050	.050	89/03/28	92/11/17
39370	DDT WHL SMPL	UG/L WATER		10	.1000000	.0000000	.0000000	.100	.100	89/03/28	92/11/17
39380	DIELDRIN	TOTUG/L WATER		10	.0500000	.0000000	.0000000	.050	.050	89/03/28	92/11/17
39388	ENDOSULN WHL SMPL	UG/L WATER		10	.0400000	.0000000	.0000000	.040	.040	89/03/28	92/11/17
39390	ENDRIN	TOT UG/L WATER		10	.0800000	.0000000	.0000000	.080	.080	89/03/28	92/11/17
39400	TOXAPHEN	TOTUG/L WATER		10	2.000000	.0000000	.0000000	2.000	2.000	89/03/28	92/11/17
39410	HEPTCHLR	TOTUG/L WATER		10	.0200000	.0000000	.0000000	.020	.020	89/03/28	92/11/17
39420	HPCHLREP	TOTUG/L WATER		10	.0200000	.0000000	.0000000	.020	.020	89/03/28	92/11/17
39480	MTHXYCLR WHL SMPL	UG/L WATER		10	.2000000	.0000000	.0000000	.200	.200	89/03/28	92/11/17
39488	PCB-1221	TOTUG/L WATER		10	.5000000	.0000000	.0000000	.500	.500	89/03/28	92/11/17
39492	PCB-1232	TOTUG/L WATER		10	.5000000	.0000000	.0000000	.500	.500	89/03/28	92/11/17
39496	PCB-1242	TOTUG/L WATER		10	.5000000	.0000000	.0000000	.500	.500	89/03/28	92/11/17
39500	PCB-1248	TOTUG/L WATER		10	.5000000	.0000000	.0000000	.500	.500	89/03/28	92/11/17
39504	PCB-1254	TOTUG/L WATER		10	.8000000	.0666670	.2582000	1.000	.500	89/03/28	92/11/17
39508	PCB-1260	TOTUG/L WATER		10	.8000000	.0666670	.2582000	1.000	.500	89/03/28	92/11/17
39700	HCB	TOT UG/L WATER		10	7.180000	39.20400	6.261300	25.000	5.200	89/03/28	92/11/17
39702	HEXCLBD	TOT UG/L WATER		10	3.700000	4.900000	2.213600	10.00	3.00	89/03/28	92/11/17
47501	WEATHER SAMPLING	CODE WATER		61	29512.00	3608E+05	18995.00	81834	10014	86/05/22	92/07/27
70300	RESIDUE DISS-180 C	MG/L WATER		79	171.7900	1076.600	32.81100	430	82	85/12/19	93/11/17
71900	MERCURY HG,TOTAL	UG/L WATER		125	.1200000	.0390320	.1975700	2.3	.1	82/01/26	93/08/02

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	PARAMETER			MEDIUM	RMK	NUMBER	MEAN	VARIANCE	STAN DEV	MAXIMUM	MINIMUM	BEG DATE	END DATE
74041	WQF	SAMPLE	UPDATED	WATER		88	902100.0	5189E+05	22780.00	940518	861001	85/08/22	93/11/17
77089	ANILINE	TOTAL	UG/L	WATER		10	2.350000	7.225000	2.687900	10.000	1.500	89/03/28	92/11/17
77147	BNZYLALC	TOTAL	UG/L	WATER		10	3.250000	5.625000	2.371700	10.000	2.500	89/03/28	92/11/17
77247	BENZOICA	TOTAL	UG/L	WATER		10	2.530000	6.889000	2.624700	10.000	1.700	89/03/28	92/11/17
77416	2MNAPTHA	TOTAL	UG/L	WATER		10	1.900000	8.100000	2.846100	10.000	1.000	89/03/28	92/11/17
77571	CARBAZOL	TOTAL	UG/L	WATER		10	1.900000	8.100000	2.846100	10.000	1.000	89/03/28	92/11/17
77687	245TCLPH	TOTAL	UG/L	WATER		10	4.840000	50.17600	7.083500	25.000	2.600	89/03/28	92/11/17
78113	ETH BENZ	WH WTR	UG/L	WATER		9	2.000000	.0000000	.0000000	2.00	2.00	89/03/28	92/11/17
78300	3-NITRO	ANILINE	TOT UG/L	WATER		10	4.750000	50.62500	7.115100	25.000	2.500	89/03/28	92/11/17
81302	DIBENZO	FURAN	TOT UG/L	WATER		10	1.900000	8.100000	2.846100	10.000	1.000	89/03/28	92/11/17
81551	XYLENE		TOT UG/L	WATER		9	9.000000	.0000000	.0000000	9.000	9.000	89/03/28	92/11/17
81552	ACETONE		TOT UG/L	WATER		9	20.00000	.0000000	.0000000	20.000	20.000	89/03/28	92/11/17
81595	MTH ETH	KETONE	TOT UG/L	WATER		9	8.422200	43.80500	6.618500	26.000	6.000	89/03/28	92/11/17
81596	MTHISOBU	KETONE	TOT UG/L	WATER		9	3.000000	.0000000	.0000000	3.000	3.000	89/03/28	92/11/17
81648	PCB 1016	/1242	TOT UG/L	WATER		10	.5000000	.0000000	.0000000	.500	.500	89/03/28	92/11/17
81649	PCB-1262	TOT	UG/L	WATER		8	.7500000	.0714290	.2672600	1.000	.500	89/03/28	92/11/17
82623	ENDOSLFN	-SO4 TOT	REC UG/L	WATER		10	.1400000	.0060001	.0774600	.2	.05	89/03/28	92/11/17
82624	ENDOSLFN	BETA TOT	REC UG/L	WATER		10	.0800000	.0006666	.0258200	.1	.05	89/03/28	92/11/17
85810	12DICLR	ETHL TRN	EFF UG/L	WATER		1	1.000000			1.000	1.000	89/03/28	89/03/28

GROSS

0 1 TOTAL STATIONS PROCESSED

	STA BEG	STA END	# OF OBS	# OF SAMPLE	STA END-PERIOD OF RECD IN YRS =0	<.5	<3	>=3
<1975	0	0	0	0	0	0	0	0
1975	0	0	0	0	0	0	0	0
1976	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0
1978	0	0	0	0	0	0	0	0
1979	0	0	0	0	0	0	0	0
1980	0	0	0	0	0	0	0	0
1981	0	0	0	0	0	0	0	0
1982	1	0	427	12	0	0	0	0
1983	0	0	407	11	0	0	0	0
1984	0	0	501	14	0	0	0	0
1985	0	0	443	12	0	0	0	0
1986	0	0	474	12	0	0	0	0
1987	0	0	452	11	0	0	0	0
1988	0	0	511	13	0	0	0	0
1989	0	0	858	12	0	0	0	0
1990	0	0	708	11	0	0	0	0
1991	0	0	599	11	0	0	0	0
1992	0	0	500	10	0	0	0	0
1993	0	1	122	7	0	0	0	1
1994	0	0	0	0	0	0	0	0
TOTAL	1	1	6002	136	0	0	0	1

0 1 TOTAL STATIONS PROCESSED

0	PARAMETER			MEDIUM	RMK	NUMBER	MEAN	VARIANCE	STAN DEV	MAXIMUM	MINIMUM	BEG DATE	END DATE
00010	WATER	TEMP	CENT	WATER		98	11.28400	52.51700	7.246900	26.0	.0	82/01/26	91/01/1(
00076	TURB	TRBIDMTR	HACH FTU	WATER		85	11.18000	192.4800	13.87400	88.0	.7	82/01/26	90/11/27
00095	CNDUCTVY	AT 25C	MICROMHO	WATER		96	265.9000	2709.100	52.04900	400	116	82/01/26	90/06/05
00300	DO		MG/L	WATER		14	10.85900	2.409600	1.552300	13.3	8.6	84/05/15	90/06/05
00310	BOD	5 DAY	MG/L	WATER		81	1.023500	.0088198	.0939140	1.7	1.0	82/01/26	93/08/02
00335	COD	LOWLEVEL	MG/L	WATER		124	8.491900	9.845500	3.137800	20.0	4.0	82/01/26	93/11/17
00400	PH		SU	WATER		89	7.917800	.1007600	.3174300	8.50	6.40	82/01/26	90/06/05
00403	PH	LAB	SU	WATER		125	7.864800	.0665010	.2578800	8.5	6.8	82/01/26	93/11/17
00410	T ALK	CACO3	MG/L	WATER		125	113.2100	28.01600	5.293000	141	94	82/01/26	93/11/17
00500	RESIDUE	TOTAL	MG/L	WATER		122	191.0300	4580.900	67.68200	863	17	82/01/26	93/11/17
00530	RESIDUE	TOT NFLT	MG/L	WATER		45	28.06700	2878.600	53.65300	219	1	82/01/26	92/05/19
00556	OIL-GRSE	FREON-GR	MG/L	WATER		44	3.011400	2.083800	1.443600	6.70	1.00	82/01/26	89/12/12
00610	NH3+NH4-	N TOTAL	MG/L	WATER		124	.1008900	.0002276	.0150860	.200	.010	82/01/26	93/11/17
00625	TOT KJEL	N	MG/L	WATER		124	.2887900	.0081529	.0902930	.700	.100	82/01/26	93/11/17
00630	NO2&NO3	N-TOTAL	MG/L	WATER		124	.3741900	.1300600	.3606400	4.00	.10	82/01/26	93/11/17
00665	PHOS-TOT		MG/L P	WATER		124	.0513710	.0397290	.1993200	2.250	.030	82/01/26	93/11/17
00680	T ORG C	C	MG/L	WATER		38	3.165800	1.805000	1.343500	9.2	1.5	82/01/26	85/06/20
00720	CYANIDE	CN-TOT	MG/L	WATER		123	.0054959	.0000184	.0042950	.050	.005	82/01/26	93/11/17
00900	TOT HARD	CACO3	MG/L	WATER		125	143.8700	80.10500	8.950100	176	124	82/01/26	93/11/17
00910	CALCIUM	CACO3	MG/L	WATER		80	94.52500	50.20700	7.085700	130.0	74.0	85/11/21	92/12/15
00916	CALCIUM	CA-TOT	MG/L	WATER		2	95.00000	2.000000	1.414200	96.0	94.0	93/08/02	93/11/17
00920	MGNSIUM	CACO3	MG/L	WATER		37	51.05400	126.3900	11.24200	76.0	20.0	85/11/21	89/05/23
00929	SODIUM	NA,TOT	MG/L	WATER		124	6.882200	1.696400	1.302500	14.00	4.80	82/01/26	93/08/02
00937	PTSSIUM	K,TOT	MG/L	WATER		43	1.704700	.3533300	.5944100	5.00	1.20	82/01/26	85/12/19
00940	CHLORIDE	TOTAL	MG/L	WATER		125	11.65200	3.936400	1.984100	22	5	82/01/26	93/11/17
00945	SULFATE	SO4-TOT	MG/L	WATER		122	24.95100	6.329000	2.515800	32	19	82/01/26	93/11/17
00951	FLUORIDE	F,TOTAL	MG/L	WATER		125	.1360000	.0028063	.0529740	.40	.10	82/01/26	93/11/17
00955	SILICA	DISOLVED	MG/L	WATER		112	1.444700	8.006800	2.829600	30.0	.1	82/06/10	93/11/17
01002	ARSENIC	AS,TOT	UG/L	WATER		123	.9382100	.0340280	.1844700	2	.6	82/01/26	93/08/02
01007	BARIUM	BA,TOT	UG/L	WATER		77	19.81800	2.808900	1.676000	23	10	86/05/22	93/08/02
01012	BERYLIUM	BE,TOT	UG/L	WATER		13	1.876900	.0902570	.3004300	2.00	1.20	89/03/28	93/08/02
01027	CADMIUM	CD,TOT	UG/L	WATER		125	2.000000	.0000000	.0000000	2	2	82/01/26	93/08/02
01032	CHROMIUM	HEX-VAL	UG/L	WATER		123	10.00000	.0000000	.0000000	10	10	82/01/26	93/11/17
01034	CHROMIUM	CR,TOT	UG/L	WATER		124	10.85500	110.8400	10.52800	120	4	82/01/26	93/08/02
01042	COPPER	CU,TOT	UG/L	WATER		125	8.832000	115.4200	10.74300	58	4	82/01/26	93/08/02
01045	IRON	FE,TOT	UG/L	WATER		122	277.0200	98996.00	314.6400	1500	20	82/01/26	93/08/02
01046	IRON	FE,DISS	UG/L	WATER		51	45.88200	956.7100	30.93100	170	20	86/05/22	92/03/25
01051	LEAD	PB,TOT	UG/L	WATER		125	8.224000	12.74000	3.569300	41	6	82/01/26	93/08/02
01055	MANGNESE	MN	UG/L	WATER		125	40.00800	25650.00	160.1600	1800.0	6.0	82/01/26	93/08/02
01059	THALLIUM	TL,TOTAL	UG/L	WATER		13	18.76900	19.69300	4.437700	20	4	89/03/28	93/08/02
01067	NICKEL	NI,TOTAL	UG/L	WATER		125	9.320000	221.5400	14.88400	100	4	82/01/26	93/08/02
01077	SILVER	AG,TOT	UG/L	WATER		77	9.870100	.2461500	.4961300	10.0	8.0	86/05/22	93/08/02

GROSS

0 1 TOTAL STATIONS PROCESSED

PARAMETER			MEDIUM	RMK	NUMBER	MEAN	VARIANCE	STAN DEV	MAXIMUM	MINIMUM	BEG DATE	END DA
01092 ZINC	ZN,TOT	UG/L	WATER		125	13.60000	36.12900	6.010800	30	10	82/01/26	93/08/
01097 ANTIMONY	SB,TOT	UG/L	WATER		13	.6692300	.0056411	.0751080	.7	.5	89/03/28	93/08/02
01147 SELENIUM	SE,TOT	UG/L	WATER		75	.5226700	.0425880	.2063700	1	.2	86/05/22	93/08/02
01503 ALPHA	DISOLVED	PC/L	WATER		14	.6700000	2.663900	1.632200	6	-.7	82/03/16	84/12/21
01504 ALPHA-D	ERROR	PC/L	WATER		14	1.146400	.5974700	.7729600	4	.3	82/03/16	84/12/21
01505 ALPHA	SUSP	PC/L	WATER		14	.6421400	.9097800	.9538300	3	-.3	82/03/16	84/12/21
01506 ALPHA-S	ERROR	PC/L	WATER		14	1.294300	.4281100	.6543000	3	.3	82/03/16	84/12/21
03503 BETA	DISOLVED	PC/L	WATER		14	3.576400	7.398100	2.719900	9	.03	82/03/16	84/12/21
03504 BETA-D	ERROR	PC/L	WATER		14	1.792100	.2870700	.5357900	3	.8	82/03/16	84/12/21
03505 BETA	SUSP	PC/L	WATER		14	2.328600	5.456000	2.335800	7	-1	82/03/16	84/12/21
03506 BETA-S	ERROR	PC/L	WATER		14	1.760000	.2565500	.5065000	3	.7	82/03/16	84/12/21
31501 TOT COLI	MFIMENDO	/100ML	WATER		44	21803.00	1143E+07	106920.0	650000	10	82/01/26	86/02/20
31616 FEC COLI	MFM-FCBR	/100ML	WATER		70	78.97200	96885.00	311.2600	1900	10	82/01/26	88/03/30
31648 E.COLI	MTEC-MF	NO/100ML	WATER		50	316.6000	4490300	2119.000	15000	10	88/04/28	93/11/17
32101 DICLBRMT		TOTUG/L	WATER		9	1.000000	.0000000	.0000000	1.0	1.0	89/03/28	92/11/17
32102 CARBNTET		TOTUG/L	WATER		9	1.000000	.0000000	.0000000	1.0	1.0	89/03/28	92/11/17
32103 12DICLET		TOTUG/L	WATER		9	1.000000	.0000000	.0000000	1.0	1.0	89/03/28	92/11/17
32104 BROMOFRM	WHL-WTR	UG/L	WATER		9	1.000000	.0000000	.0000000	1.0	1.0	89/03/28	92/11/17
32105 CLDIBRMT		TOTUG/L	WATER		9	1.000000	.0000000	.0000000	1.0	1.0	89/03/28	92/11/17
32106 CHLRFORM		TOTUG/L	WATER		9	1.000000	.0000000	.0000000	1.0	1.0	89/03/28	92/11/17
32730 PHENOLS	TOTAL	UG/L	WATER		123	5.105700	.4559600	.6752500	10	5	82/01/26	93/11/17
32732 PHENOLS		DIS UG/L	WATER		8	4.200000	.0000000	.0000000	4.20	4.20	89/03/28	92/04/21
34010 TOLUENE		TOT UG/L	WATER		9	1.500000	.0000000	.0000000	1.50	1.50	89/03/28	92/11/17
34030 BENZENE		TOT UG/L	WATER		9	1.000000	.0000000	.0000000	1.00	1.00	89/03/28	92/11/17
34200 ACENAPHT	HYLENE	TOTWUG/L	WATER		10	1.900000	8.100000	2.846100	10.000	1.000	89/03/28	92/11/17
34205 ACENAPHT	HENE	TOTWUG/L	WATER		10	1.900000	8.100000	2.846100	10.000	1.000	89/03/28	92/11/17
34220 ANTHRACE	NE	TOTWUG/L	WATER		10	1.900000	8.100000	2.846100	10.000	1.000	89/03/28	92/11/17
34230 BENZBFLU	ORANT TO	TAL UG/L	WATER		10	3.250000	5.625000	2.371700	10.000	2.500	89/03/28	92/11/17
34242 BENZO(K)	FLUORANT	TOTWUG/L	WATER		10	3.250000	5.625000	2.371700	10.000	2.500	89/03/28	92/11/
34247 BENZO(A)	PYRENE	TOTWUG/L	WATER		10	4.150000	4.225000	2.055500	10.000	3.500	89/03/28	92/11/17
34259 DELTABHC		TOTUG/L	WATER		10	.0200000	.0000000	.0000000	.020	.020	89/03/28	92/11/17
34273 BIS2CHLO	ROETHYLE	TOTWUG/L	WATER		10	2.350000	7.225000	2.687900	10.000	1.500	89/03/28	92/11/17
34278 BIS2CHLO	ROETHOXY	TOTWUG/L	WATER		10	2.350000	7.225000	2.687900	10.000	1.500	89/03/28	92/11/17
34283 BIS2CHLO	ROISOPRO	TOTWUG/L	WATER		9	4.500000	.0000000	.0000000	4.500	4.500	89/03/28	92/04/21
34292 NBB PHTH	TOTAL	UG/L	WATER		10	2.800000	6.400000	2.529800	10.000	2.000	89/03/28	92/11/17
34301 CHLOROBE	NZENE	TOTWUG/L	WATER		9	1.000000	.0000000	.0000000	1.000	1.000	89/03/28	92/11/17
34320 CHRYSENE		TOTWUG/L	WATER		10	4.150000	4.225000	2.055500	10.000	3.500	89/03/28	92/11/17
34336 DIETHYLP	HTHALATE	TOTWUG/L	WATER		10	1.900000	8.100000	2.846100	10.000	1.000	89/03/28	92/11/17
34341 DIMETHYL	PHTHALAT	TOTWUG/L	WATER		10	1.900000	8.100000	2.846100	10.000	1.000	89/03/28	92/11/17
34346 12DIPHEN	YLHYDRAZ	TOTWUG/L	WATER		10	2.800000	6.400000	2.529800	10.000	2.000	89/03/28	92/11/17
34376 FLUORANT	HENE	TOTWUG/L	WATER		10	1.900000	8.100000	2.846100	10.000	1.000	89/03/28	92/11/17
34381 FLUORENE		TOTWUG/L	WATER		10	1.900000	8.100000	2.846100	10.000	1.000	89/03/28	92/11/17

0 1 TOTAL STATIONS PROCESSED

0	PARAMETER	MEDIUM	RMK	NUMBER	MEAN	VARIANCE	STAN DEV	MAXIMUM	MINIMUM	BEG DATE	END DATE
34386	HEXACHLO ROCYCLOP TOTWUG/L	WATER		10	4.600000	3.600000	1.897400	10.000	4.000	89/03/28	92/11/17
34396	HEXACHLO ROETHANE TOTWUG/L	WATER		10	4.600000	3.600000	1.897400	10.000	4.000	89/03/28	92/11/17
34403	INDENO(1 23CD)PYR TOTWUG/L	WATER		10	4.150000	4.225000	2.055500	10.000	3.500	89/03/28	92/11/17
34408	ISPHRONE TOTUG/L	WATER		10	1.900000	8.100000	2.846100	10.000	1.000	89/03/28	92/11/17
34423	METHYLEN ECHLORID TOTWUG/L	WATER		9	6.000000	9.000000	3.000000	14.000	5.000	89/03/28	92/11/17
34428	NITROSOD IPROPYLA TOTWUG/L	WATER		10	6.400000	1.600000	1.264900	10.000	6.000	89/03/28	92/11/17
34447	NITROBEN ZENE TOTWUG/L	WATER		10	3.250000	5.625000	2.371700	10.000	2.500	89/03/28	92/11/17
34461	PHENANTH RENE TOTWUG/L	WATER		9	1.000000	.0000000	.0000000	1.000	1.000	89/03/28	92/04/21
34469	PYRENE TOTWUG/L	WATER		10	1.900000	8.100000	2.846100	10.000	1.000	89/03/28	92/11/17
34475	TETRACHL OROETHYL TOTWUG/L	WATER		9	1.000000	.0000000	.0000000	1.000	1.000	89/03/28	92/11/17
34488	TRICHLOR OFLUOROM TOTWUG/L	WATER		9	1.000000	.0000000	.0000000	1.000	1.000	89/03/28	92/11/17
34496	11DICHLO ROETHANE TOTWUG/L	WATER		9	1.000000	.0000000	.0000000	1.000	1.000	89/03/28	92/11/17
34501	11DICHLO ROETHYLE TOTWUG/L	WATER		9	1.000000	.0000000	.0000000	1.000	1.000	89/03/28	92/11/17
34506	111TRICH LOROETHA TOTWUG/L	WATER		9	1.000000	.0000000	.0000000	1.000	1.000	89/03/28	92/11/17
34511	112TRICH LOROETHA TOTWUG/L	WATER		9	1.000000	.0000000	.0000000	1.000	1.000	89/03/28	92/11/17
34516	1122TETR ACHLOROE TOTWUG/L	WATER		9	1.000000	.0000000	.0000000	1.000	1.000	89/03/28	92/11/17
34521	BENZO(GH I)PERYLE TOTWUG/L	WATER		10	4.150000	4.225000	2.055500	10.000	3.500	89/03/28	92/11/17
34526	BENZO(A) ANTHRACE TOTWUG/L	WATER		10	3.700000	4.900000	2.213600	10.000	3.000	89/03/28	92/11/17
34536	12DICHLO ROBENZEN TOTWUG/L	WATER		10	1.900000	8.100000	2.846100	10.000	1.000	89/03/28	92/11/17
34541	12DICHLO ROPROPAN TOTWUG/L	WATER		9	1.000000	.0000000	.0000000	1.000	1.000	89/03/28	92/11/17
34546	12DICHLO ROETHENE TOTWUG/L	WATER		9	1.000000	.0000000	.0000000	1.000	1.000	89/03/28	92/11/17
34551	124TRICH LOROBENZ TOTWUG/L	WATER		10	2.800000	6.400000	2.529800	10.000	2.000	89/03/28	92/11/17
34556	DIBENZ(A H)ANTHRA TOTWUG/L	WATER		10	4.150000	4.225000	2.055500	10.000	3.500	89/03/28	92/11/17
34566	13DICHLO ROBENZEN TOTWUG/L	WATER		10	2.800000	6.400000	2.529800	10.000	2.000	89/03/28	92/11/17
34571	14DICHLO ROBENZEN TOTWUG/L	WATER		10	1.900000	8.100000	2.846100	10.000	1.000	89/03/28	92/11/17
34581	2CHLORON APHTHALE TOTWUG/L	WATER		10	1.900000	8.100000	2.846100	10.000	1.000	89/03/28	92/11/17
34586	2CHLOROP HENOL TOTWUG/L	WATER		10	4.420000	3.844100	1.960600	10.000	3.800	89/03/28	92/11/17
34591	2NITROPH ENOL TOTWUG/L	WATER		10	1.900000	8.100000	2.846100	10.000	1.000	89/03/28	92/11/17
4596	DINOCTPH TOTUG/L	WATER		10	16.75000	1035.000	32.17200	98.000	1.500	89/03/28	92/11/17
34601	24DICHLO ROPHENOL TOTWUG/L	WATER		10	5.320000	2.704100	1.644400	10.000	4.800	89/03/28	92/11/17
34606	24DIMETH YLPHENOL TOTWUG/L	WATER		10	5.320000	2.704100	1.644400	10.000	4.800	89/03/28	92/11/17
34611	24DINITR OTOLUENE TOTWUG/L	WATER		10	2.800000	6.400000	2.529800	10.000	2.000	89/03/28	92/11/17
34616	24DINITR OPHENOL TOTWUG/L	WATER		10	3.940000	54.75600	7.399700	25.000	1.600	89/03/28	92/11/17
34621	246TRICH LOROPHEN TOTWUG/L	WATER		10	6.580000	1.444000	1.201700	10.000	6.200	89/03/28	92/11/17
34626	26DINITR OTOLUENE TOTWUG/L	WATER		10	2.800000	6.400000	2.529800	10.000	2.000	89/03/28	92/11/17
34636	4BROMOPH ENYLPHEN TOTWUG/L	WATER		10	2.800000	6.400000	2.529800	10.000	2.000	89/03/28	92/11/17
34641	4CHLOROP HENYLPHE TOTWUG/L	WATER		10	2.350000	7.225000	2.687900	10.000	1.500	89/03/28	92/11/17
34646	4NITROPH ENOL TOTWUG/L	WATER		10	7.360000	38.41600	6.198100	25.000	5.400	89/03/28	92/11/17
34696	NAPTHALE NE T OTWUG/L	WATER		10	1.900000	8.100000	2.846100	10.000	1.000	89/03/28	92/11/17
34699	T1,3-DCP TOT WAT UG/L	WATER		9	1.000000	.0000000	.0000000	1.000	1.000	89/03/28	92/11/17
34704	C1,3-DCP TOT WAT UG/L	WATER		9	1.000000	.0000000	.0000000	1.000	1.000	89/03/28	92/11/17
34705	C1,3-DCP DISS WAT UG/L	WATER		1	1.000000			1.000	1.000	89/03/28	89/03/28

0	PARAMETER	MEDIUM	RMK	NUMBER	MEAN	VARIANCE	STAN DEV	MAXIMUM	MINIMUM	BEG DATE	END DATE
39032	PCP	TOT UG/L WATER		10	2.620000	6.724000	2.593100	10.000	1.800	89/03/28	92/11/17
39100	B2ETHHXL PHTHALAT	TOT UG/L WATER		10	23.18000	1450.300	38.08300	110.000	1.500	89/03/28	92/11/17
39110	DNB PHTH TOTAL	UG/L WATER		10	1.370000	.9023300	.9499100	4.000	1.000	89/03/28	92/11/17
39180	TRICHLOR ETHYLENE	TOT UG/L WATER		9	1.000000	.0000000	.0000000	1.000	1.000	89/03/28	92/11/17
39330	ALDRIN	TOT UG/L WATER		10	.0200000	.0000000	.0000000	.020	.020	89/03/28	92/11/17
39337	ALPHABHC	TOTUG/L WATER		10	.0100000	.0000000	.0000000	.010	.010	89/03/28	92/11/17
39338	BETA BHC	TOTUG/L WATER		10	.0300000	.0000000	.0000000	.030	.030	89/03/28	92/11/17
39340	GAMMABHC LINDANE	TOT.UG/L WATER		10	.0100000	.0000000	.0000000	.010	.010	89/03/28	92/11/17
39350	CHLRDANE TECH&MET	TOT UG/L WATER		10	.5000000	.0000000	.0000000	.500	.500	89/03/28	92/11/17
39360	DDD WHL SMPL	UG/L WATER		10	.0500000	.0000000	.0000000	.050	.050	89/03/28	92/11/17
39365	DDE WHL.SMPL	UG/L WATER		10	.0500000	.0000000	.0000000	.050	.050	89/03/28	92/11/17
39370	DDT WHL SMPL	UG/L WATER		10	.1000000	.0000000	.0000000	.100	.100	89/03/28	92/11/17
39380	DIELDRIN	TOTUG/L WATER		10	.0500000	.0000000	.0000000	.050	.050	89/03/28	92/11/17
39388	ENDOSULN WHL SMPL	UG/L WATER		10	.0400000	.0000000	.0000000	.040	.040	89/03/28	92/11/17
39390	ENDRIN	TOT UG/L WATER		10	.0800000	.0000000	.0000000	.080	.080	89/03/28	92/11/17
39400	TOXAPHEN	TOTUG/L WATER		10	2.000000	.0000000	.0000000	2.000	2.000	89/03/28	92/11/17
39410	HEPTCHLR	TOTUG/L WATER		10	.0200000	.0000000	.0000000	.020	.020	89/03/28	92/11/17
39420	HPCHLREP	TOTUG/L WATER		10	.0200000	.0000000	.0000000	.020	.020	89/03/28	92/11/17
39480	MTHXYCLR WHL SMPL	UG/L WATER		10	.2000000	.0000000	.0000000	.200	.200	89/03/28	92/11/17
39488	PCB-1221	TOTUG/L WATER		10	.5000000	.0000000	.0000000	.500	.500	89/03/28	92/11/17
39492	PCB-1232	TOTUG/L WATER		10	.5000000	.0000000	.0000000	.500	.500	89/03/28	92/11/17
39496	PCB-1242	TOTUG/L WATER		10	.5000000	.0000000	.0000000	.500	.500	89/03/28	92/11/17
39500	PCB-1248	TOTUG/L WATER		10	.5000000	.0000000	.0000000	.500	.500	89/03/28	92/11/17
39504	PCB-1254	TOTUG/L WATER		10	.8000000	.0666670	.2582000	1.000	.500	89/03/28	92/11/17
39508	PCB-1260	TOTUG/L WATER		10	.8000000	.0666670	.2582000	1.000	.500	89/03/28	92/11/17
39700	HCB	TOT UG/L WATER		10	7.180000	39.20400	6.261300	25.000	5.200	89/03/28	92/11/17
39702	HEXCLBD	TOT UG/L WATER		10	3.700000	4.900000	2.213600	10.00	3.00	89/03/28	92/11/17
47501	WEATHER SAMPLING	CODE WATER		61	29512.00	3608E+05	18995.00	81834	10014	86/05/22	92/07/27
70300	RESIDUE DISS-180 C	MG/L WATER		79	171.7900	1076.600	32.81100	430	82	85/12/19	93/11/17
71900	MERCURY HG,TOTAL	UG/L WATER		125	.1200000	.0390320	.1975700	2.3	.1	82/01/26	93/08/02
74041	WQF SAMPLE	UPDATED WATER		88	902100.0	5189E+05	22780.00	940518	861001	85/08/22	93/11/17
77089	ANILINE TOTAL	UG/L WATER		10	2.350000	7.225000	2.687900	10.000	1.500	89/03/28	92/11/17
77147	BNZYLALC TOTAL	UG/L WATER		10	3.250000	5.625000	2.371700	10.000	2.500	89/03/28	92/11/17
77247	BENZOICA TOTAL	UG/L WATER		10	2.530000	6.889000	2.624700	10.000	1.700	89/03/28	92/11/17
77416	2MNAPTHA TOTAL	UG/L WATER		10	1.900000	8.100000	2.846100	10.000	1.000	89/03/28	92/11/17
77571	CARBAZOL TOTAL	UG/L WATER		10	1.900000	8.100000	2.846100	10.000	1.000	89/03/28	92/11/17
77687	245TCLPH TOTAL	UG/L WATER		10	4.840000	50.17600	7.083500	25.000	2.600	89/03/28	92/11/17
78113	ETH BENZ WH WTR	UG/L WATER		9	2.000000	.0000000	.0000000	2.00	2.00	89/03/28	92/11/17
78300	3-NITRO ANILINE	TOT UG/L WATER		10	4.750000	50.62500	7.115100	25.000	2.500	89/03/28	92/11/17
81302	DIBENZO FURAN	TOT UG/L WATER		10	1.900000	8.100000	2.846100	10.000	1.000	89/03/28	92/11/17
81551	XYLENE	TOT UG/L WATER		9	9.000000	.0000000	.0000000	9.000	9.000	89/03/28	92/11/17
81552	ACETONE	TOT UG/L WATER		9	20.00000	.0000000	.0000000	20.000	20.000	89/03/28	92/11/17

1STORET RETRIEVAL DATE 94/06/28 PGM=INVENT GROSS

0 1 TOTAL STATIONS PROCESSED

0	PARAMETER	MEDIUM	RMK	NUMBER	MEAN	VARIANCE	STAN DEV	MAXIMUM	MINIMUM	BEG DATE	END DATE
81595	MTH ETH KETONE	TOT UG/L WATER		9	8.422200	43.80500	6.618500	26.000	6.000	89/03/28	92/11/17
81596	MTHISOBU KETONE	TOT UG/L WATER		9	3.000000	.0000000	.0000000	3.000	3.000	89/03/28	92/11/17
81648	PCB 1016 /1242	TOT UG/L WATER		10	.5000000	.0000000	.0000000	.500	.500	89/03/28	92/11/17
81649	PCB-1262 TOT	UG/L WATER		8	.7500000	.0714290	.2672600	1.000	.500	89/03/28	92/11/17
82623	ENDOSLFN -SO4 TOT REC	UG/L WATER		10	.1400000	.0060001	.0774600	.2	.05	89/03/28	92/11/17
82624	ENDOSLFN BETA TOT REC	UG/L WATER		10	.0800000	.0006666	.0258200	.1	.05	89/03/28	92/11/17
85810	12DICLR ETHL TRN EFF	UG/L WATER		1	1.000000			1.000	1.000	89/03/28	89/03/28

THAT'S ALL FOLKS

1STORET RETRIEVAL DATE 94/06/28

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ATTACHMENT 7

REPRESENTATIVE FISHERIES

ATTACHMENT 7 - REPRESENTATIVE FISHERIES

An anecdotal summary of the representative fishery at the Amoco outfall presented in Table A7-1 is based on observations from local fishermen and other observers. Local fishermen report that the present Outfall 001 and Outfall 002 area provides good fishing. During the study period, scientists observed carp and freshwater drum in the Outfall 001 and Outfall 002 area. Table A7-1 shows the type of fish and season for several species that typically occur in the Amoco outfall area, based on information obtained from talking to local fishermen at the Amoco Cove, the Whiting City Park boat ramp, and a representative of the local Steelheaders fishing organization.

Table A7-1. Fishing information at Amoco Lakefront

Fish and Fishing Season Information for Amoco Lakefront	
Fish Type	**Prime Season**
Coho Salmon (Silver)	**January through March**
Chinook Salmon	**February through May; Mid-August through Mid-October; Spawning - September**
Steelhead	**October through July**
Perch	**April through October**
Small Mouth Bass	**April through October**
Sheepshead	**Year-round**
Catfish	**Summer**
Lake Trout	**September through October (Rare because of the shallow water in Amoco Cove).**
Brown Trout	**October through March**
Carp	**April through October**

During the present study, fishermen were frequently encountered at Whiting City Park (WCP) and the Amoco Cove while conducting the field activities. Comments, and general information about local (regional) fishing and fishing conditions in the Amoco Cove are summarized below.

- Warm water industrial and waste thermal discharges near the shoreline, such as the Amoco Outfalls 001 and 002, are recognized as excellent fishing sites. There are several such discharges along the southern portion of Lake Michigan which offer excellent boat and shore fishing. (boat fishermen WCP; Steelheaders member).

- The main factor determining fishing success seems to be water temperature. Extended wind patterns during the spring, summer and fall have the biggest effect on the distribution of water temperatures, and thus the distribution of fish. (boat fishermen WCP; Steelheaders member).

- During summer, the warmer waters near the shore contain a steady supply of carp, drum, catfish and other warm water fish. The perch fishing has always been highly variable, however, the perch fishing seems to be much improved due to a reduction of commercial net size, and changes in the fishing practices. The small mouth bass fishing seems to be steadily getting better over the past 5-8 years. (Steelheaders member).

- Water clarity in Lake Michigan is much better than it was only 5-8 years ago. (boat fishermen WPC; Amoco Lakefront fishermen; Steelheaders member).

- The Amoco Cove is one of the best chinook fisheries during the fall in southern Lake Michigan. Up to 30 fish per day can be caught, even from shore. (Steelheaders member).

- The Amoco Cove is a standard fishing location for chinook during late August at night, as well as coho, steelhead, and brown trout from January to early April. (Amoco Cove fishermen; boat fishermen WPC; Steelheaders member).

- Burns Ditch area is the only area good for lake trout because of the deeper water for spawning. The Amoco Cove is too shallow. (Steelheaders member).

SECTION 6

PROJECTED EFFLUENT QUALITY

The Indiana Industrial Wastewater NPDES and Pretreatment Regulations (327 IAC Article 5) and the USEPA *"Training Manual for NPDES Permit Writers"* (EPA 833-B-93-003, USEPA, March 1993) both discuss the requirements for determining the need for water quality-based effluent limits (WQBELs) in an NPDES permit. Excerpts from these references are provided in Attachments 1 and 2.

327 IAC 5-2-11.1 (h)(1) specifically discusses

> *"Limitations must control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the commissioner determines are, or may be, discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any narrative or numeric water quality standard promulgated under 327 IAC 2-1-6.*

In Section 6.3 of the *"Training Manual for NPDES Permit Writers,"* the determination of the need for a WQBEL is addressed as follows:

> *"When conducting an effluent characterization, the permit writer is essentially projecting the concentration of the pollutant(s) contained in the effluent once the effluent enters the receiving water. The permit writer then compares this projected receiving water concentration to the applicable State water quality criteria. If the projected concentration exceeds the applicable water quality criteria, the permit writer has established that WQBELs are needed."*

327 IAC 5-2-11.1 (h)(2) states that when determining the need for WQBELs:

> *"When determining whether a discharge causes, has the reasonable potential to cause, or contributes to an in-stream excursion above a narrative or numeric criteria within an Indiana water quality standard, the commissioner shall use procedures which account for existing controls on point and nonpoint source of pollution, the variability of the pollutant or pollutant parameter in the effluent, the sensitivity of the species to toxicity testing (when evaluating whole effluent toxicity), and, **where appropriate, the dilution of the effluent in the receiving water**"* (emphasis added).

PURPOSE OF PROJECTED EFFLUENT QUALITY

The purpose of this section is to determine whether the Whiting Refinery Outfall 001 effluent has the reasonable potential to cause receiving water concentrations above the numeric criteria presented in the Indiana Water Quality Standards (IWQS). This determination is done in accordance with the statistical procedures described in Section 3 - Effluent Characterization of the *"Technical Support Document for Water Quality-based Toxics Control"* (USEPA March 1991 TSD)(EPA/505/2-90-001,USEPA, March 1991).

In accordance with 327 IAC 5-2-11.1(h)(2), this determination includes procedures that account for the dispersion of the effluent in the receiving water (i.e., the mixing zone), and the variability within the constituent data available at the time of the permit application. The dispersion values for a mixing zone are developed on a hydraulic basis, not on a parameter-by-parameter basis. Thus, the mixing zone is a universal mixing zone for the entire effluent and is not designed to ensure attainment of receiving water quality standards for any specific parameter in the effluent. The size of the mixing zone does not vary from parameter to parameter. This is addressed in more detail in Section 7 following the development of WQBELs.

PROCEDURE FOR PROJECTING EFFLUENT QUALITY

The procedure for projecting effluent quality (PEQ) and determining the need for a WQBEL is provided in Figure 6-1. For each parameter, the first step is to determine if all the results in a data set are less than the analytical detection limit. If this is the case, then there is no reasonable potential for a numeric criterion to be exceeded. For the second step, based upon best professional judgement, the same logic has been applied to data sets where greater

than seventy-five percent of the results are less than the analytical detection limit. For parameters where the numeric criterion is less than the analytical detection limit, the required numbers of results less than the analytical detection limit has been set at one hundred percent.

The next step is to generate the necessary statistical summaries for data sets with less than seventy-five percent of the results below the analytical detection limit. The data required is governed by the number of samples (n), the observed maximum value (MAX), and the coefficient of variation (CV). In accordance with the USEPA March 1991 TSD, for data sets of less than ten samples (i.e. $n<10$) a default value of 0.6 is assumed for CV.

The next step is to calculate the maximum expected effluent concentration. This is achieved by following the procedure outlined in Section 3.3.2 in the USEPA March 1991 TSD. Using the statistical factors generated (i.e. n and CV), reasonable potential multiplying factors (MFs), at a 99 percent confidence level, are obtained for 99 percent and 95 percent probability bases from Tables 3-1 and 3-2 of the USEPA March 1991 TSD, respectively. The 99 percent and 95 percent probability bases multiplying factors are used to estimate the maximum expected acute and chronic effluent concentrations, respectively. Section 5.5.4 of the USEPA March 1991 TSD recommends a similar approach for the derivation of permit limits, i.e. use a 99 percent probability basis for calculating maximum daily limits and a 95 percent probability basis for developing average monthly limits. If the calculated maximum expected acute or chronic effluent concentrations are less than the applicable acute aquatic criteria (AAC) or continuous chronic criteria (CCC), then a WQBEL is not needed for that type of limit for that particular parameter.

The next two steps in the process are to account for background concentrations and any dispersion of the effluent in the receiving water. Background concentrations for the Lake Michigan receiving water were obtained from the EPA STORET Whiting Intake database or the *"Wasteload Allocation of Grand Calumet River - Indiana Harbor Ship Canal,"* (IDEM WLA) (IDEM, September 1992.) Dispersion for acute and chronic maximum expected effluent concentrations was projected based on the dispersion expected in a mixing zone implemented for Outfall 001. Details of the mixing zone implementation are provided in the "Mixing Zone Demonstration" report provided in Volume II of this permit application. These dispersion values for the mixing zone were determined using the USEPA-approved CORMIX2 computer model. CORMIX2 projects a zone of initial dilution of 54:1. Indiana regulations use the term zone of discharge induced mixing (ZDIM) for diffuser induced dispersion. The ZDIM of 54:1 was used to define the application of the AAC. The Total Mixing Zone (TMZ) provided a dispersion of 77:1 for application of the CCC.

Based on the regulatory history of, and scientific basis for, the Lake Michigan standards (327 IAC 2-1-6(j)), for the protection of drinking water and bathing beaches, the edge of the Total Mixing Zone is the point of application for these standards. A summary of the evolution and regulatory history of the Lake Michigan "6(j)" standards is provided in Attachment 3.

To calculate a receiving water concentration (RWC) under acute and chronic conditions, the following mass balance equation is used:

$$RWC = \frac{[\,(MAX) \times (MF) \times (1) + (BG) \times (DR)\,]}{(DR + 1)} \qquad \text{Eq.6-1}$$

where:

RWC	=	Receiving water concentration
DR	=	Dispersion ratio, i.e. 54 (acute) or 77 (chronic)
MAX	=	Observed maximum concentration
MF	=	Reasonable potential multiplying factor
BG	=	Background concentration.

PROCEDURE IMPLEMENTATION

The procedure for projecting effluent quality (PEQ) is applicable to the following:

- 327 IAC 2-1-6(a) Water Quality Standards in Table 1;
- 327 IAC 2-1-6-(b)(5)(C)(ii) Lake Michigan ammonia standard; and,
- 327 IAC 2-1-6(j) Lake Michigan standards.

These water quality criteria are provided in Table 6-1. The ammonia as N limits in Table 6-1 were calculated using the unionized ammonia concentration in 327 IAC 2-1-6(b)5(C)(ii) and Lake Michigan pH and temperature conditions appropriate to each season as defined in the IDEM WLA. The seasons are defined differently in the IDEM OWM-1 guidance. For comparison, the summer and winter pH and temperature values for the Outfall 001 effluent are provided in Attachment 4.

A summary of the results from applying the PEQ procedure is provided in Table 6-2. The shading in Table 6-2 indicates the point at which a parameter drops out of the PEQ process. For example, barium never enters the process since there is no criterion applicable to Outfall 001. Cadmium drops out of the process since the seven samples analyzed reported results below the analytical detection limit. Parameters such as selenium and zinc enter the PEQ process, but the projected effluent quality is less than the IWQS numeric criteria; therefore, WQBELs are not needed as explained in the footnotes in Table 6-2.

Several parameters in Table 6-2 have Lake Michigan standards or limits as specified in 327 IAC 2-1-6(b)5(C) and (j). Since these standards are applied outside a mixing zone, a consideration of projected acute receiving water concentrations is unnecessary unless a parameter also has an applicable AAC in 327 IAC 2-1-6(a) Table 1.

The PEQ procedure was not applied to pH and dissolved oxygen criteria since these parameters are not conservative. These parameters undergo immediate transformation whenever two different volumes of water are co-mingled. For pH, the current permit limits pH to the range of 6.5 to 9.0 which will ensure that the pH outside the mixing zone meets the Lake Michigan IWQS, as stated in the fact sheet of the current permit. Receiving water criteria for dissolved oxygen will also be achieved for the same reason. The effluent, which has been biologically treated, has an extremely low biological oxygen demand (BOD) level of 2.7 mg/L average. (The Whiting intake BOD level is 1.02 mg/L). The WLA recommendations for Outfall 001 also indicates that the effluent is well below allowable BOD loading to the Lake (Table 6-3). This extremely low oxygen demand and the fact that the effluent immediately co-mingles with Lake Michigan water indicate that the dissolved oxygen criteria for Lake Michigan will be achieved.

As a result of the PEQ procedure, the following parameters enter the process for deriving WQBELs:

- chlorides;
- sulfates;
- total phosphorous;
- TDS; and,
- ammonia as N.

EXAMPLE OF PEQ PROCEDURE IMPLEMENTATION

To determine the need for WQBELs for chlorides, the valid data set provided twenty-five samples (n = 26) with a maximum concentration of 320 mg/L (MAX = 320 mg/L) and a coefficient of variation of 0.288 (CV = 0.288). The procedure was as follows:

Step 1 — Number of results less than the analytical detection limit is 0%, therefore proceed to the next step.

Step 2 — Using the March 1991 TSD for n = 26 and CV = 0.288, the acute and chronic multiplying factors are:

MF (acute) = 1.6 (from Table 3-1 of the USEPA March 1991 TSD), and,
MF (chronic) = 1.2 (from Table 3-2 of the USEPA March 1991 TSD).

The acute and chronic maximum expected effluent concentrations are:

MAX x MF (Acute) = 320 x 1.6 = 512 mg/L (acute)
MAX x MF (Chronic) = 320 x 1.2 = 384 mg/L (chronic).

These concentrations exceed the AAC, CCC and Lake Michigan Standards, therefore proceed to the next step.

Step 3 — The background chlorides concentration from IDEM September 1992 WLA is 11 mg/L (BG = 11 mg/L).

Dispersion ratios (DR) are:

DR (acute) = 54, and,
DR (chronic) = 77.

Using Equation 6-1, the receiving water concentrations are:

$$\text{RWC (acute)} = \frac{[(320 \times 1.6 \times 1) + (11 \times 54)]}{(54 + 1)} = 20.11 \text{ mg/L}$$

$$\text{RWC (chronic)} = \frac{[(320 \times 1.2 \times 1) + (11 \times 77)]}{(77 + 1)} = 15.78 \text{ mg/L}$$

Step 4 The RWC (acute) exceeds the daily maximum Lake Michigan standard of 20 mg/L.

The RWC (chronic) exceeds the monthly average Lake Michigan Standard of 15 mg/L.

Since the process demonstrates a reasonable potential to exceed the receiving water numeric criteria, there is a demonstrated need for chlorides to enter the WQBEL development process.

WHOLE EFFLUENT TOXICITY

The procedure for projecting effluent quality can be applied to whole effluent toxicity as well as to specific chemical parameters. A consideration of acute and chronic effects of an effluent on a receiving water is required as discussed in the minimum water quality standards in 327 IAC 2-1-6(a) (1) and (2). In order to ensure that the concentration of substances do not become acutely toxic to, or produce chronic effects on, aquatic organisms, acute or chronic aquatic criterion can be based on whole effluent toxicity. As stated in 327 IAC 2-1-8.2(1)(8), the acute aquatic whole effluent criterion:

> *"...shall not exceed ten percent (10%) mortality above control mortality, as measured by the most sensitive species tested, in one hundred percent (100%) effluent".*

Chronic whole effluent toxicity is addressed in 327 IAC 2-1-8.3 (1)(B) as follows:

> *"Alternately, or in addition to the CAC* (chronic aquatic criterion) *in Section 6 (a)(2) of this rule, a site-specific CAC based on whole effluent toxicity can be utilized. This criterion shall not exceed the no observable effect level (NOEL) based on an appropriate toxicity test, as measured by the most sensitive species tested at an effluent equal to that provided by no more than one-fourth (1/4) of the $Q_{7,10}$ flow of the receiving stream."*

To determine whether Amoco's Outfall 001 effluent has the reasonable potential to cause a receiving water concentration greater than the chronic effluent toxicity criteria, federal guidance will need to be used. The presentation of Indiana's chronic effluent toxicity criteria does not state what level of receiving water toxicity is to be achieved at the edge of the Total Mixing Zone. Since "one-fourth of the $Q_{7,10}$" is one possible definition of a Total Mixing Zone (see 327 IAC 2-1-4(c)) and the CAC applies at the edge of the Total Mixing Zone (TMZ), it is logical that the receiving water chronic effluent criteria is a no observed effect level (NOEL) of 100 percent of the edge of the TMZ. Federal guidance, as per Section 3.3.3 of the USEPA March 1991 TSD, states:

> *"In the absence of a State numeric criterion for the parameter toxicity, EPA recommends the 1.0 TU_c...be used as the CCC...".*

The CCC (criteria continuous concentration) is equal to IWQS CAC, and is a chronic effect criteria applied at the edge of the TMZ.

Toxicity test data can thus be used to ensure compliance with the above narrative chronic effluent criteria of 1 TU_c. A chronic toxicity unit is defined by the equation:

$$TU_c = \frac{100}{NOEL} \qquad \text{Eq. 6-2}$$

where:

TU_c = Chronic toxicity unit

NOEL = No observable effect level, i.e. the highest effluent concentration tested at which no adverse effects are observed over a specified period of time.

Toxicity units are dimensionless, and given that 100 percent is the highest effluent concentration tested, the lowest TU_c value from a toxicity test is 1.0. The projected effluent quality procedure will be, therefore, compared to the reasonable potential to exceed a receiving water criterion of 1 TU_c.

The necessary statistical data for the chronic and acute toxicity test data included in the Form 2C characterization summary are included in Table 6-2, and the determination of a WQBEL procedure is followed similar to the process for chemical parameters. The background TU_c value is addressed in the manner shown by an example in the USEPA March 1991 TSD:

> *"Since the upstream ambient water was used as a diluent, the (toxicity) test results already include an assessment of contributions from background toxicity. Therefore, the upstream receiving water concentration was set to zero."*

Since Lake Michigan is in compliance with IWQS then, per the USEPA March 1991 TSD, a background TU_c value of zero was used in the procedure for projecting effluent quality for chronic toxicity.

Projected TU_c values were developed for fathead minnows and *Ceriodaphnia dubia*. Since no acute toxicity was observed or measured using standard USEPA methods and procedures, there was no need to project the impact of the effluent on receiving water acute toxicity quality.