



FINAL REPORT

for

PHASE II

Lake Management Plan for Invasive Species Control
in Escanaba Municipal Marina

by

H₂O in Motion, Inc.

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A. Introduction

In June of 2011, the City of Escanaba and H₂O in Motion, Inc., entered into an agreement whereby the parties agreed H₂O in Motion would:

- Conduct two surveys (one in the spring, one in the fall) of the aquatic invasive species in the marina;
- Conduct a flow study of the water in the municipal marina (done at the same time as the spring survey of aquatic invasive species); and
- Conduct a water quality analysis (one in the spring, one in the fall) in the marina.
- H₂O in Motion also agreed to provide assistance to the City in applying for any necessary chemical application permits (assuming chemical treatment is the chosen method for combating any invasive species problem found from the survey results).

H₂O in Motion conducted the “spring” aquatic invasive species survey, flow study, and water quality analysis in June 2011, and the “fall” aquatic invasive species survey and water quality analysis in August 2011. Reports were previously provided after each of these tasks was completed. This report contains a comprehensive summary of the findings from Phase II of the Lake Management Plan for Invasive Species Control. Phase II of the plan involved chemical application over 33-acres, genetic testing, FasTesting, and completion of the survey to analyze the effectiveness of the chemicals and the chemicals’ impact on the aquatic nuisance vegetation.

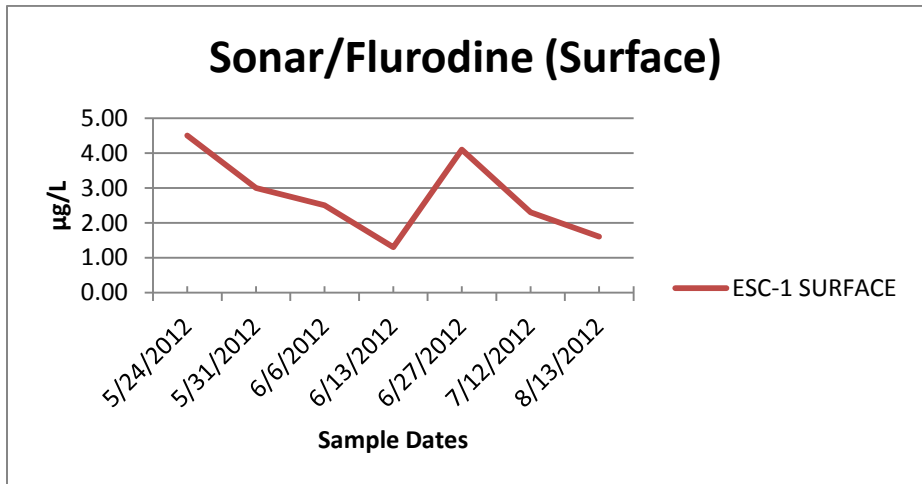
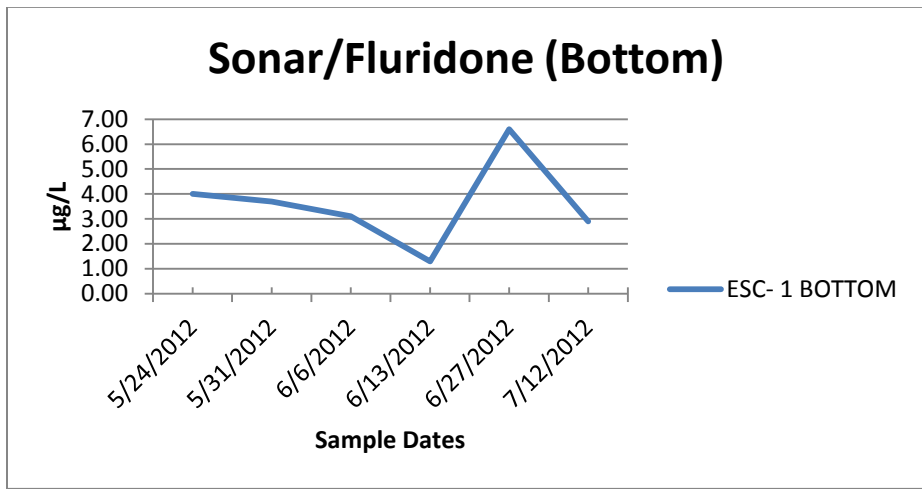
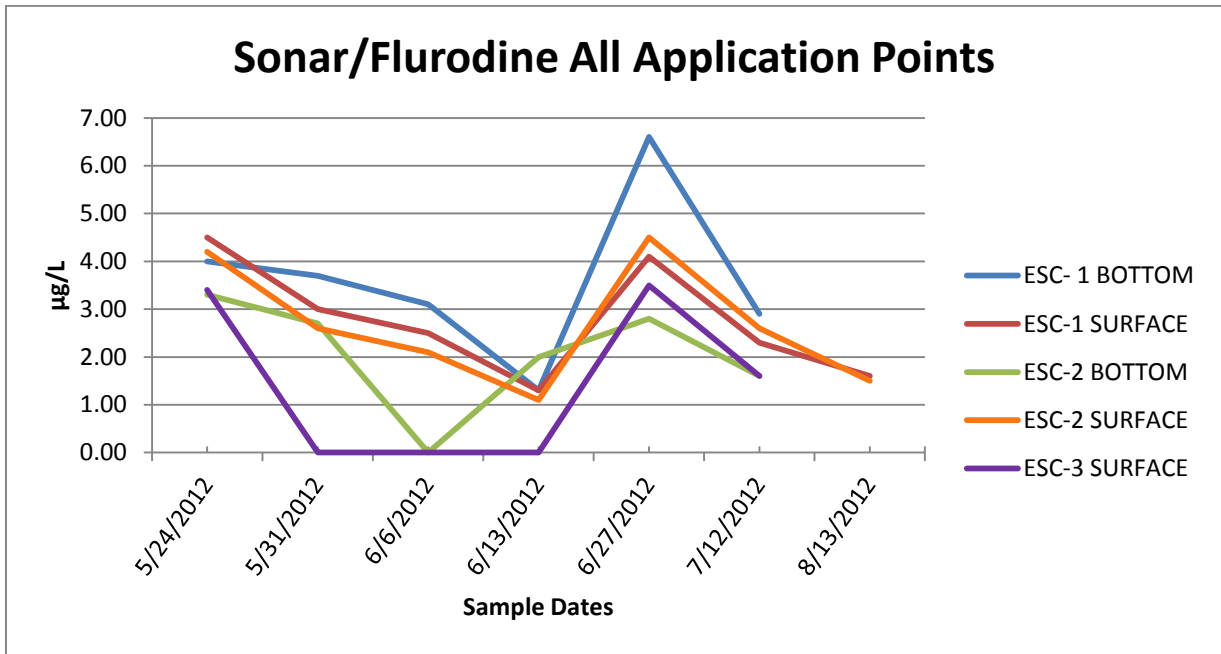
B. Sonar/Fluridone Data and Graphs

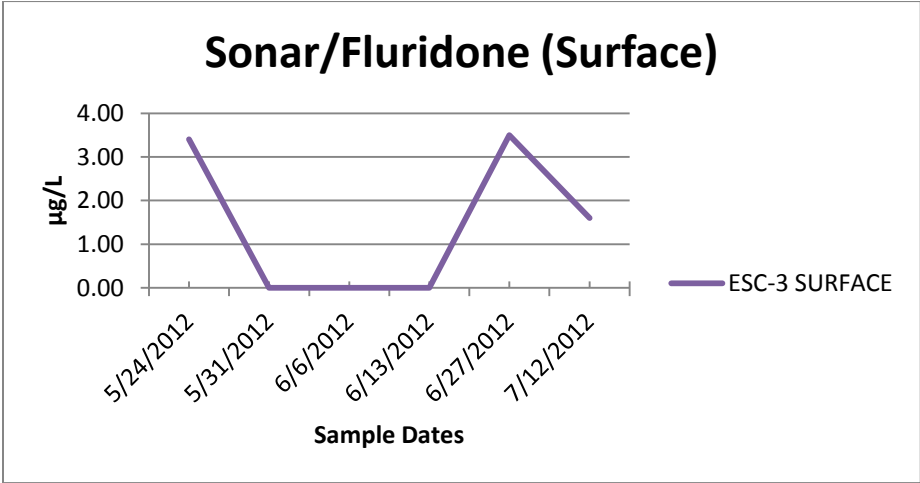
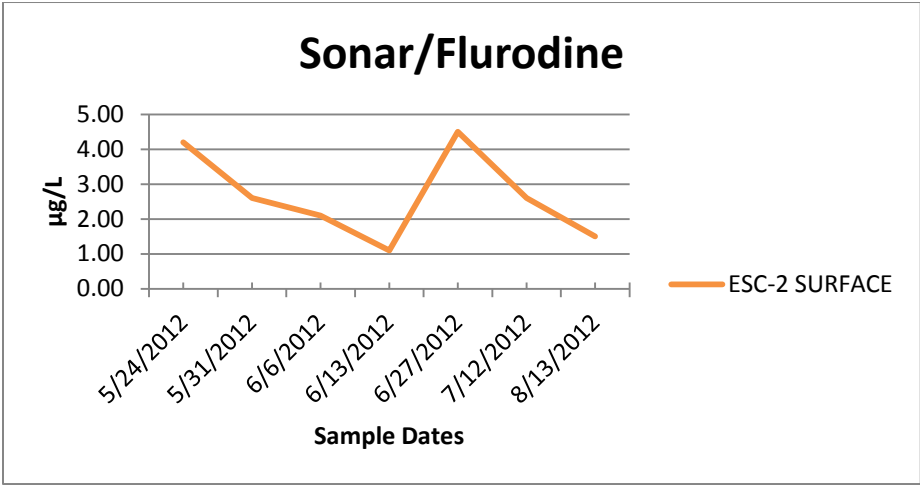
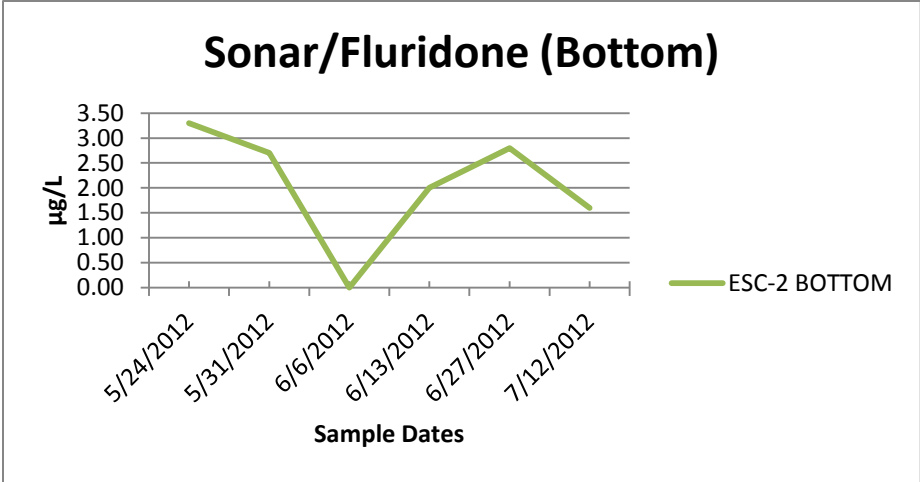
For each date an analysis was performed, five total samples were collected at various collection points around the marina. The samples to be analyzed for Flurodine concentration included:

- 2 samples from bottom of the marina
- and 3 samples from the surface of the marina.

5/24/2012	
<u>Sample Location</u>	<u>Results, µg/L</u>
ESC-1 BOTTOM	4.00
ESC-1 SURFACE	4.50
ESC-2 BOTTOM	3.30
ESC-2 SURFACE	4.20
ESC-3 SURFACE	3.40
5/31/2012	
<u>Sample Location</u>	<u>Results, µg/L</u>
ESC-1 BOTTOM	3.7
ESC-1 SURFACE	3.0

ESC-2 BOTTOM	2.7
ESC-2 SURFACE	2.6
ESC-3 SURFACE	<1.00
6/6/2012	
<u>Sample Location</u>	<u>Results, µg/L</u>
ESC- 1 BOTTOM	3.1
ESC-1 SURFACE	2.5
ESC-2 BOTTOM	<1.00
ESC-2 SURFACE	2.1
ESC-3 SURFACE	<1.00
6/13/2012	
<u>Sample Location</u>	<u>Results, µg/L</u>
ESC- 1 BOTTOM	1.3
ESC-1 SURFACE	1.3
ESC-2 BOTTOM	2.0
ESC-2 SURFACE	1.1
ESC-3 SURFACE	<1.00
6/27/2012	
<u>Sample Location</u>	<u>Results, µg/L</u>
ESC- 1 BOTTOM	6.6
ESC-1 SURFACE	4.1
ESC-2 BOTTOM	2.8
ESC-2 SURFACE	4.5
ESC-3 SURFACE	3.5
7/12/2012	
<u>Sample Location</u>	<u>Results, µg/L</u>
ESC- 1 BOTTOM	2.9
ESC-1 SURFACE	2.3
ESC-2 BOTTOM	1.6
ESC-2 SURFACE	2.6
ESC-3 SURFACE	1.6
8/13/2012	
<u>Sample Location</u>	<u>Results, µg/L</u>
ESC- 1 SURFACE	1.6
ESC- 2 SURFACE	1.5





C. Results/Discussion of Chemical Treatment

Biomass assessment through 8 weeks post SonarOne application demonstrated selective management of both EWM and CLP through the anticipated two-month active treatment period. At the start of the treatment in mid May, EWM and CLP biomass were relatively low and comparable to native SAV biomass. By 8 weeks post treatment, measured native biomass increased over 10X starting levels. Actual biomass likely increased several times more than quantified because native biomass was not collected at 4 of 7 stations due to excessive amounts that were going to be highly problematic as a supplementary component of the protocol. EWM biomass decreased 10X through 8 weeks post treatment. CLP biomass was initially steady at low levels through 4 weeks post treatment with some limited turion formation detected and then senesced through a combination of treatment and natural seasonal declines by the 8-week sampling event on July 10.

Overall, the FastEST record through 8 weeks post treatment (Table 2) indicates sufficient, but by no means excessive, levels of Sonar to provide selective management of EWM and CLP in Escanaba Harbor through use of the SonarOne treatment plan. Average levels of Sonar measured for the 8 week period were 3 – 3.6 ppb and 2.2 – 2.9 ppb at treated sites ESC-1 and ESC-2 respectively. Although only 300 yards approximately from the active treatment zone, ESC-3 surface samples averaged several times lower than treated site results and for many events were less than 1 ppb. This outcome supports the value of the SonarOne pellet formulation to target and sustain sufficient herbicide dosing in the active treatment zone in a relatively dynamic harbor system attached directly to Lake Michigan.

As of the end of July, the SonarOne treatment appears to have successfully met control objectives, and therefore it is recommended that further FastEST sampling be decreased in frequency and intensity per original project planning.

D. Fall 2012 Aquatic Vegetation Assessment

The aquatic vegetation survey was completed on September 21, 2012. This survey was conducted in accordance with the MDEQ procedures for aquatic vegetation surveys. A grid of points (AVAS) was overlaid across the entire harbor using a 50-meter resolution. Each site (AVAS) was sampled using a double-headed rake attached to a 16-foot long sampling rod. A total of 87 sites were sampled. At each AVAS, species on the rake and densities were documented using the four-part MDEQ estimated density ranking. In addition to species collected on the rake, a visual assessment was completed for each AVAS.

Below is a summary of the percent frequency of each species found during the Fall 2012 Aquatic Vegetation Assessment. Please refer to Appendix C for the complete data collected during the survey.

2012 AVAS Summary – Escanaba Harbor, Escanaba, MI

Species	Percent Frequency
<i>C. demersum</i> (hornwort)	29.89
<i>Chara</i> (algae)	8.05
<i>E. canadensis</i> (Elodea)	16.09
<i>E. nutelli</i> (coonstail)	17.24
<i>H. dubia</i> (water stargrass)	43.68
<i>M. spicatum</i> (Eurasian watermilfoil)	25.29
<i>N. flexalis</i> (Common naiad)	4.60
<i>N. odorata</i> (water lily)	6.90
<i>P. crispus</i> (culry leaf pondweed)	12.64
<i>P. praelongus</i> (white-stem pondweed)	1.15
<i>P. pusillus</i> (small pondweed)	4.60
<i>P. richarsonii</i> (Richardson's pondweed)	12.64
<i>P. zosterformis</i> (flatstem pondweed)	3.45
<i>Phragmites</i> spp. (reeds)	1.15
<i>R. aquatilis</i> (white water-crowfoot)	5.75
<i>Typha</i> spp. (cattail)	12.64
<i>V. americana</i> (American Speedwell)	10.34

Map of Fall 2011 Survey Results



 Sample locations

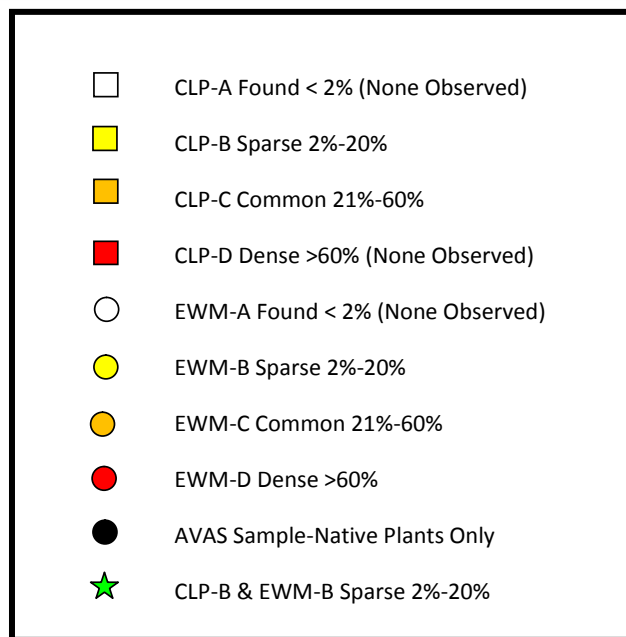
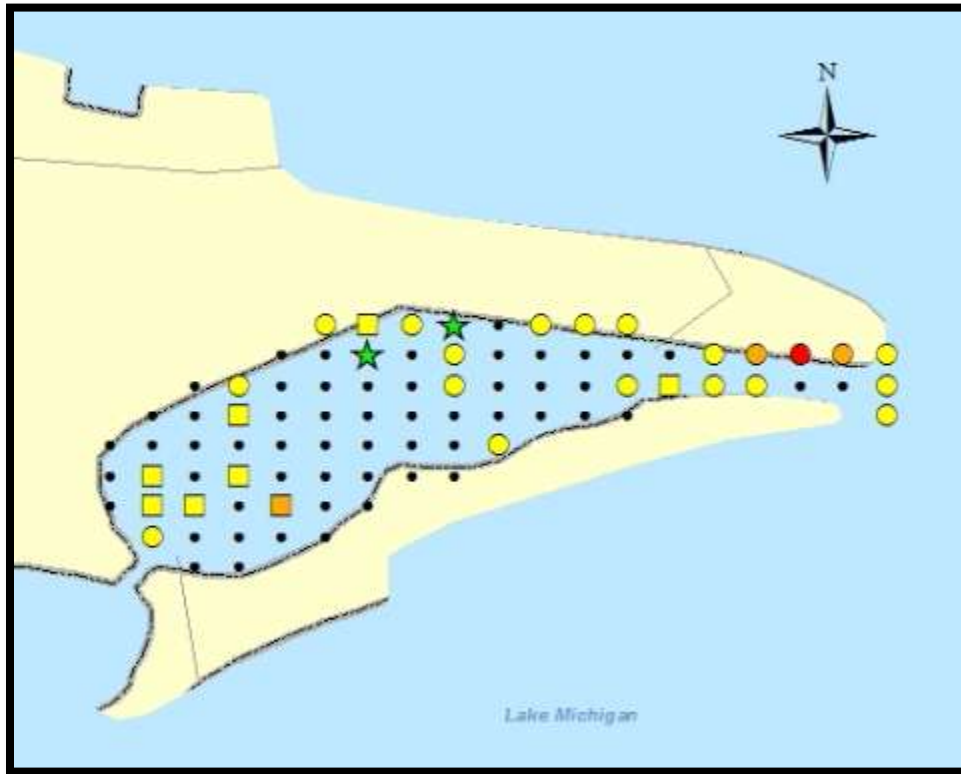
 Curly Pondweed (*Potamogeton crispus*) (dead on bottom) and Eurasian Water Milfoil (*Myriophyllum spicatum*)

Map of Fall 2012 Survey Results After Chemical Treatment



- Curly Pondweed (*Potamogeton crispus*)
- Eurasian Water Milfoil (*Myriophyllum spicatum*)

Fall 2012 EWM and CLP Surveys



Appendix A
SePRO BioMass Assessment



Escanaba Harbor, Michigan

2012 SonarOne™ Treatment

Submersed Vegetation Biomass Assessment

Update July 30, 2012

Introduction:

SonarOne™, a 5% active pellet formulation of Sonar (a.i., fluridone), was applied to Escanaba Harbor on May 17, 2012, per Michigan DEQ ANC permit number 12-98-0039-0. 36 acres of the approximate 42 total surface acres were treated with 476 lbs of SonarOne to achieve a theoretical 20 ppb dose for the harbor's total volume (approximately 28 ppb in treated acres). On June 19, a second 'bump' application of 340 lbs (14 ppb whole harbor, 20 ppb in treated acres) was made to extend the effective exposure period for the Sonar treatment. Along with standard Michigan assessment protocols, assessment of native and invasive submersed aquatic plant biomass before and during the treatment was conducted to assess the efficacy and selectivity of this evaluation protocol for Escanaba Harbor.

Methods:

On May 16, one day prior to application, initial pre-treatment biomass was collected in the harbor. Seven different sampling stations (map – Figure 1) were selected based on historical presence of the invasive submersed target species, *Myriophyllum spicatum* (Eurasian water milfoil or EWM) and *Potamogeton crispus* (Curly-leaf pondweed or CLP). At each station, 0.01 square meter areas were sampled for submersed plant shoot fresh weight at four different points (approximate corners of boat) using a cross-shaped plant rake (Figure 2). The original evaluation protocol did not call for native submersed assessment, but a composite native biomass metric was added along with EWM and CLP assessment. Rake was lowered to just above the sediment surface, twisted several times to entangle plant biomass in proximity to the rake and then extracted. Root material collected was excised from the shoot material and discarded. Plants were rinsed of any sediment and filamentous algae removed as needed. Collected plants for all four sub-sampling areas were composited and then excess water removed by placing the plant tissue into a nylon mesh bag and spinning the bag vigorously for ~ 15 seconds. EWM and CLP were separated from the other submersed species found. Fresh weights of EWM, CLP, and native species were separately measured for composited samples and expressed on a kg per square meter basis. While not weighed individually by species, all natives species found at each station were recorded. Although sediment sampling for CLP turion counts was not a part of this protocol, turions found on sampled CLP biomass at each event were counted and recorded.

Results and Discussion:

Biomass assessment through 8 weeks post SonarOne application demonstrated selective management of both EWM and CLP through the anticipated two-month active treatment period (Table 1 and Figure



Figure 1. Map of 2012 FastTEST and submersed plant biomass assessment stations in Escanaba Harbor.



Figure 2. Photos of cross-design plant rake used for aboveground biomass assessment.

3). At the start of the treatment in mid May, EWM and CLP biomass were relatively low and comparable to native SAV biomass. By 8 weeks post treatment, measured native biomass increased over 10X starting levels. Actual biomass likely increased several times more than quantified because native biomass was not collected at 4 of 7 stations due to excessive amounts that were going to be highly problematic as a supplementary component of the protocol. EWM biomass decreased 10X through 8

weeks post treatment. CLP biomass was initially steady at low levels through 4 weeks post treatment with some limited turion formation detected and then senesced through a combination of treatment and natural seasonal declines by the 8-week sampling event on July 10.

Figure 3. Changes in above-ground fresh biomass of native (all species) and invasive (EWM and CLP) submersed macrophytes in Escanaba Harbor from 1 day before (May 16) and 4 and 8 weeks post May 17, 2012, treatment with SonarOne herbicide. Note: results are presented on a logarithmic scale for easier interpretation of invasive biomass declines amidst strong native growth.

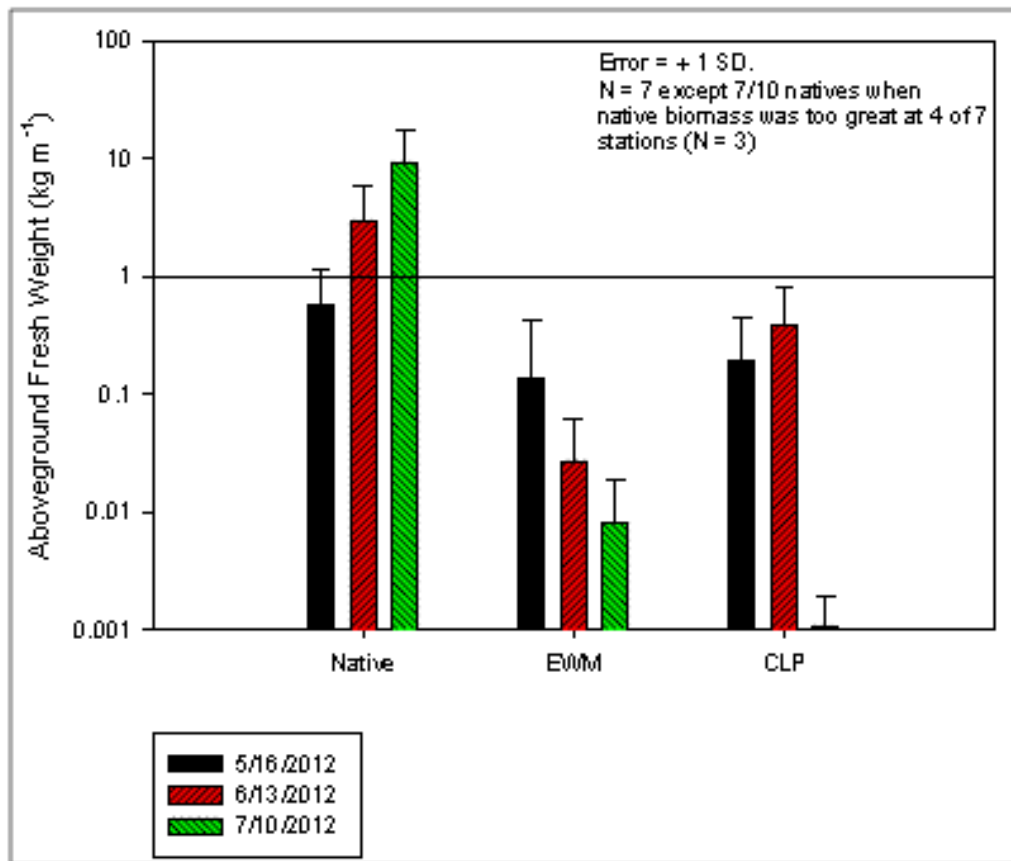




Table 1. Native Vegetation Detected, Above-ground Fresh Weights of EWM, CLP, and Natives plus CLP turion counts for assessment events 1 day before (May 16), 4 weeks (June 13), and 8 weeks post treatment (July 10).

16-May-12		kg FW per square meter			CLP
Station	Native Vegetation Found	EWM	CLP	Native	Turions
BM1	Coontail, Elodea (E. nutelli + E. canadensis)	0.000	0.255	0.028	-
BM2	Coontail, Elodea (E. nutelli + E. canadensis)	0.000	0.730	1.618	-
BM3	Coontail, Elodea (E. nutelli + E. canadensis)	0.020	0.093	0.360	-
BM4	Elodea (E. nutelli + E. canadensis)	0.001	0.093	0.988	-
BM5	Coontail, Elodea (E. nutelli + E. canadensis)	0.080	0.165	0.323	-
BM6	Coontail, Elodea (E. nutelli + E. canadensis)	0.773	0.033	0.358	-
BM7	Coontail, Elodea (E. nutelli + E. canadensis)	0.080	0.000	0.273	-
	AVG.	0.136	0.195	0.564	
13-Jun-12		kg FW per square meter			CLP
Site	Native Vegetation Found	EWM	CLP	Native	Turions
BM1	Coontail, Elodea (E. nutelli + E. canadensis)	0.001	0.978	0.528	20
BM2	Coontail, Elodea (E. nutelli + E. canadensis)	0.015	0.943	8.205	18
BM3	Coontail, Elodea (E. nutelli + E. canadensis), fil algae	0.001	0.050	5.540	5
BM4	Elodea (E. nutelli + E. canadensis), coontail, p. pusillus, fil algae	0.001	0.165	0.943	16
BM5	Coontail, Elodea (E. nutelli + E. canadensis), crowfoot (R. aquatilis), fil algae	0.085	0.063	3.583	5
BM6	Coontail, Elodea (E. nutelli + canadensis)	0.028	0.393	1.415	13
BM7	Coontail, Elodea (E. nutelli + E. canadensis), flat stem pondweed (P. zosteriformis)	0.058	0.025	0.528	1
	AVG.	0.027	0.374	2.963	
10-Jul-12		kg FW per squaremeter			CLP
Site	Native Vegetation Found	EWM	CLP	Native*	Turions
BM1	Coontail, Elodea (E. nutelli + E. canadensis)	0.000	0.001	2.703	0
BM2	Coontail, Elodea (E. nutelli + E. canadensis), stargrass (H. dubia or Z. dubia)	0.001	0.000	18.128	1
BM3	Coontail, Elodea (E. nutelli + E. canadensis), stargrass, fil algae	0.008	0.000	NM	0
BM4	Elodea (E. nutelli + E. canadensis), coontail, small pondweed (P. pusillus), stargrass	0.000	0.003	NM	2
BM5	Coontail, Elodea (E. nutelli + E. canadensis), Fries' pondweed (P. friesii), stargrass	0.010	0.001	NM	1
BM6	Coontail, Elodea (E. nutelli + E. canadensis), stargrass, Richardson's pondweed (P. richardsonii)	0.008	0.001	7.185	2
BM7	Coontail, Elodea , flat stem pondweed, stargrass, crowfoot, small pondweed	0.030	0.001	NM	3
	AVG.	0.008	0.001	9.338	

* NM = Not measured, excessive biomass

Overall, the FastEST record through 8 weeks post treatment (Table 2) indicates sufficient, but by no means excessive, levels of Sonar to provide selective management of EWM and CLP in Escanaba Harbor through use of the SonarOne treatment plan. Average levels of Sonar measured for the 8-week



period were 3 – 3.6 ppb and 2.2 – 2.9 ppb at treated sites ESC-1 and ESC-2 respectively. Although only 300 yards approximately from the active treatment zone, ESC-3 surface samples averaged several times lower than treated site results and for many events were less than 1 ppb. This outcome supports the value of the SonarOne pellet formulation to target and sustain sufficient herbicide dosing in the active treatment zone in a relatively dynamic harbor system attached directly to Lake Michigan.

As of the end of July, the SonarOne treatment appears to have successfully met control objectives, and therefore it is recommended that further FastEST sampling be decreased in frequency and intensity per original project planning. SePRO will update this draft report as needed to capture additional future 2012 sampling and assessment information.

Table 2. Sonar FastEST Analytical Monitoring Summary (through 8 weeks post initial application)

parts per billion (ppb) Sonar (Fluridone)							
*Re-treated 6/19							
	1 WAT	2 WAT	3 WAT	4 WAT	6 WAT	8 WAT	
	24-May	31- May	6-Jun	13-Jun	27-Jun	12- Jul	Mean
Esc-1 Surface	4.5	3.0	2.5	1.3	4.1	2.3	3.0
Esc- 1 Bottom	4.0	3.7	3.1	1.3	6.6	2.9	3.6
Esc-2 Surface	4.2	2.6	2.1	1.1	4.5	2.6	2.9
Esc-2 Bottom	3.3	2.7	0.5	2.0	2.8	1.6	2.2
Esc- 3 Surface	3.4	0.5	0.5	0.5	3.5	1.6	1.7
<1.0 readings are noted as 0.5 ppb							

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Appendix B

Site Contour Map

Maximum Depth 20+ feet				
Contour	Area	Area between Contour and Next Contour	Average Depth (feet)	Volume (acre-ft)
0	33		5	12.5
5	28	14.5	7.5	108.75
10	13.5	11.9	12.5	148.75
15	1.6	1.4	17.5	24.5
20	0.2	0.2	25	5
25		0	27.5	0
30		0	45	0
35		0	37.5	0
40		0	45	0
45		0	47.5	0
50		0	55	0
60		0	65	0
70		0	72.5	0
75		0	75	0
Total				299.50



Appendix C
Fall 2012 Aquatic Vegetation Assessment Data

Standard Aquatic Vegetation Assessment Site Species Density Sheet		Aquatic Vegetation Assessment Site Number																		
Code No.	Plant Name	Summary				NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.
		A	B	C	D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
20	<i>C. demersum (hornwort)</i>	0	22	2	2					b	b	b	b	b		b				
3	<i>Chara (algae)</i>	0	7	0	0	b												b		
21	<i>E. canadensis (Elodea)</i>	0	14	0	0					b										b
28	<i>E. nutelli (coonstail)</i>	0	15	0	0				b	b				b						
14	<i>H. dubia (water stargrass)</i>	0	18	7	13	b			b		b		b			d				
1	<i>M. spicatum (Eurasian watermilfoil)</i>	0	19	2	1				b	b	b		b	b		b		b	c	d
25	<i>N. flexalis (Common naiad)</i>	0	4	0	0													b		
30	<i>N. odorata (water lily)</i>	6	0	0	0															
2	<i>P. crispus (curly leaf pondweed)</i>	0	10	1	0								b		b					
8	<i>P. praelongus (white-stem pondweed)</i>	1	0	0	0															
4	<i>P. pusillus (small pondweed)</i>	4	0	0	0															a
9	<i>P. richarsonii (Richardson's pondweed)</i>	0	11	0	0	b												b		
5	<i>P. zosterformis (flatstem pondweed)</i>	0	3	0	0															
44	<i>Phragmites spp. (reeds)</i>	0	1	0	0															
24	<i>R. aquatilis (white water-crowfoot)</i>	5	0	0	0					a						a				
39	<i>Typha spp. (cattail)</i>	0	11	0	0															
15	<i>V. americana (American Speedwell)</i>	0	9	0	0	b										b				

Standard Aquatic Vegetation Assessment																														
Site Species Density Sheet																														
Code No.	Plant Name	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.
		16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40				
20	<i>C. demersum (hornwort)</i>			b	b	b		b	b	b					b				b	d			d	b		b				
3	<i>Chara (algae)</i>																													
21	<i>E. canadensis (Elodea)</i>			b										b			b	b	b					b						
28	<i>E. nutelli (coonstail)</i>					b			b					b		b			b			b				b			b	
14	<i>H. dubia (water stargrass)</i>											c	b					c	d	b	b								b	
1	<i>M. spicatum (Eurasian watermilfoil)</i>	c	b						b		b			b			b	b		b					b					
25	<i>N. flexalis (Common naiad)</i>			b										b	b															
30	<i>N. odorata (water lily)</i>											a																		
2	<i>P. crispus (culry leaf pondweed)</i>			b							b										b									
8	<i>P. praelongus (white-stem pondweed)</i>										a																			
4	<i>P. pusillus (small pondweed)</i>															a														
9	<i>P. richarsonii (Richardson's pondweed)</i>																			b										
5	<i>P. zosterformis (flatstem pondweed)</i>			b																									b	
44	<i>Phragmites spp. (reeds)</i>																													
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15	<i>V. americana (American Speedwell)</i>													b	b															

Standard Aquatic Vegetation Assessment Site Species Density Sheet																												
Code No.	Plant Name	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.
		41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65		
20	<i>C. demersum (hornwort)</i>							s	b	c	b	c															b	
3	<i>Chara (algae)</i>																										b	
21	<i>E. canadensis (Elodea)</i>								b	b		b															b	
28	<i>E. nutelli (coonstail)</i>								b				b															
14	<i>H. dubia (water stargrass)</i>	b	b	c	c		d	d	b			c		b	d		d							d	d	b		
1	<i>M. spicatum (Eurasian watermilfoil)</i>			b		b																			b			
25	<i>N. flexalis (Common naiad)</i>																											
30	<i>N. odorata (water lily)</i>	a						a																				
2	<i>P. crispus (culry leaf pondweed)</i>															b												
8	<i>P. praelongus (white-stem pondweed)</i>																											
4	<i>P. pusillus (small pondweed)</i>									a						a												
9	<i>P. richarsonii (Richardson's pondweed)</i>								b							b								b	b			
5	<i>P. zosterformis (flatstem pondweed)</i>																										b	
44	<i>Phragmites spp. (reeds)</i>																											
24	<i>R. aquatilis (white water-crowfoot)</i>						a																					
39	<i>Typha spp. (cattail)</i>							b	b																		b	
15	<i>V. americana (American Speedwell)</i>																										b	

LAKE NAME-Escanaba Harbor					COUNTY- Delta				SURVEY DATE: 9.21.2012			
Standard Aquatic Vegetation Summary Sheet					SURVEY BY: Larry Sundling & Barb Gajewski							
Code No	Plant Name	Total number of AVAS's for each Density Category				Calculations				Sum of Previous	Total Number	Quotient of Column 9
		A	B	C	D	Category A x 1	Category B x10	Category C x 40	Category D x 80	Four Columns	of AVAS's	divided by Column 10
		1	2	3	4	5	6	7	8	9	10	11
20	<i>C. demersum (hornwort)</i>	0	22	2	2	0	220	80	160	460	87	5.3
3	<i>Chara (algae)</i>	0	7	0	0	0	70	0	0	70	87	0.8
21	<i>E. canadensis (Elodea)</i>	0	14	0	0	0	140	0	0	140	87	1.6
28	<i>E. nutelli (coonstail)</i>	0	15	0	0	0	150	0	0	150	87	1.7
14	<i>H. dubia (water stargrass)</i>	0	18	7	13	0	180	280	1040	1500	87	17.2
1	<i>M. spicatum (Eurasian watermilfoil)</i>	0	19	2	1	0	190	80	80	350	87	4.0
25	<i>N. flexalis (Common naiad)</i>	0	4	0	0	0	40	0	0	40	87	0.5
30	<i>N. odorata (water lily)</i>	6	0	0	0	6	0	0	0	6	87	0.1
2	<i>P. crispus (culry leaf pondweed)</i>	0	10	1	0	0	100	40	0	140	87	1.6
8	<i>P. praelongus (white-stem pondweed)</i>	1	0	0	0	1	0	0	0	1	87	0.0
4	<i>P. pusillus (small pondweed)</i>	4	0	0	0	4	0	0	0	4	87	0.0
9	<i>P. richarsonii (Richardson's pondweed)</i>	0	11	0	0	0	110	0	0	110	87	1.3
5	<i>P. zosterformis (flatstem pondweed)</i>	0	3	0	0	0	30	0	0	30	87	0.3
44	<i>Phragmites spp. (reeds)</i>	0	1	0	0	0	10	0	0	10	87	0.1
24	<i>R. aquatilis (white water-crowfoot)</i>	5	0	0	0	5	0	0	0	5	87	0.1
39	<i>Typha spp. (cattail)</i>	0	11	0	0	0	110	0	0	110	87	1.3
15	<i>V. americana (American Speedwell)</i>	0	9	0	0	0	90	0	0	90	87	1.0

<u>Depth, ft</u>	<u>D.O.</u>	<u>Temperature °C</u>	<u>% Saturation</u>
Surface	9.09	13.8	87.4
0.5	9.18	13.8	88.5
1	9.15	13.8	88
1.5	9.07	13.8	87.5
2	9.07	13.8	87.5
2.5	9.03	13.8	86.6
3	8.95	13.7	87
3.5	8.97	13.8	86.6
4	8.97	13.7	86.9
4.5	8.93	13.7	85.9
Bottom	0.25	14.1	1.7

Appendix D
State of Michigan Application Permit



STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY

INDIVIDUAL PERMIT FOR PESTICIDE APPLICATION
TO SURFACE WATERS OF THE STATE OF MICHIGAN

Permits are required by Part 31, Water Resources Protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA), and Part 33, Aquatic Nuisance Control, of the NREPA (Part 33).

Permission is hereby granted, based on information supplied on the permit application and on the applicant's assurance of adherence to State requirements and this permit, to apply chemicals to the waters described herein for the control of aquatic plants and/or algae or swimmer's itch.

PERMIT NUMBER: [12-98-0039-0](#)

DATE EFFECTIVE:

This permit is valid only through .

Permittee Name and Address

[City of Escanaba](#)

[2914 17.75 Lane](#)

[Escanaba, Michigan 49829](#)

Name of Waterbody Affected

[Lake Michigan – Escanaba Marina](#)

County(ies) in which Waters are Located

[Delta](#)

Authority granted by this permit is subject to the following conditions and limitations:

Section A. Authorizations and Coverage Provisions

1. Chemical Application

The application of chemicals is restricted to the following CHEMICAL(S) (product name and/or active

ingredient), APPLICATION RATE(S), and MAXIMUM AMOUNT(S) PER TREATMENT.

MAXIMUM AMOUNT(S) TO BE APPLIED PER TREATMENT

CHEMICAL(S) AND APPLICATION RATE(S)

Sonar One - fluridone (submergent) pound(s)

- **Please note** - due to recent revisions in the product label, two different rates and amounts of Navigate 2,4-D may be listed above. The dosage on the updated label is based on water volume (acre-feet) rather than treatment surface area (acre) for submersed plants. Product with the old label has not yet cleared the channels of trade. Please carefully read the label supplied with the product that you are using and apply it accordingly.

Application of 2,4-D granular herbicide in shallow areas may result in disproportionate product concentration, which could result in unacceptable impacts to non-target organisms. The application rate must be adjusted as necessary to compensate. Consult the product label to ensure proper application.

The applicant may apply only those specific chemical products that are approved by the Department of Environmental Quality (DEQ). If only an active ingredient is approved in the table above, consult the list of DEQ-approved aquatic pesticides and related products to determine if the brand name product you plan to use is approved. This document is available at <http://www.michigan.gov/deqinlandlakes>, or upon request.

2. Treatment Intervals

Each chemical approved for use in Section A(1) of this permit has a minimum length of time required between each treatment in same area(s) of impact, in accordance with the federal product label. Follow the federal treatment interval unless a different interval or use limitation is specified in Section A(4) of this permit.

3. Authorized Areas

Control of aquatic nuisances is authorized only in areas as defined on the attached treatment map(s).

Areas where control of aquatic nuisances is undertaken must be either under the legal control of the permittee or the party(ies) who has/have granted the permittee permission to do the treatment.

4. Special Conditions

The initial fluridone treatment is permitted one time only, as an evaluation, at an initial rate not to exceed 20 ppb based upon the calculated water volume of the treatment area. The objective is to reach a fluridone dose at or above 4 ppb in the treatment area and maintain fluridone concentration at 3 ppb or greater for 60 days.

The DEQ may amend this permit for the DEQ's approved amount of fluridone needed for a second application. Calculations of the second application amount will be required prior to the issuance of the permit amendment.

Fluridone concentrations shall be monitored at the three locations indicated on the approved residue sampling site location map. Samples shall be collected at 1.5 feet below the water surface and 1 foot off the bottom at Sites 1 and 2. Samples shall be collected at 1.5 feet below the water surface at Site 3. Beginning seven days after the initial treatment, each location shall be sampled once weekly during the first four weeks following the initial treatment, and biweekly thereafter until Eurasian watermilfoil control is achieved. Following confirmation that Eurasian watermilfoil is controlled, only surface water samples at Sites 1 and 2 shall be collected every four weeks until fluridone levels fall below 2 ppb for both sites or until November 1, 2012, whichever comes first. Each sam

Vegetation surveys are required in August or September of each year of the vegetation management plan (2012, 2013, and 2014). These vegetation surveys are to be conducted per DEQ's "Procedures for Aquatic Vegetation Surveys". The results of these vegetation surveys (maps and summary sheets) must be mailed to the DEQ (attention: Lisa Huberty) by November 1 of the year the survey was performed.

Prior to the initial treatment plant samples for the genetic analysis of watermilfoil shall be collected according to the protocol recommended by Dr. Ryan Thum at Grand Valley State University.

The fresh weight biomass of Eurasian watermilfoil and curly leaf pondweed shall be estimated at 5 locations within 24-48 hours prior to or after the initial treatment and at six and twelve weeks after the initial treatment according to the protocol provided by SePRO Corporation.

Notification of Escanaba Water Treatment Plant personnel 5 business days prior to treatment and day of treatment.

5. Notification and Posting Requirements

The applicant is required to notify, in writing, an owner of any waterfront property within 100 feet of the area of impact, not less than seven days, and not more than 45 days, before the initial chemical treatment. Requirements for written notification are provided in Section 324.3310(h) of Part 33. If the owner is not the occupant of the waterfront property or the dwelling located on the property, then the owner is responsible for notifying the occupant.

Notice of the chemical application must be posted prior to each chemical application, in accordance with Section 324.3310(d) of Part 33. Water use restrictions listed on the label for the specific product (i.e., trade name) used shall be included on the posting signs. In addition, a 24-hour water use restriction for swimming/entry shall be indicated on the signs for all chemical applications, except for copper-based algae treatments and dyes when approved for use as a tracer or marker. A 48-hour swimming restriction shall be indicated on the signs for swimmer's itch treatments with copper sulfate.

Section B. Permit Amendments

The DEQ may make minor revisions to this permit to minimize the impacts to the natural resources, public health and safety, or to improve aquatic nuisance control, if the proposed revisions do not involve a change in the scope of the project and the permittee requests the revisions in writing. A revision that involves a change in the scope of the original project requires submittal of a new permit application. As part of the amendment request, the permittee shall include all of the following information: (a) the proposed changes to the permit; (b) an explanation of the necessity for the proposed changes; (c) maps that clearly delineate any proposed changes to the area of impact; and (d) additional information that would help the DEQ reach a decision on the permit amendment.

Section C. Reporting and Record Keeping

1. Environmental Impacts

The applicant is required to immediately contact the DEQ, Water Resources Division, at 517-241-1554 if any fish or wildlife damage or significant non-target plant impacts occur in association with any chemical application.

2. Treatment Report

A treatment report, on the approved DEQ form, must be returned postmarked no later than November 30 of the year this permit is in effect, even if treatment is not undertaken. Blank forms can be downloaded from the website <http://www.michigan.gov/deqinlandlakes> or are available upon request. Submit completed and signed report to: Aquatic Nuisance Control Program, Water Resources Division, Department of Environmental Quality, P.O. Box 30458, Lansing, Michigan 48909-7958; fax 517-335-4381; or e-mail DEQ-LWM-ANC@michigan.gov.

3. Record Retention

The applicant shall obtain and maintain written permission from each bottomland owner in the area of impact for 1 year from the expiration date of the permit, unless exempt under Section 324.3308 of Part 33. The records shall be made available to the DEQ upon request.

Section D. Liability

1. Noncompliance

Initiation of any work on the permitted project confirms the applicant's acceptance and agreement to comply with all terms and conditions of this permit. Noncompliance with these terms and conditions, and/or the initiation of other regulated activities not specifically authorized by this permit, shall be cause for the modification, suspension, or revocation of this permit, in whole or in part. Further, the DEQ may initiate criminal and/or civil proceedings to correct project deficiencies, protect public health and natural resource values, and secure compliance with statutes.

Federal pesticide label requirements are incorporated into this permit by reference. Violation of federal pesticide label requirements is considered a violation of this permit.

The issuance of this permit does not authorize violation of any federal, state or local laws or regulations, nor does it obviate the necessity of obtaining such permits, including any other DEQ permits, or approvals from other units of government as may be required by law.

2. Property Rights

This permit does not convey property rights in either real estate or material, nor does it authorize any injury to private property or invasion of public or private rights.

3. Indemnification

The applicant shall indemnify and hold harmless the State of Michigan and its departments, agencies, officials, employees, agents and representatives for any and all claims or causes of action arising from acts or omissions of the applicant, or employees, agents, or representatives of the applicant, undertaken in connection with this permit. This permit shall not be construed as an indemnity by the State of Michigan for the benefit of the applicant or any other person.

4. Right of Entry

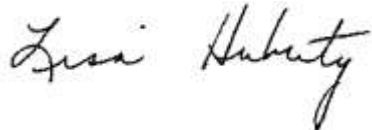
The permittee shall allow the Department upon the presentation of credentials: To enter upon the permittee's premises where application equipment is located or in which any records are required to be kept under the terms and conditions of this permit; and at reasonable times to have access to waterbodies regulated under this permit, copy any records required to be kept under the terms and conditions of this permit; to inspect equipment regulated or required under this permit; and to sample chemicals, discharges, chemical products, and waterbodies.

5. Laboratory and Analytical

When required by this permit or per the pesticide product label, laboratory analytical methods, practices and product or water sampling techniques shall be performed in accordance with standard laboratory guidelines. The permittee shall periodically calibrate and maintain all monitoring instrumentation at necessary intervals to ensure accuracy of measurements. When outside contractors are utilized to perform sampling and analysis, the permittee shall ensure that said contractors are sufficiently qualified to perform the required sampling and analysis, and that the quality control measures listed above are properly executed.

Dan Wyant, Director

Department of Environmental Quality

A handwritten signature in black ink that reads "Lisa Huberty". The signature is written in a cursive style with a large initial "L" and "H".

By: [Lisa Huberty](#)

Environmental Quality Analyst

Water Resources Division

For additional information or questions regarding this permit, please contact the DEQ at:

DEQ, Water Resources Division, Constitution Hall, 525 West Allegan Street, P.O. Box 30458, Lansing, Michigan 48909-7958,

Telephone: (517) 241-1554, E-mail: DEQ-LWM-ANC@michigan.gov, Website: <http://www.michigan.gov/deq>