ER REFERENCES TO BE DOCKETED

ATTACHMENT 7

ATTACHMENT 1
Predefine Data Package Cover Sheet
Page 1 of 1

Procedure # N/A Unit: 00 PM ID: 73528-01
Title ZEBRA MUSSEL STATUS REPORT

PREDEFINE INFORMATION: Work Order #: N/A
Due Date: 5/13/10 Late Date: 8/12/10
Tech Spec: NO X YES ___

SIGNATURE AUTHORIZATION/APPROVALS

Opposite Train Operable	YES NO (N/A)		
Authorization to Start Work	N/A		
Work Started By	D. Manrezaa	5/10/10	11:00
Work Completed By	Dana Manrezaa	5/10/10	11:30
Surveillance Found Within Acceptance Criteria	(YES) NO		
Surveillance Left Within Acceptance Criteria	(YES) NO	11:35	
Supv Review of Work Complete	Robert Bryerton	~~5-10~~ RCB 5-10-10	5-10-10
	Signature	Time	Date

Update Predefine (circle one of the following):

(COMPLETE/SAT) - COMPLETE/PORTIONS UNSAT - PARTIAL - FAILED

COMMENTS

Intake - Zebra mussel density calculated at 1 $\#/m^2$, down from 38 $\#/m^2$ in 2008.

Lake - No Zebra mussels found

Levels are acceptable.

REVIEW OF RESULTS

MAY 1 0 2010

Title	Signature	Date

ZEBRA MUSSEL MONITORING PROGRAM
At LaSalle Nuclear Station, 2009

Prepared for
EXELON NUCLEAR

February 2010

HDR Engineering, Inc.
Environmental Science & Engineering Consultants
10207 Lucas Road, Woodstock, Illinois 60098

ZEBRA MUSSEL MONITORING PROGRAM
At LaSalle Nuclear Station, 2009

Prepared for

EXELON NUCLEAR
Warrenville, Illinois

HDR Engineering, Inc.
Environmental Science & Engineering Consultants
10207 Lucas Road, Woodstock, Illinois 60098

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1.0 INTRODUCTION

Exelon Nuclear has sponsored a zebra mussel (*Dreissena. polymorpha*) monitoring program since 1990 (ZEI 2003, LMS 2004-2005, HDR/LMS 2006-2007, HDR Engineering, Inc. 2008-2009). Stations electing to continue monitoring in 2009 include Braidwood Station, Byron Station, and LaSalle Station. Since the monitoring program began in 1990, zebra mussel colonization has occurred at all three of these stations, to varying degrees.

The principal objectives of these monitoring efforts at LaSalle are to:

- Detect the presence and densities of zebra mussels at the intake structures and source water bodies.
- Evaluate year-to-year changes in the zebra mussel populations, including settlement densities.
- Provide a basis for examining possible effects of zebra mussels on Station operations.

2.0 METHODS

2.1 ARTIFICIAL SUBSTRATE SAMPLING

To determine zebra mussel settlement densities, artificial substrates were placed in front of the LaSalle Station river intake in the Illinois River. Three arrays of artificial substrate samplers were placed, which included two Type A substrates and one Type B substrate.

Type A substrates consisted of two pieces of PVC pipe that were 15 cm (6 in.) long and had an inside diameter of 5.08 cm (2 in.) and an outside diameter of 6.08 cm (2.39 in.). Each pipe was cut in half lengthwise and rejoined using hose clamps. The PVC substrates were deployed by cable from the railing above the intake in a central location. Concrete blocks were used to anchor each sampling array to the bottom of the intake. One cumulative substrate sampler and one monthly (periodic) array was deployed at each sampling location. The PVC substrates were attached to the cable approximately 0.5 and 1.5 meters below the surface of the water, respectively. Artificial substrates were installed in front of the intake on 15 April. Retrieval of Type A substrates occurred on a monthly and cumulative basis and consisted of gently removing the series of PVC pipes from the water and placing each individual sample into a labeled container containing a solution of 40% isopropyl alcohol. New PVC substrates were then placed on the monthly array and returned to their original positions in the water column.

Type B substrate arrays consist of a microscope slide rack (Dura-Sampler) attached in the same manner as the PVC Type A arrays. Retrieval of Type B substrates occurred on a monthly basis and required gently removing the microscope slide samplers from the water and placing eight glass slides from each sampler into an appropriately labeled container containing 40% isopropyl alcohol solution. New labeled glass slides were then installed into the slide samplers and returned to their original location. PVC and glass were chosen as principle substrates because it has been shown that PVC is a preferred substrate (Walz 1975), while glass slides allow for a standard measurement of settlement densities and examination under a low powered binocular microscope (Marsden 1992).

Two Type A and one Type B sample arrays were placed within the LaSalle Station Cooling Lake on 15 April. Substrates were set at depths of 1.0, 3.0 and 5.0 meters on a cable suspended between a surface float and a concrete anchor. Both cumulative and monthly substrates were set.

Sampling was concluded on 5 November with the removal of all the substrates from the LaSalle Station intake and cooling lake. Monitoring was designed to provide information on accumulated infestation and growth of settled zebra mussels throughout the growing season.

Settlement was determined by scraping the inside and outside of both halves of each PVC pipe sampler. The area of the substrate that was sampled was calculated by first finding the inside and outside circumferences of the PVC pipe.

$$c = \pi d$$

Where:

c = circumference of a circle

$\pi = 3.14$

d = diameter of a circle

The total area of PVC pipe that was sampled was calculated by summing the total area inside of the PVC pipe that was sampled plus the total area of the outside of the PVC pipe that was sampled. The inside and outside area of the PVC pipe was calculated using the following equation:

$$A = c \, x \, l$$

Where:

A = area sampled

c = circumference of a circle

l = length of the PVC pipe

The number of mussels found was then converted and extrapolated from number per square inch to the conventional number per square meter. Shell lengths (measured along the longest axis) were also measured for up to 50 individuals to obtain maximum, minimum, and mean sizes for each substrate. Shells less than 1.0 mm in length were measured to the nearest 25 microns using an ocular micrometer that was calibrated to a stage micrometer. Shells greater than 1.0 mm in length were measured to the nearest half-millimeter using a standard metric ruler.

2.3 WATER QUALITY MEASUREMENTS

Four physicochemical parameters (temperature, dissolved oxygen, pH and conductivity) were measured in conjunction with the sampling program. These data were collected at each location prior to each sampling effort. All physicochemical measurements were made at one meter below the surface of the water. Temperature (°C), dissolved oxygen (ppm), and conductivity (µmhos) were measured using an YSI Model 85 Oxygen, Conductivity, Temperature, and Salinity meter. An Oakton WP pH Tester1 was used to determine pH.

Temperature monitors (Onset OpticStowAway Temp Loggers) were attached at mid-depth to the cumulative and monthly substrates to record changes in temperature during the sampling period. Periodic temperature data was downloaded on a monthly basis, while cumulative temperature recordings were monitored by a separate logger from 15 April through 5 November.

3.0 RESULTS AND DISCUSSION

3.1 ARTIFICIAL SUBSTRATE SAMPLING

3.1.1 Intake Substrates

The cumulative Type A array at the LaSalle Station intake resulted in two zebra mussels settling on the sampling structure (Table 3-1). These two individuals measured 7.0 and 9.5 mm in length. One was collected on the inside of the 0.5 m (surface) substrate, and the other was collected on the inside of the 1.5 m depth (bottom) substrate. The zebra mussel density estimate calculated for each cumulative sampler was $19/m^2$. One large adult measuring 14.5 mm was also collected from the cumulative temperature probe. No zebra mussels were found on any of the seven periodic substrates collected monthly from 15 April through 5 November.

3.1.2. Cooling Lake Substrates

No individuals were collected on the monthly or cumulative substrates from the LaSalle Station Cooling Lake throughout the seven month sampling period (Table 3-2).

3.2 WATER QUALITY MEASUREMENTS

Four physicochemical parameters (temperature, dissolved oxygen, pH and conductivity) were measured in conjunction with the sampling program. Water quality measurements were taken during each of the sampling dates at the LaSalle Station intake and cooling water lake (Table 3-1 and 3-2).

3.2.1 Intake Water Quality

Temperatures at the LaSalle Station intake ranged from 8.2° C on 15 April to 30.2° C on 29 July (Figure 3-1). Dissolved oxygen (DO) concentrations ranged from 7.7 ppm on 1 July to 12.5 ppm on 4 August (Table 3-1). Recordings for pH ranged from 7.6 to 8.8 and conductivity ranged from 523 to 710 µmhos throughout the sampling season.

3.2.2 Cooling Lake Water Quality

Temperatures from the LaSalle Station cooling lake ranged from 17.9° C on 16 October to 37.2° C on 23 June (Figure 3-2). Dissolved oxygen (DO) concentrations ranged from 5.4 ppm on 7 October to 9.6 ppm on 15 April (Table 3-2). Recordings for pH ranged from 8.3 to 8.8 and conductivity ranged from 1081 to 1310 µmhos throughout the sampling season.

Table 3-1. Water Quality Parameters and Mean Zebra Mussel Densities Collected Monthly During the 2009 Sampling Effort at LaSalle Intake.

		Water Quality						Juveniles		Adults	
Date	Days/ Sample	Time	Temp. (°C)	DO (ppm)	pH	Cond. (µmhos)	Sample Depth	Glass	PVC	Glass	PVC
4/15/09		08:26	8.0	10.5	8.8	628		-	-	-	-
5/06/09	21	08:10	16.3	9.6	7.6	653		0	0	0	0
6/10/09	35	08:30	21.1	8.5	8.0	706		0	0	0	0
7/01/09	21	08:06	24.0	7.7	8.3	679		0	0	0	0
8/04/09	34	15:50	28.1	12.5	8.2	698		0	0	0	0
9/10/09	35	08:15	26.2	7.8	7.7	710		0	0	0	0
10/07/09	27	08:15	16.6	8.5	7.7	698		0	0	0	0
11/05/09	29	08:40	10.5	10.2	8.1	523		0	0	0	0
11/05/09	Cumulative						0.5m	-	7.0 mm	-	0
11/05/09	Cumulative						1.5m	-	0	-	9.5 mm

Table 3-2. Water Quality Parameters and Mean Zebra Mussel Densities Collected Monthly During the 2009 Sampling Effort at LaSalle Cooling Lake.

		Water Quality						Juveniles		Adults	
Date	Days/ Sample	Time	Temp. (°C)	DO (ppm)	pH	Cond. (µmhos)	Sample Depth	Glass	PVC	Glass	PVC
4/15/09		09:32	15.2	9.6	8.8	1310		-	-	-	-
5/06/09	21	09:07	25.9	7.5	8.6	1247		0	0	0	0
6/10/09	35	09:23	27.9	7.2	8.4	1162		0	0	0	0
7/01/09	21	08:57	27.3	6.4	8.5	1118		0	0	0	0
8/04/09	34	16:34	30.5	7.7	8.8	1110		0	0	0	0
9/10/09	35	09:00	30.9	6.7	8.5	1117		0	0	0	0
10/07/09	27	09:11	20.3	5.4	8.3	1119		0	0	0	0
11/05/09	29	09:29	18.9	8.0	8.3	1081		0	0	0	0

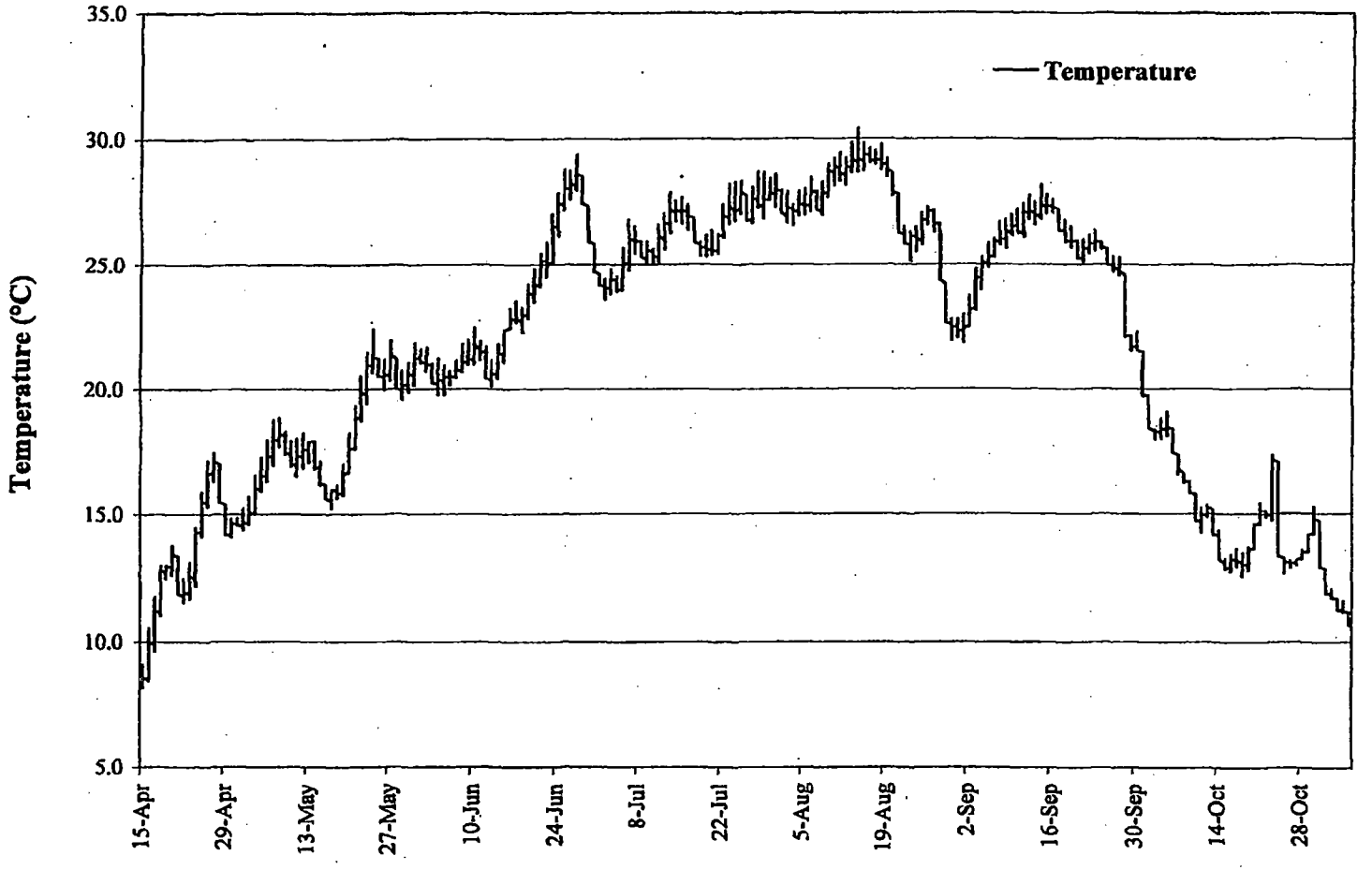

Figure 3-1. Temperature Profile at the LaSalle Station Intake for the Period of 15 April to 5 November, 2009.

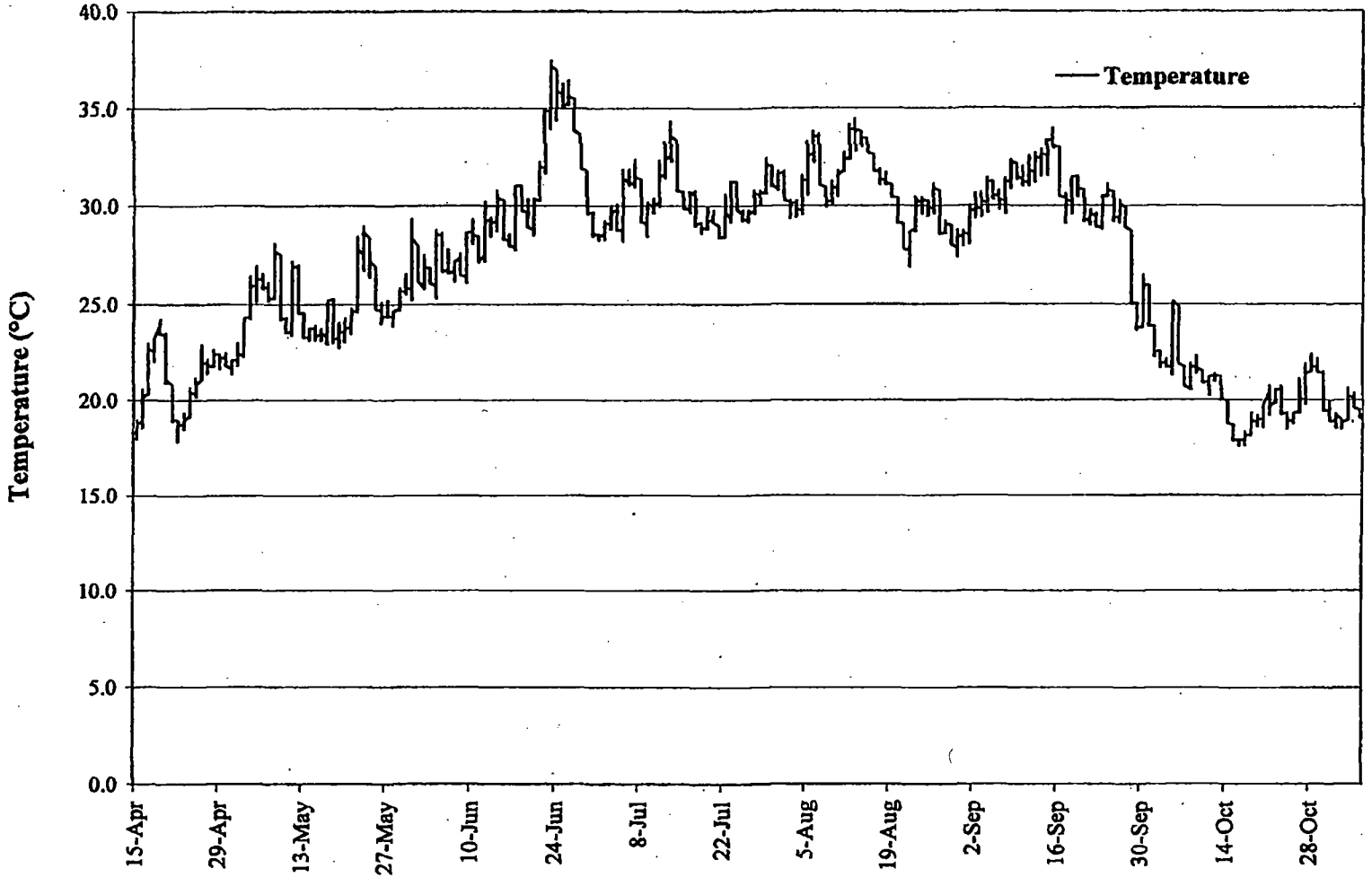

Figure 3-2. Temperature Profile at LaSalle Lake for the Period of 15 April to 5 November, 2009.

4.0 SUMMARY AND RECOMMENDATIONS

In 2009, two zebra mussels were collected from the Type A cumulative substrates place in the LaSalle Station intake. One individual was collected on the inside of the PVC substrate located approximately 1.5 m off the bottom of the intake, while a second individual was collected on the inside of the PVC substrate located approximately 0.5 m from the water surface. These two individuals measured 9.5 and 7.0 mm in length, respectively. Settlement density on each substrate was calculated to be 19 individuals per square meter. One large adult zebra mussel, measuring 14.5 mm, was also collected from the cumulative temperature probe. No zebra mussels were found on any of the periodic intake substrates over the seven month sampling period or on any of the periodic or cumulative substrate samples located in the LaSalle cooling lake.

Early detection of zebra mussel colonization is essential for uninterrupted Station operation. Because zebra mussels are present in the Illinois River, they are continually reintroduced to the cooling lake through make-up water. Continued monitoring is important to recognize the circumstances associated with zebra mussel infestation and colonization.

5.0 REFERENCES

HDR Engineering, Inc. 2009. Zebra Mussel Monitoring Program at LaSalle Nuclear Station, 2008. Prepared for Exelon Nuclear. Warrenville, IL. 12 pp.

HDR Engineering, Inc. 2008. Zebra Mussel Monitoring Program at LaSalle Nuclear Station, 2007. Prepared for Exelon Nuclear. Warrenville, IL. 12 pp.

HDR/LMS. 2007. Zebra Mussel Monitoring Program at LaSalle Nuclear Station, 2006. Prepared for Exelon Nuclear. Warrenville, IL. 12 pp.

HDR/LMS. 2006. Zebra Mussel Monitoring Program at LaSalle Nuclear Station, 2005. Prepared for Exelon Nuclear. Warrenville, IL. 12 pp.

Lawler, Matusky & Skelly Engineers, LLP (LMS). 2005. Zebra Mussel Monitoring Program at LaSalle Nuclear Station, 2004. Prepared for Exelon Nuclear. Warrenville, IL. 12 pp.

Lawler, Matusky & Skelly Engineers, LLP (LMS). 2004. Zebra Mussel Monitoring Program at LaSalle Nuclear Station, 2003. Prepared for Exelon Nuclear. Warrenville, IL. 12 pp.

Marsden, J. E. 1992. Standard Protocols for Monitoring and Sampling Zebra Mussel Illinois Natural History Survey. Biological Notes 138, April 1992.

Walz, V. N. 1975. The Settlement of Larvae of *Dreissena polymorpha* on Artificial Substrates. Arch. Hydrobiol. Suppl. 47: 423-431.

Zambrana Engineering, Inc. 2003. Byron Station 2002 Zebra Mussel (Dreissena polymorpha) Monitoring Program Annual Report.