THREE MILE ISLAND AQUATIC STUDY

MONTHLY REPORT FOR DECEMBER 1981

by

Ichthyological Associates, Inc.
P.O. Box 223, Etters, PA 17319

George A. Nardacci, Project Leader

For

Metropolitan Edison Company

Ichthyological Associates, Inc.
Edward C. Raney, Ph.D., President
301 Forest Drive
Ithaca, New York 14850

TABLE OF CONTENTS

TABLE OF TABLES

INTRODUCTION

The ecology of York Haven Pond near the Three Mile Island Nuclear Station (TMINS) has been under investigation since February 1974. Studies initiated in April 1974 include analysis of ambient water quality, ichthyoplankton (far-field), ichthyoplankton entrainment, macroinvertebrates, fish population dynamics, impingement of fishes, creel survey, and thermal plume mapping.

This report discusses the progress of investigations conducted in December 1981.

COMPLIANCE WITH ENVIRONMENTAL TECHNICAL SPECIFICATIONS (ETS)

Objective: To determine compliance with the nonradiological (aquatic) environmental monitoring programs specified in sections 3.1.1.a.(4), 3.1.2.a., 4.2, and 4.6.1 of the ETS and to insure that said programs are performed as detailed in the Generation Procedures Manual.

Progress: Compliance with the impingement program specified in the ETS and detailed in the Procedures Document was achieved in December (Table 1). Compliance with all other programs was hampered by ice cover on York Haven Pond during the weeks of 13, 20, and 27 December.

The macroinvertebrate, trapnet, seine, electrofishing, and water quality programs were completed once in December; ice cover prevented additional sampling during the month.

The creel survey program was conducted in all areas on 5 December. The third creel survey period (1701-2100 h) was not conducted on 5 December at the East Dam, West Dam, and General Reservoir areas due to darkness. On 11, 14, and 20 December the creel survey program was limited to the York Haven Generating Station as all other areas were inaccessible due to ice cover.

A program by program summary of the progress for December follows.

MACROINVERTEBRATES

Objectives: To describe the diversity and distribution of the benthic macroinvertebrates occurring at the five benthos sampling stations in the vicinity of TMINS.

Progress: Replicate (4) benthos samples were taken on 3 December (Table 1). Enumeration, determination of dry weights, and identification

of the macroinvertebrates have been completed through 3 December.

Ice cover prevented the collection of a second December sample.

ICHTHYOPLANKTON

Objectives: (1) To determine the species composition, abundance, and distribution of ichthyoplankton in York Haven Pond; and (2) To investigate ichthyoplankton entrained at TMINS Unit 1 and 2 Intakes.

Far-Field

Progress: Final printouts of day and night running tables were proofed and corrected. Species diversities were computed and length frequency tables were completed. Work on figures of overall density and species composition was initiated.

Entrainment

Progress: Entrainment estimates for individual species were calculated and tabulated. Work was initiated on the methods section of the 1981 report.

TRAPNET

Objectives: (1) To determine the distribution and relative abundance of fishes in the Three Mile Island area vulnerable to trapnet; (2) To provide specimens for movements studies; (3) To monitor the occurrence of diseased fishes; (4) To provide specimens for radiation analysis; and (5) To determine reproductive status for fishes throughout the year.

Progress: Samples were taken on 1-3 December (Table 1); twenty-seven fish of six species were taken (Table 2). Most fish (20) were taken at Station 1A3, most species (3) at 11A2, and greatest biomass (503 g) occurred at 9B2. The spottail shiner comprised 70.4% of the total catch. One smallmouth bass had a fungus on its anal fin and left side and one white crappie had anchor worms at its branchiostegals and mandible.

River ice prevented the collection of a second set of December samples.

Summary tables for the 1981 report were generated.

SEINE

Objectives: (1) To determine the species composition of fish upstream and downstream from the TMINS Discharge vulnerable to seine; (2) To determine the relative condition factor for important species; and (3) To determine the reproductive status for fishes throughout the year.

Progress: Collections were made at the 10 stations on 2 December (Table 1). A total of 4,409 fish of 10 species was taken on 2 December (Table 3). Most fish (3,195) and greatest biomass (290.2 g) occurred at Station 13B5. Most species (7) occurred at both 13B5 and 4A2. The spotfin shiner was the most abundant species at all stations and comprised 97.9% of the total catch. Glochidia parasitized 23 spotfin shiner, 7 swallowtail shiner, 5 pumpkinseed, 3 comely shiner, 3 bluntnose minnow, 2 mimic shiner, 1 rock bass, 1 bluegill, and 1 tessellated darter. Slight black spot infestations were observed on 99 spotfin shiner, 1 bluntnose minnow, and 1 tessellated darter. One bluntnose minnow bore protozoan cysts and one rock bass was parasitized by a leech. One spotfin shiner exhibited spinal curvature.

Seining was attempted on 14 December but was abandoned due to snow and/or ice cover at eight of the 10 stations. Ice cover prevented any further sampling in December.

IMPINGEMENT OF FISH

Objectives: (1) To determine the numbers and species impinged on

the river water intake screens; (2) To determine day-night differences in impingement frequency; and (3) To determine the extent of mortality of impinged fish.

Progress: Impingement surveys were conducted on 9-10 and 21-22 December at the TMINS Unit 1 and 2 Intakes (Table 1). Unit 1 impinged 6 fish of 5 species weighing 8.0 g (Tables 4 through 7). Most fish were young and half were dead. Fish numbers and biomass were highest during the 21-22 December survey. More fish were collected at 2000 h than during any other survey period. The estimated impingement for Unit 1 for December was 93 fish weighing 124.0 g (0.3 lb).

Unit 2 impinged 8 fish of 4 species weighing 15.0 g (Tables 8 through 11). Most fish were young and dead. Fish numbers were highest during the 21-22 December survey and biomass was highest during the 9-10 December survey. The estimated impingement for December for Unit 2 was 124 fish weighing 232.5 g (0.5 lb).

The total estimated impingement at TMINS during December was 217 fish weighing 356.5 g (0.8 lb).

ELECTROFISHING

Objectives: (1) To provide specimens for radiation analysis and movements studies; and (2) To determine the relative abundance of fishes vulnerable to electrofishing in various parts of York Haven Pond.

Progress: Sampling was conducted on two nights in December (Table 1). Ice on the river prevented a second set of samples in December. Twelve collections in 12 zones yielded 112 specimens of 15 species (Table 12). The rock bass (40 specimens), walleye (16), pumpkinseed (10), and bluegill (10) were most abundant. Twelve fish were tagged for movements studies.

MOVEMENTS OF FISHES

Objective: To determine if fishes in waters receiving the TMINS effluent mix with fishes from other areas.

Progress: Twelve fish were tagged in December. No recaptures were reported.

CREEL SURVEYS

Objectives: (1) To determine the extent and success of sport fishing; and (2) To determine information on angler residence and use of catch.

Progress: Creel surveys were conducted in all areas on 5 December, but the third survey period was not conducted at the East Dam, West Dam, and General Reservoir due to darkness (Table 1). On 11, 14, and 20 December ice conditions limited surveys to the York Haven Generating Station (YHGS).

The four anglers interviewed fished 1.25 hours; no fish were caught (Tables 13 through 16). Two of the anglers were interviewed at the East Dam and two at the YHGS.

Angler residence was equal between York (2) and Dauphin (2) counties. All four anglers reported they eat some of their catch.

AMBIENT WATER QUALITY

Objective: To determine the concentrations of selected water quality parameters in ambient river areas and the TMINS effluent.

Progress: Water quality samples were collected on 3 December at the five river stations (Table 1). Data were analyzed and tabulated; results are presented in Table 17. Ice cover on York Haven Pond prevented a second water quality sampling in December.

On 3 December values for pH and sulfate were highest at Station 1A1 (located above the TMINS Discharge). Values for turbidity and total zinc

(11A1), alkalinity (11A2), and total dissolved solids (9B1) were highest at stations located at or below the Discharge.

Parameters, for which State water quality criteria have been established, were not exceeded at any station on 3 December.

Table 1

Sampling conducted in compliance with the Generation Procedures Manual in December 1981.

PROGRAM	Dec 1-5	Dec 6-12	Dec 13-19	Dec 20-26	Dec 27-31
Macroinvertebrates	X				
Ichthyoplankton:					
Far-Field[1]					
Entrainment[1]					
Trapnet	X				
Seine	X				
Impingement of Fish		X		X	
Electrofishing	X				
Movements of Fishes	X				
Creel Surveys	X	X	X	X	
Ambient Water Quality	X				

1 Sampling terminated for 1981 as of 31 August.

Table 2

Fishes taken by trapnet on 1-3 December 1981 near TMINS.

Station	TM-AQF-1A3		TM-AQF-11A2		TM-AQF-11A3		TM-AQF-9B2		Total	% Catch
Date	1-2	2-3	1-2	2-3	1-2	2-3	1-2	2-3		
Time	1407-1406	1410-1400	1358-1349	1351-1340	1351-1345	1347-1329	1339-1330	1332-1325		
Air Temp (C)	1.5, 10.0	10.0, 8.0	1.0, 10.0	10.0, 7.0	1.0, 10.0	10.0, 5.5	1.5, 10.0	10.0, 6.5		
Water Temp (C)	2.5, 4.0	4.0, 5.0	2.5, 4.0	4.0, 5.0	3.0, 4.0	4.0, 4.5	2.5, 4.0	4.0, 4.5		
Dissolved Oxygen (mg/l)	12.6, 12.6	12.6, 12.3	12.7, 12.8	12.8, 12.6	12.8, 12.7	12.7, 12.4	12.8, 12.7	12.7, 12.8		
pH	7.6, 7.3	7.3, 7.3	7.6, 7.3	7.3, 7.5	7.6, 7.4	7.4, 7.4	7.6, 7.3	7.3, 7.4		
Secchi Disc (cm)	163, 86	86, 152	163, 66	66, 130	150, 66	66, 147	155, 64	64, 142		
River Stage (m)	1.29, 1.29	1.29, 1.30	1.29, 1.29	1.29, 1.30	1.29, 1.29	1.29, 1.30	1.29, 1.29	1.29, 1.30		
Weather	Light Rain, Clear	Clear, Partly Cloudy	Light Rain, Partly Cloudy	Partly Cloudy, Partly Cloudy	Light Rain, Clear	Clear, Partly Cloudy	Light Rain, Clear	Clear, Overcast		
No. of specimens	17	3	3	1	1	-	1	1	27	
No. of Species	1	2	3	1	1	-	1	1	6	
Spottail shiner	17	2	-	-	-		-	-	19	70.4
Paddlefish	-	-	-	-	1	NO	-	-	1	3.7
Shorthead redhorse	-	-	1	-	-		1	-	2	7.4
Rock bass	-	1	-	-	-	FISH	-	-	1	3.7
Smallmouth bass	-	-	1	-	-		-	-	1	3.7
White crappie	-	-	1	1	-	TAKEN	-	1	3	11.1

Table 3

Fishes taken by seine on 2 December 1981 near TMINS.

Station	TM-AQF-13B5	TM-AQF-10B5	TM-AQF-16A5	TM-AQF-1A2	TM-AQF-14A1	TM-AQF-10A2	TM-AQF-9B6	TM-AQF-9A1	TM-AQF-9B3	TM-AQF-4A2	Total	% Catch
Time	1201	0901	1140	1120	1035	1017	0957	0942	0926	1100		
Air Temp (C)	6.5	2.0	6.0	5.5	4.5	4.0	3.5	3.0	3.0	6.0		
Water Temp (C)	3.0	2.5	3.5	3.5	3.5	3.0	3.0	3.0	3.0	3.5		
Dissolved Oxygen (mg/l)	12.6	13.0	13.0	12.1	12.2	12.4	12.3	12.4	12.4	12.4		
pH	7.3	7.5	7.5	7.4	7.4	7.4	7.2	7.2	7.5	7.2		
Secchi Disc (cm)	152*	122*	97*	76	76	76	81	91	91	142*		
River Stage (m)	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29		
Weather	Partly Cloudy	Overcast	Partly Cloudy	Partly Cloudy	Partly Cloudy	Partly Cloudy	Partly Cloudy	Overcast	Overcast	Partly Cloudy		
No. of Specimens	3195	422	2	214	136	44	118	36	34	208	4409	
No. of Species	7	3	1	2	3	5	1	2	2	7	10	
No. of Hauls	2	6	5	4	4	4	4	4	4	4	41	
Comely shiner	9	1	-	1	-	-	-	-	-	1	12	0.3
Spottail shiner	-	-	-	-	-	1	-	1	-	-	2	+
Swallowtail shiner	5	-	-	-	-	2	-	-	2	-	9	0.2
Spotfin shiner	3138	420	2	213	133	33	118	35	32	191	4315	97.9
Mimic shiner	25	1	-	-	2	-	-	-	-	-	28	0.6
Bluntnose minnow	16	-	-	-	-	5	-	-	-	1	22	0.5
Rock bass	1	-	-	-	1	-	-	-	-	2	4	0.1
Pumpkinseed	1	-	-	-	-	-	-	-	-	7	8	0.2
Bluegill	-	-	-	-	-	-	-	-	-	5	5	0.1
Tessellated darter	-	-	-	-	-	3	-	-	-	1	4	0.1

* Clear to bottom at indicated depth.
\+ Less than 0.05%.

Table 4

Numbers of fishes impinged at the Unit 1 Intake during a 24-h impingement survey on 9-10 December 1981.

Date	9		10		10			
Time	2000		0400		1200			
Volumetric Flow Rate (m^3/s)	0.84		0.84		0.84			
Number of River Water Pumps:								
Nuclear Service	1		1		1			
Secondary Service	1		1		1			
Decay Heat	0		0		0			
Intake Velocity (cm/s)	NA		NA		NA			
River Flow (m^3/s)	572.5		576.3		577.7			
Air Temp (C)	-1.0		-2.5		0.0			
Water Temp (C)	2.0		1.0		1.0			
Condition of Fish	Alive	Dead	Alive	Dead	Alive	Dead	Total Alive	Total Dead
Bluegill	-	-	1	-	-	-	1	-
Tessellated darter	-	-	-	-	-	1	-	1
Total	-	-	1	-	-	1	1	1

NA Not Available.

Table 5

Summary of lengths, weights, breeding condition, and numbers of fishes impinged at the Unit 1 Intake on 9-10 December 1981.

Species	Fork Length Range (5 mm groups)	Reproductive Status	Total Weight (g)	Total Number
Bluegill	56-60	1 Juvenile	3.0	1
Tessellated darter	41-45	1 Juvenile	0.6	1
Total			3.6	2

Table 6

Numbers of fishes impinged at the Unit 1 Intake during a 24-h impingement survey on 21-22 December 1981.

Date	21		22		22			
Time	2000		0400		1200			
Volumetric Flow Rate (m^3/s)	0.84		0.84		0.84			
Number of River Water Pumps:								
Nuclear Service	1		1		1			
Secondary Service	1		1		1			
Decay Heat	0		0		0			
Intake Velocity (cm/s)	NA		NA		NA			
River Flow (m^3/s)	891.3		817.7		790.0			
Air Temp (C)	-1.0		1.0		3.0			
Water Temp (C)	0.0		0.0		0.0			
Condition of Fish	Alive	Dead	Alive	Dead	Alive	Dead	Total Alive	Total Dead
Spotfin shiner	1	1	-	-	-	-	1	1
Channel catfish	1	-	-	-	-	-	1	-
Redbreast sunfish	-	-	-	-	-	1	-	1
Total	2	1	-	-	-	1	2	2

NA Not Available.

Table 7

Summary of lengths, weights, breeding condition, and numbers of fishes impinged at the Unit 1 Intake on 21-22 December 1981.

Species	Fork Length Range (5 mm groups)	Reproductive Status	Total Weight (g)	Total Number
Spotfin shiner	31-40	2 Young	1.0	2
Channel catfish	56-60	1 Young	2.4	1
Redbreast sunfish	36-40	1 Young	1.0	1
Total			4.4	4

Table 8

Numbers of fishes impinged at the Unit 2 Intake during a 24-h impingement survey on 9-10 December 1981.

Date	9		10		10			
Time	2000		0400		1200			
Volumetric Flow Rate (m^3/s)	1.58		1.58		0.50			
Number of River Water Pumps:								
Nuclear Service	1		1		0			
Secondary Service	1		1		1			
Intake Velocity (cm/s)	NA		NA		NA			
River Flow (m^3/s)	572.5		576.3		577.7			
Air Temp (C)	-1.0		-3.0		-1.0			
Water Temp (C)	2.0		0.5		0.5			
Condition of Fish	Alive	Dead	Alive	Dead	Alive	Dead	Total Alive	Total Dead
Channel catfish	-	-	-	-	1	1	1	1
Total	-	-	-	-	1	1	1	1

NA Not Available.

Table 9

Summary of lengths, weights, breeding condition, and numbers of fishes impinged at the Unit 2 Intake on 9-10 December 1981.

Species	Fork Length Range (5 mm groups)	Reproductive Status	Total Weight (g)	Total Number
Channel catfish	76-85	2 Young	12.0	2
Total			12.0	2

Table 10

Numbers of fishes impinged at the Unit 2 Intake during a 24-h impingement survey on 21-22 December 1981.

Date	21		22		22			
Time	2000		0400		1200			
Volumetric Flow Rate (m^3/s)	1.58		1.58		1.58			
Number of River Water Pumps:								
Nuclear Service	1		1		1			
Secondary Service	1		1		1			
Intake Velocity (cm/s)	NA		NA		NA			
River Flow (m^3/s)	891.3		817.7		790.0			
Air Temp (C)	-2.0		0.0		3.0			
Water Temp (C)	0.0		0.0		0.0			
Condition of Fish	Alive	Dead	Alive	Dead	Alive	Dead	Total Alive	Total Dead
Spotfin shiner	-	3	-	-	-	1	-	4
Redbreast sunfish	-	1	-	-	-	-	-	1
Tessellated darter	-	1	-	-	-	-	-	1
Total	-	5	-	-	-	1	-	6

NA Not Available.

Table 11

Summary of lengths, weights, breeding condition, and numbers of fishes impinged at the Unit 2 Intake on 21-22 December 1981.

Species	Fork Length Range (5 mm groups)	Reproductive Status	Total Weight (g)	Total Number
Spotfin shiner	21-35	4 Young	0.7	4
Redbreast sunfish	31-35	1 Young	1.0	1
Tessellated darter	46-50	1 Juvenile	1.3	1
Total			3.0	6

Table 12

Numbers of fishes captured by AC electrofisher near TMINS in December 1981.

Zone	15B2	16B8	4A1	16A2	15A2	15A1	11B1	10B3	10B1	13A1	10A3	9B5	Total
Date	2 Dec	2 Dec	2 Dec	2 Dec	2 Dec	2 Dec	3 Dec	3 Dec	3 Dec	3 Dec	3 Dec	3 Dec	
Time	1742	1827	1859	1927	1955	2022	1733	1810	1835	1908	1930	1954	
Duration (min)	16	13	15	13	15	14	15	15	13	16	14	13	
Air Temp (C)	5.5	6.0	5.0	6.0	4.5	4.5	1.5	1.5	1.5	1.5	1.5	1.5	
Water Temp (C)	4.0	3.5	4.5	4.5	4.0	4.5	2.0	4.0	4.0	4.0	4.0	4.0	
Dissolved Oxygen (mg/l)	14.0	13.8	12.8	12.7	12.8	13.2	12.8	13.2	13.0	12.4	12.6	12.6	
pH	7.8	7.8	7.7	7.6	7.8	7.8	7.6	7.6	7.5	7.4	7.5	7.5	
Conductivity (micromhos/cm)	290	178	340	310	210	195	290	225	225	325	310	300	
Secchi Disc (cm)	160	152*	145	150	188	157	137*	157*	193	132	132	127	
Volts	200	205	195	210	205	210	205	210	205	195	205	205	
Amps	2.5	2.5	5.5	5.5	3.5	2.0	5.0	4.0	3.0	5.0	5.0	5.0	
Gizzard shad	1	-	-	-	-	-	-	-	-	-	-	-	1
Golden shiner	-	-	-	-	-	-	3	-	-	-	-	-	3
White sucker	-	2	1	-	-	1	-	-	-	1	-	-	5
Northern hog sucker	-	-	-	3	-	1	-	-	-	-	-	-	4
Shorthead redhorse	-	-	-	-	-	-	-	-	-	-	1	-	1
Rock bass	14	5	-	4	5	8	-	-	1	3	-	-	40
Redbreast sunfish	-	-	-	-	-	1	-	-	1	-	-	-	2
Pumpkinseed	2	-	5	-	-	-	-	1	1	1	-	-	10
Bluegill	7	-	-	3	-	-	-	-	-	-	-	-	10
Smallmouth bass	-	-	-	1	-	-	-	-	2	-	-	-	3
Largemouth bass	-	-	-	-	-	-	4	-	-	-	-	-	4
White crappie	-	-	-	-	-	-	4	-	-	-	-	-	4
Black crappie	-	-	-	-	-	-	8	-	-	-	-	-	8
Yellow perch	-	1	-	-	-	-	-	-	-	-	-	-	1
Walleye	1	-	1	6	1	-	-	1	-	3	1	2	16
No. of Specimens	25	8	7	17	6	11	19	2	5	8	2	2	112
No. of Species	5	3	3	5	2	5	4	2	4	4	2	1	15

* Clear to bottom.

Table 13

Creel survey data from the GR for each survey day in December 1981.

Day	5 Sat			11 Fri[1]			14 Mon[1]			20 Sun[1]			
Weather	Partly Cloudy												
River Stage (m)	1.32			1.39			1.35			1.36			
Air Temperature (°C)	3.5	3.5	NA										
Water Temperature (C)	3.0	3.0	NA										
Times:													
a) morning (0900-1300)	a			a			a			a			
b) afternoon (1301-1700)		b			b			b			b		
c) evening (1701-2100)			c			c			c			c	TOTAL
Total Per Time Period:													
Anglers	-	-	NO SURVEYS										-
Fish Caught	-	-											-
Fish Kept	-	-											-
Hours Fished	-	-											-
Catch/Effort (h)	-	-											-
Day Totals:													
Anglers		-											
Fish Caught		-											
Fish Kept		-											
Hours Fished		-											
Catch/Effort		-											
Species	a	b	c	a	b	c	a	b	c	a	b	c	Total

1 Surveys not conducted due to ice.
NA Not Available.

Table 14

Creel survey data from the West Dam for each survey day in December 1981.

Day	5 Sat			11 Fri[1]			14 Mon[1]			20 Sun[1]			
Weather	Partly Cloudy												
River Stage (m)	1.32			1.39			1.35			1.36			
Air Temperature (C)	3.5	3.5	NA										
Water Temperature (C)	3.0	3.0	NA										
Times:													
a) morning (0900-1300)	a			a			a			a			
b) afternoon (1301-1700)		b			b			b			b		
c) evening (1701-2100)			c			c			c			c	TOTAL
Total Per Time Period:													
Anglers	-	-											-
Fish Caught	-	-											-
Fish Kept	-	-											-
Hours Fished	-	-											-
Catch/Effort (h)	-	-											-
Day Totals:													
Anglers		-											
Fish Caught		-											
Fish Kept		-											
Hours Fished		-											
Catch/Effort (h)													
Species	a	b	c	a	b	c	a	b	c	a	b	c	Total

SURVEY ON

1 Surveys not conducted due to ice.
NA Not Available.

Table 15

Creel survey data from the East Dam for each survey day in December 1981.

Day	5 Sat			11 Fri[1]			14 Mon[1]			20 Sun[1]			
Weather	Partly Cloudy												
River Stage (m)	1.32			1.39			1.35			1.26			
Air Temperature (C)	3.5	4.0	NA										
Water Temperature (C)	3.5	3.5	NA										
Times:													
a) morning (0900-1300)	a			a			a			a			
b) afternoon (1301-1700)		b			b			b			b		
c) evening (1701-2100)			c			c			c			c	TOTAL
Total Per Time Period:													
Anglers	2	-	NO SURVEY										2
Fish Caught	-	-											-
Fish Kept	-	-											-
Hours Fished	0.25	-											0.25
Catch/Effort (h)	-	-											-
Day Totals:													
Anglers		2											
Fish Caught		-											
Fish Kept		-											
Hours Fished		0.25											
Catch/Effort (h)		-											
Species	a	b	c	a	b	c	a	b	c	a	b	c	Total

1 Surveys not conducted due to ice.
NA Not Available.

Table 16

Creel survey data from the YHCS for each survey day in December 1981.

Day	5 Sat			11 Fri			14 Mon			20 Sun			
Weather	Overcast, Partly Cloudy			Overcast			Overcast, Snow			Overcast, Partly Cloudy			
River Stage (m)	1.32			1.39			1.35			1.36			
Air Temperature (C)	3.0	3.5	3.0	-1.0	0.5	-0.5	-2.5	-1.0	-0.5	-4.5	-3.5	-3.5	
Water Temperature (C)	3.5	3.5	3.5	0.5	0.5	0.5	-0.5	-0.5	*	*	*	*	
Times:													
a) morning (0900-1300)	a			a			a			a			
b) afternoon (1301-1700)		b			b			b			b		
c) evening (1701-2100)			c			c			c			c	TOTAL
Total Per Time Period:													
Anglers	-	-	-	-	-	-	-	-	-	-	2	-	2
Fish Caught	-	-	-	-	-	-	-	-	-	-	-	-	-
Fish Kept	-	-	-	-	-	-	-	-	-	-	-	-	-
Hours Fished	-	-	-	-	-	-	-	-	-	-	1.00	-	1.00
Catch/Effort (h)	-	-	-	-	-	-	-	-	-	-	-	-	-
Day Totals:													
Anglers		-			-			-			2		
Fish Caught		-			-			-			-		
Fish Kept		-			-			-			-		
Hours Fished		-			-			-			1.00		
Catch/Effort (h)		-			-			-			-		
Species	a	b	c	a	b	c	a	b	c	a	b	c	Total

* Ice present.

Table 17

Summary of selected physicochemical parameters taken on 3 December 1981 near the TMINS. Values are expressed in mg/l except for water temperature (C), pH, and turbidity (NTU).

Location	Date	Water Temperature (C)	pH	Dissolved Oxygen	Turbidity (NTU)	Alkalinity as $CaCO_3$	Sulfate	Total Dissolved Solids	Total Copper	Dissolved Copper	Total Zinc	Dissolved Zinc
TM-AQI-1A1	3 Dec	3.5	8.7	12.6	5.1	46.0	54	165	0.007	0.002	0.022	0.012
TM-AQI-1A2		3.5	8.5	12.6	4.8	59.5	43	185	0.008	0.002	0.022	0.015
TM-AQI-11A1		3.5	8.2	12.6	6.5	62.0	51	185	0.008	0.002	0.023	0.015
TM-AQI-11A2		4.0	8.0	12.4	5.8	62.5	50	186	0.010	0.002	0.020	0.012
TM-AQI-9B1		4.0	8.0	12.2	4.5	61.0	51	188	0.010	0.002	0.020	0.012

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

FEB 16 1982

Docket No. 50-320

MEMORANDUM FOR: Michael Collins
Document Management Branch
Division of Technical Information
and Document Control

FROM: Clarence R. Hickey, Jr., Senior Fishery Biologist
Environmental Engineering Branch
Division of Engineering, NRR

SUBJECT: THREE MILE ISLAND NUCLEAR STATION - DECEMBER 1981 IA
MONTHLY REPORT

Attached is the monthly report of aquatic studies for December 1981 at Three Mile Island. This document should be placed in the Public Document Room and made available under FOIA.

Clarence R. Hickey, Jr.

Clarence R. Hickey, Jr.
Senior Fishery Biologists
Environmental Engineering Branch
Division of Engineering

Attachment: As stated