

**ADDENDUM NUMBER 1 TO THE SECOND
SEMIANNUAL PROGRESS REPORT**

**FLUOROCHEMICAL (FC) SITE RELATED
ENVIRONMENTAL ASSESSMENT PROGRAM
3M COTTAGE GROVE, MN FACILITY**

March 2006

Prepared for

3M Company

by

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W.O. No. 02181.002.010.00



1. INTRODUCTION

In December 2004, 3M submitted to the Minnesota Pollution Control Agency (MPCA) the *Facility-wide Fluorochemical (FC) Investigation Work Plan (Work Plan)* to investigate FCs at its Cottage Grove, Minnesota plant. The Work Plan presented a systematic approach to collect data in various environmental media related to FC manufacturing operations. In a letter to 3M dated January 31, 2005, the MPCA approved the *Work Plan* with modifications.

The Second Semiannual Progress Report for activities conducted in accordance with the approved *Work Plan* at the 3M Cottage Grove facility was submitted to the MPCA in January 2006. It covered the reporting period extending from July 1 to December 31, 2005. At the time that the Second Semiannual Progress Report was prepared, the August 2005 fish sampling activities were described but no final analytical report was available for fish samples. Since the submission of the Second Semiannual Progress Report, analytical results for fish samples collected in August 2005 have been finalized. This addendum provides a preliminary data summary. A detailed discussion and interpretation of the fish data and other media data will be provided in the Final Report that will be submitted to the MPCA near the end of March 2006. Information on sample collection activities, samples collected and morphometric data previously reported in the Second Semiannual Progress Report is included in this Addendum for completeness.



2. COTTAGE GROVE FISH SAMPLE INVESTIGATION

2.1 COTTAGE GROVE FISH SAMPLING

Collections of fish were performed in the Mississippi River in the vicinity of Cottage Grove, Minnesota under the scientific collection permit (SCP) Special Permit No. 13031 issued by the Minnesota Department of Natural Resources Fish Management Section of the Division of Fish and Wildlife. Prior to the collection effort, the Area Fisheries Manager and the Regional Fisheries Manager were notified of the pending sampling activities. No threatened or endangered species were encountered and all collections were performed in accordance with the SCP conditions. A collection activities report was submitted to MDNR on January 30, 2006 in accordance with the requirements of the SCP.

Fish collections were performed between August 8, 2005 and August 12, 2005 at three reaches adjacent to the 3M Cottage Grove facility. Specimens were collected of smallmouth bass (*Micropterus dolomieu*), channel catfish (*Ictalurus punctatus*) and bluegill sunfish (*Lepomis macrochirus*). While sufficient channel catfish specimens were captured to meet the numeric targets of the *Work Plan*, smallmouth bass were not as abundant and those captured were used for filet tissue samples. Bluegill sunfish were more abundant than smallmouth bass in the reaches sampled and were collected to augment the smallmouth bass samples. Bluegill sunfish were used in lieu of smallmouth bass for the whole body samples from all three sampling reaches. While the target of 5 smallmouth bass samples were collected for filet tissue analyses from the uppermost reach (Reach 1), only three smallmouth bass filet samples were collected from the other two sampling reaches. As a result, two bluegill sunfish filet samples were collected from each of the three sampling reaches to allow for comparisons of analytical results.

Sample collection gear types included electrofishing for smallmouth bass and bluegill sunfish and trotlining for catfish. Non-target species were released. A total of 62 fish were collected including 11 smallmouth bass, 30 channel catfish and 21 bluegill sunfish. Whole body or filet tissue samples were prepared from the collected specimens for



chemical analyses, preserved by freezing with dry ice, and shipped to the Exygen Laboratory in State College, Pennsylvania for fluorochemical analyses. Sample identification codes are of the form CGMN-F01-xxxxxx-050812 with the following conventions for location, species and sample type in the -xxxxxx- string:

- First character indicates the sampling reach (1, 3 or 5).
- Second and third characters indicate the species where IP = channel catfish, MD = smallmouth bass and LM = bluegill sunfish.
- Fourth character indicates the sample type where F = filet tissue and W = whole body tissue.
- Last character(s) indicate either sample number within a location, species and sample type (01 – 05) or a composite sample (C).

For example, the sample designated CGMN-F01-3IPW04-0-050812 is the fourth channel catfish whole body tissue sample from Reach 3 and CGMN-F01-5MDFC-0-050812 is the Reach 5 smallmouth bass filet tissue composite sample.

Figure 2-1 shows the collection locations and the sample IDs. Tabulated morphometric data on the fish whole body and filet tissue samples are provided in Tables 2-1 and 2-2, respectively.

2.2 COTTAGE GROVE FISH ANALYTICAL DATA

Tissue sample mass was limited for some whole body and filet samples from smaller bluegill sunfish and smallmouth bass specimens in the sample group necessitating analysis of 1 gram aliquots for these samples instead of 5 gram aliquots as stated in the *Work Plan*. Because recoveries of PFOA matrix spikes in the 1 gram aliquot fish samples were below acceptance criteria, PFOA results for these individual specimen samples are not reported (NR). In order to provide quantitative results representative of the sample types and locations, composite samples of the remaining tissue homogenate from each of these 17 fish samples were prepared from like species, sample type and location yielding 6 composite samples (see Table 2-3). Analyses of PFOA in the composite fish samples



met acceptance criteria and are reported with the results of the individual fish tissue samples.

Summaries of fluorochemical concentrations in the fish whole body and filet tissue samples are provided in Tables 2-4 and 2-5. The concentration values for each of the samples were obtained by averaging the concentrations of the primary and replicate sample results. In instances where one of the results of a primary/replicate sample pair was reported as ND (less than the 0.5 ng/g LOQ), the numerical value is presented. Results of analyses of fluorochemical concentrations in the fish samples and documentation associated with all fish sample fluorochemical analyses are contained in the analytical data package (Appendix A).

PFOA concentrations in whole body tissue samples from the upper reach (MR001) upstream of the 3M facility ranged from 0.881 ng/g (ppb) in a channel catfish sample to 1.52 ppb in a bluegill sunfish sample. PFOS concentrations in whole body tissue samples from the MR001 reach ranged from 11.0 ng/g (ppb) in a channel catfish sample to 75.4 ppb in a bluegill sunfish sample. Filet tissue PFOA results for the MR001 reach ranged from non-detect in all channel catfish samples and the bluegill sunfish composite sample to 0.972 ppb in a smallmouth bass filet tissue sample. PFOS concentrations in the MR001 reach samples ranged from 2.34 ppb in a channel catfish sample to 178 ppb in a smallmouth bass sample. Bluegill sunfish filet tissue samples from reach MR001 contained 30.3 and 32.3 ppb PFOS.

PFOA concentrations in whole body tissue samples from the middle reach (MR003) adjacent to the 3M facility ranged from 0.774 ppb in a channel catfish sample to 37.9 ppb in a bluegill sunfish sample. PFOS concentrations in whole body tissue samples from the MR003 reach ranged from 12.6 ppb in a channel catfish sample to 9000 ppb in a bluegill sunfish sample. The other four bluegill sunfish whole body samples from this reach contained PFOS at concentrations ranging from 55.4 and 334 ppb. Filet tissue PFOA results for the MR003 reach included non-detect for all channel catfish samples, 0.58 ppb in the smallmouth bass filet composite sample and 3.21 ppb in the bluegill sunfish filet composite sample. PFOS concentrations in the MR003 reach filet tissue samples ranged



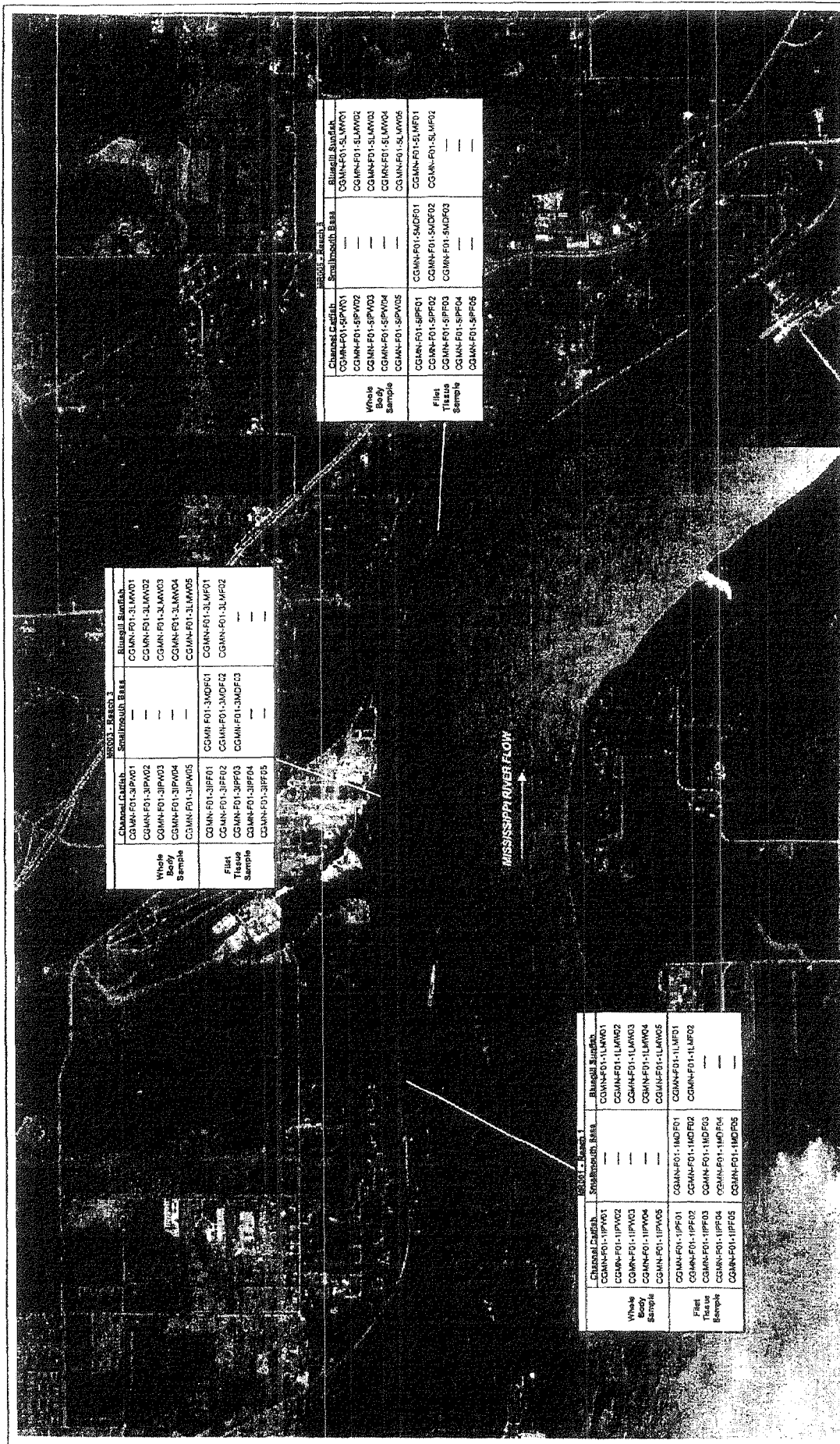
from 5.60 ppb in a channel catfish sample to 1320 ppb in a smallmouth bass sample. PFOS concentrations in bluegill sunfish filet tissue samples from reach MR003 were 59.7 and 709 ppb.

PFOA concentrations in whole body tissue samples from the lower reach (MR005) below the 3M facility were 1.41 to 2.54 ppb in the channel catfish whole body samples and 0.600 ppb in the bluegill sunfish whole body composite sample. PFOS concentrations in whole body tissue samples from the MR005 reach ranged from 39.9 ppb in a channel catfish sample to 629 ppb in a bluegill sunfish sample. Filet tissue PFOA results for the MR005 reach included non-detect to 1.71 ppb in channel catfish samples, 0.504 ppb in the bluegill sunfish filet composite sample and 1.04 ppb in the smallmouth bass filet composite sample. PFOS concentrations in the MR005 reach filet samples ranged from 2.86 ppb in a channel catfish sample to 5150 ppb in a smallmouth bass sample. PFOS concentrations in bluegill sunfish filet tissue samples from reach MR005 were 331 and 330 ppb.

2.3 GENERAL DISCUSSION

While a detailed discussion and interpretation of the fish data and other media data will be provided in the Final Report that will be submitted to the MPCA near the end of March 2006, the following general observations are offered relative to this submittal:

- The dataset represents a fairly limited number of samples. Specifically, there were 62 fish specimens collected across three species (channel catfish, smallmouth bass and bluegill sunfish).
- The extent of river sampled was quite finite involving three distinct reaches – immediately upstream of the facility, adjacent to the facility and immediately downstream. All samples were collected in close proximity to the river bank with the intent of evaluating areas of potentially greatest impact.



WFO3 - Reach 3	
Channel Depth	Bluegill Sample
CGMN-F01-3IPW01	CGMN-F01-3LW01
CGMN-F01-3IPW02	CGMN-F01-3LW02
CGMN-F01-3IPW03	CGMN-F01-3LW03
CGMN-F01-3IPW04	CGMN-F01-3LW04
CGMN-F01-3IPW05	CGMN-F01-3LW05
CGMN-F01-3IPF01	CGMN-F01-3LW06
CGMN-F01-3IPF02	CGMN-F01-3LW07
CGMN-F01-3IPF03	CGMN-F01-3LW08
CGMN-F01-3IPF04	CGMN-F01-3LW09
CGMN-F01-3IPF05	CGMN-F01-3LW10

WFO3 - Reach 3	
Channel Depth	Bluegill Sample
CGMN-F01-3IPW01	CGMN-F01-3LW01
CGMN-F01-3IPW02	CGMN-F01-3LW02
CGMN-F01-3IPW03	CGMN-F01-3LW03
CGMN-F01-3IPW04	CGMN-F01-3LW04
CGMN-F01-3IPW05	CGMN-F01-3LW05
CGMN-F01-3IPF01	CGMN-F01-3LW06
CGMN-F01-3IPF02	CGMN-F01-3LW07
CGMN-F01-3IPF03	CGMN-F01-3LW08
CGMN-F01-3IPF04	CGMN-F01-3LW09
CGMN-F01-3IPF05	CGMN-F01-3LW10

WFO1 - Reach 1	
Channel Depth	Bluegill Sample
CGMN-F01-1IPW01	CGMN-F01-1LW01
CGMN-F01-1IPW02	CGMN-F01-1LW02
CGMN-F01-1IPW03	CGMN-F01-1LW03
CGMN-F01-1IPW04	CGMN-F01-1LW04
CGMN-F01-1IPW05	CGMN-F01-1LW05
CGMN-F01-1IPF01	CGMN-F01-1LW06
CGMN-F01-1IPF02	CGMN-F01-1LW07
CGMN-F01-1IPF03	CGMN-F01-1LW08
CGMN-F01-1IPF04	CGMN-F01-1LW09
CGMN-F01-1IPF05	CGMN-F01-1LW10

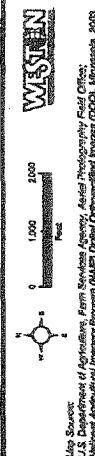


FIGURE 2-1
AUGUST 2005 FISH SAMPLES
3M COTTAGE GROVE, MN FACILITY

Table 2-1
Fish Whole Body Tissue Samples

Reach 1 - Whole Body Samples				
Sample ID	Common Name	Total Length (mm)	Fork Length (mm)	Total Weight (g)
CGMN-F01-1IPW01-0-050812	Channel catfish	195	174	54
CGMN-F01-1IPW02-0-050812	Channel catfish	343	295	265
CGMN-F01-1IPW03-0-050812	Channel catfish	445	375	600
CGMN-F01-1IPW04-0-050812	Channel catfish	443	395	596
CGMN-F01-1IPW05-0-050812	Channel catfish	550	485	1617
CGMN-F01-1LMW01-0-050812	Bluegill sunfish	124	120	44
CGMN-F01-1LMW02-0-050812	Bluegill sunfish	135	129	50
CGMN-F01-1LMW03-0-050812	Bluegill sunfish	120	112	37
CGMN-F01-1LMW04-0-050812	Bluegill sunfish	129	120	44
CGMN-F01-1LMW05-0-050812	Bluegill sunfish	120	113	32
Reach 3 - Whole Body Samples				
Sample ID	Common Name	Total Length (mm)	Fork Length (mm)	Total Weight (g)
CGMN-F01-3IPW01-0-050812	Channel catfish	222	191	74
CGMN-F01-3IPW02-0-050812	Channel catfish	335	278	252
CGMN-F01-3IPW03-0-050812	Channel catfish	330	279	250
CGMN-F01-3IPW04-0-050812	Channel catfish	505	439	979
CGMN-F01-3IPW05-0-050812	Channel catfish	552	491	1630
CGMN-F01-3LMW01-0-050812	Bluegill sunfish	142	134	64
CGMN-F01-3LMW02-0-050812	Bluegill sunfish	128	121	46
CGMN-F01-3LMW03-0-050812	Bluegill sunfish	140	133	62
CGMN-F01-3LMW04-0-050812	Bluegill sunfish	132	125	575
CGMN-F01-3LMW05-0-050812	Bluegill sunfish	125	120	45
Reach 5 - Whole Body Samples				
Sample ID	Common Name	Total Length (mm)	Fork Length (mm)	Total Weight (g)
CGMN-F01-5IPW01-0-050812	Channel catfish	562	512	1548
CGMN-F01-5IPW02-0-050812	Channel catfish	397	350	481
CGMN-F01-5IPW03-0-050812	Channel catfish	568	515	1643
CGMN-F01-5IPW04-0-050812	Channel catfish	552	491	1440
CGMN-F01-5IPW05-0-050812	Channel catfish	483	450	1100
CGMN-F01-5LMW01-0-050812	Bluegill sunfish	98	94	19
CGMN-F01-5LMW02-0-050812	Bluegill sunfish	122	118	40
CGMN-F01-5LMW03-0-050812	Bluegill sunfish	100	95	21
CGMN-F01-5LMW04-0-050812	Bluegill sunfish	114	109	34
CGMN-F01-5LMW05-0-050812	Bluegill sunfish	100	95	20

**Table 2-2
Fish Filet Tissue Samples**

Reach 1 - Filet Tissue Samples - Bass/Sunfish					
Sample ID	Common Name	Total Length (mm)	Fork Length (mm)	Total Weight (g)	Sample Weight (g)
CGMN-F01-1MDF01-0-050812	Smallmouth bass	387	367	692	137
CGMN-F01-1MDF02-0-050812	Smallmouth bass	320	300	454	97
CGMN-F01-1MDF03-0-050812	Smallmouth bass	231	220	178	36
CGMN-F01-1MDF04-0-050812	Smallmouth bass	228	215	162	39
CGMN-F01-1MDF05-0-050812	Smallmouth bass	230	220	166	34
CGMN-F01-1LMF01-0-050812	Bluegill sunfish	180	172	155	29
CGMN-F01-1LMF02-0-050812	Bluegill sunfish	155	148	92	19
Reach 3 - Filet Tissue Samples - Bass/Sunfish					
Sample ID	Common Name	Total Length (mm)	Fork Length (mm)	Total Weight (g)	Sample Weight (g)
CGMN-F01-3MDF01-0-050812	Smallmouth bass	160	156	63	26*
CGMN-F01-3MDF02-0-050812	Smallmouth bass	227	218	175	39
CGMN-F01-3MDF03-0-050812	Smallmouth bass	222	213	175	37
CGMN-F01-3LMF01-0-050812	Bluegill sunfish	145	138	65	24*
CGMN-F01-3LMF02-0-050812	Bluegill sunfish	150	140	75	31*
Reach 5 - Filet Tissue Samples - Bass/Sunfish					
Sample ID	Common Name	Total Length (mm)	Fork Length (mm)	Total Weight (g)	Sample Weight (g)
CGMN-F01-5MDF01-0-050812	Smallmouth bass	220	210	158	34
CGMN-F01-5MDF02-0-050812	Smallmouth bass	250	239	274	59
CGMN-F01-5MDF03-0-050812	Smallmouth bass	240	228	214	46
CGMN-F01-5LMF01-0-050812	Bluegill sunfish	140	135	72	29*
CGMN-F01-5LMF02-0-050812	Bluegill sunfish	139	131	69	29*
Reach 1 - Filet Tissue Samples - Channel Catfish					
Sample ID	Common Name	Total Length (mm)	Fork Length (mm)	Total Weight (g)	Sample Weight (g)
CGMN-F01-1IPF01-0-050812	Channel catfish	750	680	4500	861
CGMN-F01-1IPF02-0-050812	Channel catfish	700	630	2800	538
CGMN-F01-1IPF03-0-050812	Channel catfish	540	495	1750	285
CGMN-F01-1IPF04-0-050812	Channel catfish	660	600	2500	428
CGMN-F01-1IPF05-0-050812	Channel catfish	562	500	1750	357

* Both right and left side filets included in sample to provide adequate sample mass for analyses.

Table 2-2
Fish Filet Tissue Samples

Reach 3 - Filet Tissue Samples - Channel Catfish					
Sample ID#	Common Name	Total Length (mm)	Fork Length (mm)	Total Weight (g)	Sample Weight (g)
CGMN-F01-3IPF01-0-050812	Channel catfish	625	570	2250	317
CGMN-F01-3IPF02-0-050812	Channel catfish	640	573	2500	479
CGMN-F01-3IPF03-0-050812	Channel catfish	700	645	3250	528
CGMN-F01-3IPF04-0-050812	Channel catfish	760	710	3500	540
CGMN-F01-3IPF05-0-050812	Channel catfish	640	580	3000	603
Reach 5 - Filet Tissue Samples - Channel Catfish					
Sample ID#	Common Name	Total Length (mm)	Fork Length (mm)	Total Weight (g)	Sample Weight (g)
CGMN-F01-5IPF01-0-050812	Channel catfish	560	500	2000	392
CGMN-F01-5IPF02-0-050812	Channel catfish	670	600	2500	355
CGMN-F01-5IPF03-0-050812	Channel catfish	680	630	3250	646
CGMN-F01-5IPF04-0-050812	Channel catfish	672	630	3250	406
CGMN-F01-5IPF05-0-050812	Channel catfish	620	560	2000	319

* Both right and left side filets included in sample to provide adequate sample mass for analyses.

Table 2-3

Composite Samples

Composite Sample ID and Description	Initial Sample ID
CGMN-F01-1LMFC-0-050812 Reach 1 Bluegill sunfish filet composite	CGMN-F01-1LMF01-0-050812 CGMN-F01-1LMF02-0-050812
CGMN-F01-3LMFC-0-050812 Reach 3 Bluegill sunfish filet composite	CGMN-F01-3LMF01-0-050812 CGMN-F01-3LMF02-0-050812
CGMN-F01-3MDFC-0-050812 Reach 3 Smallmouth bass filet composite	CGMN-F01-3MDF01-0-050812 CGMN-F01-3MDF02-0-050812 CGMN-F01-3MDF03-0-050812
CGMN-F01-5LMWC-0-050812 Reach 5 Bluegill sunfish whole body composite	CGMN-F01-5LMW01-0-050812 CGMN-F01-5LMW02-0-050812 CGMN-F01-5LMW03-0-050812 CGMN-F01-5LMW04-0-050812 CGMN-F01-5LMW05-0-050812
CGMN-F01-5LMFC-0-050812 Reach 5 Bluegill sunfish filet composite	CGMN-F01-5LMF01-0-050812 CGMN-F01-5LMF02-0-050812
CGMN-F01-5MDFC-0-050812 Reach 3 Smallmouth bass filet composite	CGMN-F01-5MDF01-0-050812 CGMN-F01-5MDF02-0-050812 CGMN-F01-5MDF03-0-050812

Table 2-4
Mississippi River
Whole Fish Results, ppb (wet weight)

Reach	Sample	Total Length, mm	Total Weight, g	PFOA, ng/g	PFOS, ng/g	PFBS, ng/g	PFHS, ng/g
1	Channel catfish 1	195	54	0.810	18.3	0.734	ND
1	Channel catfish 2	343	256	0.971	32.2	0.564	ND
1	Channel catfish 3	445	600	1.00	17.0	ND	ND
1	Channel catfish 4	443	596	1.04	16.1	ND	ND
1	Channel catfish 5	550	1617	0.881	11.0	ND	ND
1	Bluegill sunfish 1	124	44	1.52	46.8	3.63	ND
1	Bluegill sunfish 2	135	50	1.05	33.5	2.35	ND
1	Bluegill sunfish 3	120	37	1.03	75.4	2.33	ND
1	Bluegill sunfish 4	129	44	1.33	34.6	0.992	ND
1	Bluegill sunfish 5	120	32	1.07	34.5	0.500	ND
5	Channel catfish 21	562	1548	1.41	54.4	ND	ND
5	Channel catfish 22	397	481	1.93	126	ND	0.942
5	Channel catfish 23	568	1643	2.48	320	ND	1.05
5	Channel catfish 24	552	1440	2.54	125	ND	ND
5	Channel catfish 15	483	1100	2.30	39.9	ND	ND
5	Bluegill sunfish 15	98	19	NR	367	ND	ND
5	Bluegill sunfish 16	122	40	NR	381	5.99	ND
5	Bluegill sunfish 17	100	21	NR	629	ND	ND
5	Bluegill sunfish 18	114	34	NR	562	24.0	ND
5	Bluegill sunfish 19	100	20	NR	390	ND	ND
5	Composite - Bluegill sunfish 15,16,17,18 & 19	NA	NA	0.600	NA	NA	NA

Notes:

Sample results reported on a wet weight basis

In instances where a sample and sample duplicate pair contain a numerical result and a non-detect result, the numerical value is presented.

NR = Not reported due to quality control result failures

ND = Not detected at or above the Limit of Quantitation (LOQ) which is 0.5 ng/g (2.5 ng/g for 1 g sample)

NA = Not a target analyte for composite sample analyses

Table 2-5

**Mississippi River Fish
Filet Results, ppb (wet weight)**

Reach	Sample	Total Length, mm	Total Weight, g	PFOA, ng/g	PFOS, ng/g	PFBS, ng/g	PFHS, ng/g
1	Channel catfish 6	750	4500	ND	2.97	ND	ND
1	Channel catfish 7	700	2800	ND	2.34	ND	ND
1	Channel catfish 8	540	1750	ND	4.02	ND	ND
1	Channel catfish 9	660	2500	ND	9.08	ND	ND
1	Channel catfish 10	562	1750	ND	11.7	ND	ND
1	Smallmouth bass 1	387	692	0.948	178	ND	ND
1	Smallmouth bass 2	320	454	0.972	89.8	ND	ND
1	Smallmouth bass 3	231	178	0.856	19.0	ND	ND
1	Smallmouth bass 4	228	162	0.796	53.2	ND	ND
1	Smallmouth bass 5	230	166	0.904	45.0	ND	ND
1	Bluegill sunfish 6	180	155	NR	32.3	ND	ND
1	Bluegill sunfish 7	155	92	NR	30.3	ND	ND
1	Composite - Bluegill sunfish 6 & 7	NA	NA	ND	NA	NA	NA
5	Channel catfish 26	560	2000	0.622	69.2	ND	ND
5	Channel catfish 27	670	2500	ND	11.7	ND	ND
5	Channel catfish 28	680	3250	1.16	2.86	ND	ND
5	Channel catfish 29	672	3250	1.71	42.0	ND	ND
5	Channel catfish 30	620	2000	1.34	7.74	ND	ND
5	Smallmouth bass 9	220	158	NR	290	3.33	ND
5	Smallmouth bass 10	250	274	NR	5150	ND	ND
5	Smallmouth bass 11	240	214	NR	884	ND	ND
5	Composite - Smallmouth bass 9, 10 & 11	NA	NA	1.04	NA	NA	NA
5	Bluegill sunfish 20	140	72	NR	331	ND	ND
5	Bluegill sunfish 21	139	69	NR	330	ND	ND
5	Composite - Bluegill sunfish 20 & 21	NA	NA	0.504	NA	NA	NA

Notes:

Sample results reported on a wet weight basis

In instances where a sample and sample duplicate pair contain a numerical result and a non-detect result, the numerical value is presented.

NR = Not reported due to quality control result failures

ND = Not detected at or above the Limit of Quantitation (LOQ) which is 0.5 ng/g (2.5 ng/g for 1 g sample)

NA = Not a target analyte for composite sample analyses